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Technical Memorandum

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To: Maine Turnpike Authority

From: Rodney Emery, PE, PTOE, FITE

Subject: Southern Toll Plaza
Technical Memorandum on Alternatives Analysis

INTRODUCTION

This technical memorandum was prepared by Jacobs Engineering Group (Jacobs) in accordance with the contract scope of work with Maine Turnpike Authority (MTA) for Task Order 1, Amendment 2 – Southern Toll Plaza Preliminary Engineering and Permitting Services dated March 12, 2015. The scope of work consists of engineering and permitting services related to alternatives evaluation and conceptual design for replacement of the York Toll Plaza. Alternatives for open road tolling (ORT) facilities were identified and developed for conceptual design.

This technical memorandum summarizes the methods and results of the alternatives analysis. The categories analyzed include Engineering/Safety, Environmental, Abutter Impacts, Logistics during Construction and Costs/Financials. The analysis includes a screening matrix that summaries the advantages or disadvantages, quantified impacts, and qualitative comments of each alternative based on the criteria identified in the evaluation matrix. For each resource category, the impacts were assigned a relative rating. The relative rating is then shown by color to help visualize and show trends when comparing locations and when comparing dissimilar resources. The least impact range is green, and the most impact range is orange, with yellow representing the middle range. The alternate sites can be compared both individually by resource, and collectively between resources. A complete and thorough evaluation of each alternative must meet the project's purpose statement. This technical memorandum was developed to provide the findings of the alternatives evaluated and recommendation for the Southern Toll Plaza.

The alternatives identified in this memorandum are at mile 7.3, mile 8.1, mile 8.8, mile 10.0 and mile 13.2. The No Build alternative was not evaluated because it does not meet the project purpose and need of the project. Split plaza was not reviewed as part of the alternative evaluations; only the single toll plaza configuration was used. Given the small impacts of a single plaza, primarily to abutters and the natural environment, there is no advantage to split plaza design. A split plaza design would in affect increase the impacts to the number of abutters and potentially wetlands, streams and vernal pools located on two sides on the turnpike rather than just the one side. A split plaza design would increase staff and maintenance requirements by the fact that two separate maintenance facilities, parking areas and access roads would be required to service the two locations rather than the one. Here are some of the operational disadvantages to a split plaza:

- A split plaza could double the required number of supervisors;
- A split plaza would increase the number of toll attendants because they would no longer be able to switch between the northbound and southbound directions to accommodate peak flows;

- A split plaza would require two sets of utilities;
- A split plaza would require two fully equipped support buildings;
- A split plaza would require up to four turnarounds for winter maintenance, whereas a single plaza would require up to two.

The direct impact line is the cut or fill slope limit shown on the conceptual alternative plans.

See Figures 1 through Figure 5 for conceptual plans, profiles and typical section of mile 7.3, mile 8.1, mile 8.8, mile 10.0 and mile 13.2. See Appendix A for the Evaluation Matrix, Appendix B for the Project Purpose Statement and Appendix C for Recommended Alternative.

ENGINEERING / SAFETY

The following engineering guidelines were used for the alternative designs evaluated in this memo:

- "A Policy on Geometric Design of Highways and Streets" (AASHTO, 2011)
- "Manual on Uniform Traffic Control Devices" (MUTCD, Federal Highway Administration, 2009)
- "State of the Practice and Recommendations on Traffic Control Strategies at Toll Plazas" (Federal Highway Administration, 2006)
- "Roadside Design Guide" (AASHTO, 2011)

The purpose of national engineering guidelines is to provide guidance based on established practices that are supplemented by recent research. Below are excerpts from various guidelines highlighting their purpose as well as how to implement the guidelines.

1. <u>A Policy on Geometric Design of Highways and Streets (AASHTO, 2011):</u>
   Page xli: The intent of this policy is to provide guidance to the designer by referencing a recommended range of values for critical dimensions. Good highway design involves balancing safety, mobility, and preservation of scenic, aesthetic, historic, cultural, and environmental resources. This policy is therefore not intended to be a detailed design manual that could supersede the need for the application of sound principles by the knowledgeable design professional.

2. <u>Manual on Uniform Traffic Control Devices (MUTCD, FHWA, 2009)</u>
   Page 1: The purpose of traffic control devices, as well as the principles for their use, is to promote highway safety and efficiency by providing for the orderly movement of all road users on streets, highways, bikeways, and private roads open to public travel throughout the Nation.

   Page 2: Uniformity of devices simplifies the task of the road user because it aids in recognition and understanding, thereby reducing perception/reaction time. Uniformity assists road users, law enforcement officers, and traffic courts by giving everyone the same interpretation. Uniformity assists public highway officials through efficiency in manufacture, installation, maintenance, and administration. Uniformity means treating similar situations in a similar way. The use of uniform traffic control devices does not, in itself, constitute uniformity. A standard device used where it is not appropriate is as objectionable as a non-standard device; in fact, this might be worse, because such misuse might result in disrespect at those locations where the device is needed and appropriate.

Page 4: This manual describes the application of traffic control devices, but shall not be a legal requirement for their installation.

3. <u>"State of the Practice and Recommendations on Traffic Control Strategies at Toll Plazas" (Federal Highway Administration, 2006)</u>
Page 1: The purpose and focus of this report is to develop guidelines for designing and implementing traffic control strategies and devices at toll plazas that, for example, inform drivers which lanes to use for specific methods of payment, reduce speed variance, discourage lane changing and properly install equipment and devices.
Page 1: The goal is to achieve a consistent strategy for handling potential points of conflict, controlling flow of various vehicle types and conveying information at toll plazas so that safety and operations are enhanced, better efficiency and economy of design are achieved, and motorist recognition and comprehension are improved. This must be accomplished in consideration of the fact that each toll facility may desire its own unique identity.

4. <u>Roadside Design Guide (AASHTO, 2011):</u>
Page xxvii: A second noteworthy point is that this book is a guide. It is not a standard, nor is it a design policy. It is intended to be used as a resource document from which individual highway agencies can develop standards and policies. Although much of the material in the guide can be considered universal in its application, several recommendations are subjective in nature and may need modification to fit local conditions. However, it is important that significant deviations from the guide be based on operational experience and objective analysis.

Evaluation of alternatives will be based on these design policies, guides, reports and manuals. The overriding theme throughout these documents is uniformity of design while applying these guidelines and best practices. The evaluation matrix is intended to provide a comprehensive summary for balancing safety, mobility, and preservation of scenic, aesthetic, historic, cultural, and environmental resources.

A. <u>Horizontal Alignment</u> (Column 1)

FHWA guidelines state the toll plaza should be located on a tangent section of highway such that motorists will be able to see the plaza, while driving at posted speeds with adequate stopping sight distance before the queue zone. Horizontal curvature within the plaza area will limit the sight distance affecting the lane choice decision time a driver has. Curvature approaching the tollbooths has an operational impact on the lanes utilized by approaching traffic. Vehicles tend to travel more toward the outside of a curve resulting in less traffic using booths on inside of curve. There is less impact if the curvature is prior to decision points and tangent through the plaza.

Low-range of impacts is applied to alternatives with tangent section through plaza and approaches to split point. Mid-range impacts are applied to alternatives with a curve on approach to split point and a tangent through the plaza. High-range impacts are locations with a curve through the plaza.

Alternatives at mile 8.8 and mile 13.2 are rated as low-range impacts. Alternatives at mile 8.1 and mile 10.0 are rated as mid-range impacts due to curvature at approaches to split point, and mile 7.3 is rated as high-range impact due to curvature through the plaza.

B. Vertical Alignment (Column 2)

FHWA guidelines state a toll plaza should be at the crest of a profile grade which results in sight distance advantages and plaza operations benefits from gravitational forces in slowing vehicles approaching the plaza and accelerating vehicles departing the plaza. A consideration should be made for commercial vehicles. The recommended approach and departure grades are between positive 1% and 2%. The vertical alignment has been separated into three categories to better differentiate the alternatives. The first category rates if the cash toll plaza is at a high point. This rating is a general comparison to show if the existing profile complies with guidelines from State of the Practice and Recommendations on Traffic Control Strategies at Toll Plazas. Low-range of impacts is applies to alternatives with an existing profile crest at the location of cash plaza. Mid-range impacts are applied to alternatives located near a crest and with some minor profile modifications to cash lanes, could be constructed maintaining ORT lanes on existing pavement. High-range impacts are locations in a sag vertical curve or would need major grade changes to create a crest vertical curve at the cash plaza. Alternative at mile 8.8 and mile 13.2 are rated as low-range impact due to the cash plaza being close to the existing profile high point. Alternatives at mile 7.3, mile 8.1 and mile 10.0 are rated as mid-range impacts due to the need for a profile adjustment. No alternative is rated as high-range of impacts. The second category rates the approach grades to the plaza. Approach grades are evaluated starting at the point where two lanes begin to widen for cash plaza and ends where traffic exiting plaza forms two lanes. Low-range of impacts is applied to alternatives with ideal approach and departure grades between positive 1% and 2%. Mid-range impacts are applied to alternatives with approach or departure grades between positive 0.5% and 1% or between positive 2% and 3%. High-range impacts are applied to alternatives with approach or departure grades less than positive 0.5% or greater than 3%. Alternative at mile 8.8 is rated as low-range impact. Alternatives at mile 8.1 and mile 13.2 are rated as mid-range impacts. Mile 7.3 and mile 10.0 are rated high-range impact. The third category has no rating. This category shows the alternatives that use the existing pavement for the ORT lanes with no modification to existing turnpike profile. These categories are based on guidelines. After selection of an alternative location, continued engineering judgments will determine if modification to the existing vertical alignment will be needed.

C. Sight Distance (Column 3)

There are two different types of sight distance to consider, stopping sight distance (SSD) and decision sight distance (DSD). AASHTO defines SSD to be sufficiently long enough to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. A typical example would be the sight distance required to react and stop prior to vehicles stopped at the cash plaza to pay toll. AASHTO defines DSD as the distance needed for a driver to detect an unexpected or otherwise difficult to perceive information source or condition in a roadway environment that may be visually cluttered, recognize the condition or its potential threat, select an appropriate speed and path, and initiate and complete complex maneuvers. AASHTO specifically mentions toll plazas as an example of where DSD is needed.

DSD is used at locations whenever there is a likelihood for error in either information reception, decision making, or control actions. DSD is needed prior to the split between highway speed and conventional toll plaza lanes. The driver approaching the toll facility will make a decision to proceed through conventional toll plaza or ORT lanes, and following signage to determine which lane is appropriate.

AASHTO guidelines have been used to evaluate each alternative. The evaluation of each alternative consists of decision sight distances and stopping sight distances at multiple locations both northbound and southbound. The existing turnpike does not meet current guidelines in all locations and upgrading the turnpike to meet current design guidelines would require significant work. AASHTO states "The fact that new design values are presented herein does not imply that existing streets and highways are unsafe, nor does it mandate the initiation of improvement projects.", "Specific site investigations and crash history analyses often indicate that the existing design features are performing in a satisfactory manner." A low-range of impacts is applied when decision sight distances meet or exceed the minimum length, mid-range impacts are applied when one or two decision sight distances do not meet the design speed but do meet a slightly lower design speed (5 mph less), high-range impacts are applied when one or more decision sight distances do not meet design speed and need to be reduced by 10 mph or more.

Alternatives at mile 7.3, mile 8.1, mile 10.0 are all rated as mid-range impacts. Alternatives at mile 8.8 and mile 13.2 are rated as low-range impacts.

D. Separation from Interchange (Column 4)

AASHTO recommends separation between interchanges to 1 mile minimum for urban and 3 miles minimum for rural highways. FHWA references the AASHTO standard and states this should remain the guideline for selection of new mainline toll plaza sites. AASHTO defines urban as an area within a set of boundaries with over 5,000 in population. The population in York is over 5000, therefore a 1 mile minimum for urban highways will be used for this evaluation.

Low-range of impacts is applied to interchanges greater than 1 mile from plaza. Mid-range impacts are applied to interchanges greater than 1 mile from plaza and ramp tapers within 1 mile. High-range impacts are locations with less than 1 mile of separation between plaza and interchange.

Alternatives at mile 8.8, mile 10.0, mile 13.2 are all rated as low-range impacts. Alternative at mile 8.1 is rated as a mid-range impact due to proximity of exit 7, and mile 7.3 is rated as high-range impact.

E. Historic Crash Data (Column 5)

MaineDOT has a system of classifying whether or not a particular roadway location is considered a *high crash location* (HCL). MaineDOT's Crash Records Section identifies all reported crashes that have property damage in excess of $1,000, or where there has been personal injury. To retain and categorize this information, MaineDOT has established a "Node and Element System." This system assigns a four or five digit node number to each intersection, major bridge, railroad crossing, and crossing of town, county, or urban compact lines as a *node*. The segments of road that connect the nodes are referred to as *elements or links*. As crashes are received by MaineDOT, the information is assigned to the corresponding element or node corresponding to the geographic location.

A designation of HCL warrants an analysis for patterns of crashes associated with possible geometric issues. If crash history of a particular element or link or node meets two criteria, then MaineDOT would classify it as a HCL. The two (2) criteria that must be met are:

- The element/link or node must have eight (8) or more reported crashes over the past 3 years
- The element/link must have a "critical rate factor" (CRF) greater than 1.00. (The critical rate factor relates the crash rate at a particular element/link or node to the statewide crash rate average for a similar type of facility).

It should be noted that the critical rate factors are calculated differently between nodes and links, since nodes are essentially intersections (i.e. spot locations) and links have length of roadway.

In early and mid-2015, Jacobs coordinated with the Safety office of MaineDOT to obtain crash data for the Maine Turnpike in the study area. The study area consists of the existing York Toll Plaza (mile 7.3), mile 8.1, mile 8.8, mile 10.0, and mile 13.2. The Safety Office provided crash information relating to the study area for the last three years of available data, which are 2012 to 2014. As of early 2015, the State of Maine contains 382 high crash locations (HCL) nodes (i.e. intersections, bridges, etc.) and 483 HCL links (i.e. roadway segments).

The toll plaza at mile 7.3 is listed as a high-crash location (HCL), and the other four sites are not considered a HCL. However, to provide a more in-depth view for comparison purposes with the other sites, individual crashes identified by mile post location were reviewed and summarized. Any crashes within 0.5 miles of the subject site were deemed to be affiliated with the site. For example, any crashes between 8.3 and 9.3 were attributed to the 8.8 site (i.e, plus/minus 0.5 miles). Due to the crash area of influence for each site, some crashes were attributed to 2 sites.

It should be noted that this methodology was developed in lieu of using MaineDOT's node and link system, since some links would represent more than one site and have ambiguous value. Links in the MaineDOT system are directional and have irregular lengths and node placements, relative to the reverse direction.

For this evaluation, low-range impacts to high-range impacts were identified for each of the considered sites. Any sites containing 30 or more crashes were classified as a *high-range impact* location. Any sites containing between 20 and 30 crashes were classified as a mid-*range impact* location. Sites containing less than 20 crashes were designated as *low-range impact*. Table 1 shows a summary of the crash impacts for the 5 locations under this evaluation.

Table 1: Crash Impacts (2012-2014 Data)

MaineDOT Crash History (2012-2014)	NB	SB	Total
MaineTurnpike, Mile 7.3	18	25	43
MaineTurnpike, Mile 8.1	8	15	23
MaineTurnpike, Mile 8.8	3	10	13
MaineTurnpike, Mile 10.0	7	14	21
MaineTurnpike, Mile 13.2	10	8	18

As shown in Table 1, mile 7.3 is classified as a high-range impact location since it has over 30 crashes over the course of 3 years. This high-range impact classification can be primarily attributed to the proximity of the York interchange and the ramp merging, diverging, and weaving movements. It is also designated as a high crash location (HCL) by MaineDOT. Mile 8.8 and mile 13.2 are classified as low-range impacts since they have less than 20 crashes over the course of 3 years. Mile 8.8 has the lowest crashes over the course of 3 years.

While individual crash records were examined as part of the crash analysis, there is no definitive means of determining the number of crashes that would have occurred if there were no toll plaza or no interchange in close proximity. Assuming (conservatively) that 50% of the crashes at the toll plaza are due to other reasons besides the toll plaza or interchange, the crash rates within the plaza limits would still be higher than the statewide average.

The weaving issue at the existing Toll Plaza is a multi-faceted problem. It is a function of four characteristics that contribute to increased crashes and decreased operational efficiency:

1) Close proximity of an interchange
2) Horizontal curve
3) Elevation of the plaza site (bottom of a hill)
4) Proximity of a bridge.

The existing Toll Plaza is located within 700 feet of the Exit 7 interchange.

- This causes merging and weaving complications within the Plaza limits due to some vehicles navigating to the interchange and the majority vehicles continuing along I-95.
- Also, the close proximity of the existing Toll Plaza causes inefficient usage of toll lanes, where vehicle queues begin to compile before overall toll capacity is reached.

The existing Toll Plaza is situated on a horizontal curve.

- The southbound traffic tends to drift to the outside of the curve which reduces utilization of all tollbooths (i.e., the left side booths become over-utilized and the right side booths become under-utilized).
- The curve hinders the sight of the toll booths for the southbound vehicles until approximately 1,500 feet before reaching the existing toll plaza. This doesn't allow for adequate time to make appropriate and necessary lane changes which compromises safety.

The existing Toll Plaza is located at the base of a hill.

- A heavy vehicle having a brake malfunction poses as a safety concern for the Toll Plaza, where a heavy vehicle may strike the plaza in such an event.
- There are drainage issues, pavement "shoving", leading to excess rutting and the potential for hydroplaning.
- The excess noise affiliated with trucks decelerating before the toll plaza and accelerating after the toll plaza.

The existing Toll Plaza is less than ½ mile from the Chases Pond Road Bridge over I-95

- The bridge hinders the sight of the merging on-ramp traffic at Exit 7 from northbound vehicles
- Reduces the visibility of queuing traffic at the toll booths in the northbound direction
- Information overload with signage due to the proximity of the interchange and the Toll Plaza is another issue.

F. <u>Geotechnical</u> (Column 6)

The geotechnical study for the alternative at mile 7.3 (400 feet north of existing plaza) was based on subsurface field investigations performed in 2014 and 2015, while the study for the other four alternatives at miles 8.1, 8.8, 10.0 and 13.2 were based on site observations along with geologic information available from the Maine Office of GIS. For each alternative, the project impact area is roughly 1.5 miles long with varying geotechnical conditions within this corridor. The proposed construction at each location was considered in the evaluation and includes a new tunnel, toll booth, highway widening, and administration building and parking lot.

The following generalized value rankings for the Geotechnical sub-category are based on the following:

- Green (Low Impact) represents mostly stable granular soils, no apparent groundwater impact, and no apparent bedrock excavation (Ledge). No alternative falls into this category.

- Yellow (Medium Impact) represents ledge excavation, possible unstable soils, minor groundwater impacts, and possible need for retaining walls to limit impacts on adjacent wetland areas. Four out of the five alternatives fall into this category.
- Orange (High Impact) represents soft and compressible soils, impacts due to high groundwater elevation, and no apparent ledge. One of the five alternatives falls into this category.

Findings of Selected Alternatives:

1. Mile 7.3: The subsurface conditions of concern mainly consist of a thick deposit of soft marine clay which has been settling since the roadway construction in 1947, high groundwater elevations, and possible unstable soils adjacent to low-lying wetland areas. The assigned impact ranking for this alternative is High.
2. Mile 8.1: The subsurface conditions of concern include shallow bedrock and rock outcrops (observed on the west side of the roadway), possible clay material (based on the Maine GIS information) above bedrock, and possible unstable soils at adjacent wetland areas. The assigned impact ranking for this alternative is Medium.
3. Mile 8.8: The subsurface conditions of concern include shallow bedrock and rock outcrops (observed on the west side of the roadway), and possible unstable soils at adjacent wetland areas. The assigned impact ranking for this alternative is Medium.
4. Mile 10.0: The subsurface conditions of concern include shallow bedrock and rock outcrops (observed on the west side of the roadway), possible unstable soils at adjacent wetland areas, and possible need of retaining wall to limit impacts on the adjacent wetland soils along the northeast side of the proposed roadway alignment where the road is to be widened and filled in. The assigned impact ranking for this alternative is Medium.
5. Mile 13.2: The subsurface conditions of concern include shallow bedrock and rock outcrops (observed on both the west and east sides of the roadway), and possible unstable soils at adjacent wetland areas. The assigned impact ranking for this alternative is Medium.

ENVIRONMENTAL

An extensive review of the corridor yielded a series of alternative sites between mile 8.1 and 13.2 including a site near the existing toll plaza location in York that warranted further evaluation. A significant effort was expended to gather updated environmental data in the form of on the ground surveys of wetlands, vernal pools and streams as well as update information on floodplains, cultural/historical resource impacts and potential threatened/endangered species habitats. The environmental findings and screening of the alternatives developed was prepared in a separate report titled "Environmental Screening Report for Potential Southern Maine Toll Plaza Locations" dated October 8, 2015.

A. Wetland Impacts (Column 7)

The following provides a general overview of each alternative location evaluated. Estimated wetland impacts are based upon field mapped wetlands and area calculations of direct impacts from limits of cut/fill completed as part of the conceptual design.

1. Mile 7.3: The study area identified a large wetland complex located on the west and east sides of the turnpike. Wetlands in this area were identified as forested wetland and wetlands of special significance (WOSS). The wetland complex is also identified on the York Shoreland Zoning Map

as a Shoreland Zone including Resource Protection. The expected wetland alteration at this location is 5.5 acres.

2. Mile 8.1: The study area identified a small forested wetland area located on the west and east sides of the MTA. Wetlands in this area were identified as forested wetland and WOSS (Vernal Pools). These wetlands are both shown as Resource Protection on the York Shoreland Zoning Map. There is also Stream Protection identified on the Shoreland Zoning Map on both sides of the turnpike. The expected wetland alteration at this location is 1.0 acres.
3. Mile 8.8: The study area identified several small forested wetland areas located on the west and east sides of the MTA. Wetlands in this area were generally identified as forested wetland. There is an emergent wetland at mile 9.0. The emergent wetland and the significant vernal pools are considered WOSS. There appears to be Stream Protection on the west side and Resource Protection on the east side shown on the York Shoreland Zoning Map. Wetland alterations at this location will include 1.0 acres of wetland alteration.
4. Mile 10.0: The study area identified forested wetlands with several significant vernal pools. The wetlands containing significant vernal pools are considered WOSS. The wetland impacts at this location are 1.0 acres.
5. Mile 13.2: The study area identified small wetlands on the west side of the turnpike and no wetlands on the east side at mile 13.2. At mile 13.4, there is a potential stream on the east side of the turnpike. Wetlands in this area were identified as forested wetlands. There is Stream Protection on the west side of the turnpike as shown on the York Shoreland Zoning Map near mile 13.0. The expected wetland alterations at this location is 0.7 acres.

B. <u>Impacts to Maine DEP Wetlands of Special Significance</u> (Column 8)

The Maine Department of Environmental Protection has established regulations identifying certain wetlands containing high functional value as “Wetlands of Special Significance” (WOSS). WOSS require higher level permitting considerations at the State permit level.

1. Mile 7.3: Wetlands in this area were identified as forested wetland and wetlands of special significance. The WOSS are associated with the Little River and 100-year floodplain. These wetlands are within an area of Resource Protection on the York Shoreland Zoning Map. Approximately 1.9 acres of WOSS would be altered.
2. Mile 8.1: Wetlands in this area were identified as forested wetland and WOSS (Significant Vernal Pool). These wetlands are both shown as Resource Protection on the York Shoreland Zoning Map. There is also Stream Protection identified on the Shoreland Zoning Map on both sides of the turnpike. Approximately 0.1 acres of WOSS would be altered.
3. Mile 8.8: There is an emergent wetland at mile 9.0 and vernal pools identified in the study area. The emergent wetland and the significant vernal pools are considered WOSS. There also appears to be Stream Protection on the west side and Resource Protection on the east side shown on the York Shoreland Zoning Map. Approximately 0.8 acres of WOSS would be altered.
4. Mile 10.0: The wetlands containing significant vernal pools are considered WOSS. The expected WOSS impacts are approximately 1.0 acres.
5. Mile 13.2: At mile 13.4, there is a stream on the east side of the turnpike. Wetlands in this area were identified as forested wetlands. There is a second steam on the west side of the turnpike as shown on the York Shoreland Zoning Map around mile 12.9. The expected WOSS impacts are approximately 0.2 acres.

C. <u>Wetlands Relative Function and Value</u> (Column 9)

While all wetlands have functional value, the importance of the wetlands functions and values will depend on a number factors. The USACE has established guidelines for evaluation and assessing wetland functions and values through the "Highway Methodology Approach," that identifies 13 criteria. Criteria includes Groundwater Recharge/Discharge, Floodflow Alteration, Production Export, Sediment/Toxicant Retention, Nutrient Removal, Sediment/Shoreline Stabilization, Wildlife Habitat, Recreation, Uniqueness/Heritage, Visual Quality/Aesthetics and Endangered Species Habitat.

In an effort to understand the relevant significance of the wetlands at each potential tolling location, an assessment of comparative functions and values was completed and categorized as high, average, and low based upon extent of impacts and value of the resources. The overall extent of wetland impacts at each location was given a higher weight since permitting will typically look for avoidance and minimization of impacts. The following functional assessment is based upon best professional judgment of the field data collected and desktop analysis summarized using the Highway Methodology Approach.

1. Mile 7.3: This alternative includes wetlands 3, 4, 24, and 25 as shown in Environmental Screening Report. The wetlands adjacent to the existing toll booth are classified as seasonally saturated, broad-leaved deciduous forested wetlands (PFO1E). These areas are considered Red Maple (Acer rubrum) swamps. The dominant vegetative species are red maple, white pine (Pinus strobus), highbush blueberry (Vaccinum corymbosum), speckled alder, cinnamon fern, sensitive fern, and royal fern. These wetlands are large forested wetlands that contain the Little River with associated floodplain wetlands. A portion of these floodplain wetlands are shown on the FEMA flood map as being located within the 100-year floodplain. According to the county soil survey, the soils within the 100-year floodplain are very poorly drained Chocorua peat which generally includes several feet of organic soil. The remaining wetlands are classified as poorly drained Scantic silt loam.

   The primary functions and values of these wetlands include groundwater discharge, floodflow alteration, sediment/toxicant retention, and nutrient removal. These areas are very low in the watershed and the flow through these wetlands is very slow. The fine-textured and organic soils promote groundwater discharge in these wetlands due to slow vertical flow. The Little River becomes more defined east of the turnpike showing that water from this wetland channelizes as it travels east. The floodflow alteration function is high due to the vast size of the wetland and the amount of water that it can retain. Sediment/toxicant retention and nutrient removal is high near the turnpike due to the added stormwater runoff and contaminants from the pavement. Due to the extent of wetland impacts (over 5 acres) and their relative functions/values, these wetlands were assessed a high value as compared to resources corridor-wide.

2. Mile 8.1: This alternative includes wetlands 8, 21, and 22 as shown in Environmental Screening Report. These wetlands are classified as seasonally saturated, broad-leaved deciduous forested wetlands (PFO1E). The dominant vegetative species are red maple, gray birch, highbush blueberry, speckled alder, cinnamon fern and sensitive fern. There is a stream that enters wetland 21 via a 48-inch concrete culvert under the turnpike. The Town of York has a Stream Protection District around this stream on both sides of the turnpike. There is an undefined floodplain shown on the FEMA flood map in the area east of the turnpike in wetlands 21 and 22, which is identified as a 500-year flood. According to the county soil survey, the soils within the wetlands are very poorly drained Chocorua mucky peat and poorly drained Brayton fine sandy loam.

The primary functions and values of these wetlands include groundwater discharge, sediment/toxicant retention, and nutrient removal. These wetlands serve as groundwater discharge areas as they contain organic soils and are surrounded by soils with shallow ledge depths. Sediment/toxicant retention and nutrient removal is high near the turnpike due to the added stormwater runoff and contaminants from the pavement. They are flat and contain ponded conditions during much of the year which allows for sediment/toxicant retention as well as nutrient removal from the turnpike. The expected wetland impacts are approximately 1 acre in this area and collectively with the relative functional assessment was assigned an average value.

3. Mile 8.8: This alternative includes wetlands 9-11 and 16-18 as shown in the Environmental Screening Report. Wetland 11 is classified as a seasonally flooded, persistent emergent wetland (PEM1C) dominated by broad-leaved cattail. The remaining wetlands are seasonally saturated, broad-leaved deciduous forested wetlands (PFO1E). The dominant vegetative species are red maple, white pine, highbush blueberry, speckled alder, cinnamon fern and sensitive fern. The east side of the turnpike is shown as Resource Protection on the Town of York shoreland zoning map. According to the county soil survey, the soils in wetland 11 are mapped as very poorly drained Chocorua mucky peat and the remaining forested wetlands were not mapped as wetland soil.

   The primary functions and values of the emergent wetland include groundwater discharge, floodflow alteration, sediment/toxicant retention, nutrient removal, and wildlife habitat. This marsh is located in the bottom of the watershed with many wetlands above it and shallow to bedrock soils in the adjacent upland. The value for sediment/toxicant retention and nutrient removal is high in this marsh but currently does not function accordingly due to a natural hill between the turnpike and the wetland. The forested wetlands on the east side of the turnpike function well for sediment/toxicant retention and nutrient removal. The wetlands in this area serve as wildlife habitat since portions of it may contain Ribbon Snake and Spotted Turtle habitat. There are documented vernal pools in the forested wetlands as well. The expected wetland impacts are approximately 1 acre in size and collectively with the relative functional assessment was assigned an average value.

4. Mile 10.0: This alternative includes wetlands 35, 43, and 44 as shown in Environmental Screening Report. These wetlands are classified as seasonally saturated broad-leaved deciduous forested wetlands (PFO1E). The dominant vegetative species are red maple, yellow birch, highbush blueberry, speckled alder, cinnamon fern and sensitive fern. Wetland 43 on the east side of the turnpike is shown as Resource Protection on the Town of York shoreland zoning map. According to the county soil survey, the soils in the Resource Protection zone are poorly drained Raynham silt loam and the remaining wetland soils are poorly drained Brayton fine sandy loam.

   The primary functions and values of the wetlands include sediment/toxicant retention, nutrient removal, and wildlife habitat. There is a jurisdictional stream which travels under Chases Pond Road into wetland 35 and then under the turnpike where it enters wetland 43 via an 18-inch culvert. Sediment/toxicant retention and nutrient removal is high near the turnpike due to added stormwater runoff and contaminants from the pavement. All of these wetlands contain vernal pools as well as possible Ribbon Snake and Spotted Turtle Habitat. The expected wetland impacts are approximately 1 acre and include over 30,000 square feet of vernal pool impacts. Due to these critical habitat impacts, the relative functional assessment was assigned average value.

5. Mile 13.2: This alternative includes wetlands 38, 39, 47 and 48 as shown in Environmental Screening Report. These wetlands are classified as a seasonally saturated broad-leaved deciduous

forested wetland (PFO1E). The dominant vegetative species are red maple, white pine, highbush blueberry, speckled alder, cinnamon fern and sensitive fern. There is Stream Protection District along Clay Hill Brook which runs through wetland 48 on the west side of the turnpike and wetland 38 on the right side of the turnpike at mile 13.0. According to the county soil survey, the soils in the wetland are classified as very poorly drained Biddeford mucky peat and poorly drained Scantic silt loam.

The primary functions and values of the wetland include floodflow alteration, groundwater discharge, sediment/ toxicant retention, nutrient removal and wildlife habitat. Clay Hill Brook contains a 100-year floodplain on the west side of the turnpike according to the FEMA flood map. The fine-textured soils and shallow ledge allow for groundwater discharge to occur. There are two vernal pools near mile 13.4 which serve as amphibian breeding habitat. There is also a potential stream on the east side of the turnpike running westerly. The expected wetland impacts are approximately 0.7 acres. Comparatively, this study area represented the lowest overall impacts and was assessed a low value as compared to other wetlands.

D. Stream Impacts (Column 10)

Both the MDEP and USACE regulate stream impacts. Depending on the stream’s location, ability to sustain fish and other aquatic species, the relative value of the stream will vary. Regardless of the presence or lack of presence (fish and aquatic species), streams are regulated and require permitting for impacts.

1. Mile 7.3: 360 linear feet of stream would be impacted.
2. Mile 8.1: 50 linear feet of stream would be impacted.
3. Mile 8.8: 80 linear feet of stream would be impacted.
4. Mile 10.0: 160 linear feet of stream would be impacted.
5. Mile 13.2: 140 linear feet of stream would be impacted.

Review of the MDEP Chapter 502 Stormwater Regulations indicated no Urban Impaired Streams are located within the improvement areas.

E. Vernal Pool Impact (Column 11)

“Vernal pools or "spring pools" are shallow depressions that usually contain water for only part of the year. In the Northeast, vernal pools may fill during the fall and winter as the water table rises. Rain and melting snow also contribute water during the spring. Vernal pools typically dry out by mid to late summer. Although vernal pools may only contain water for a relatively short period of time, they serve as essential breeding habitat for certain species of wildlife, including salamanders and frogs. Since vernal pools dry out on a regular basis, they cannot support permanent populations of fish. The absence of fish provides an important ecological advantage for species that have adapted to vernal pools, because their eggs and young are safe from predation by fish.

Species that must have access to vernal pools in order to survive and reproduce are known as "obligate" vernal pool species. In Maine, obligate vernal pool species include wood frogs, spotted and blue-spotted salamanders (two types of mole salamanders) and fairy shrimp. While wood frogs and mole salamanders live most of their lives in uplands, they must return to vernal pools to mate and lay their eggs. The eggs and young of these amphibians develop in the pools until they are mature enough to migrate to adjacent uplands. Fairy shrimp are small crustaceans which spend their entire life cycle in vernal pools, and have adapted to constantly changing environmental conditions. Fairy shrimp egg cases remain on the pool bottom even after all water has disappeared. The eggs can survive long periods of drying and freezing, but will hatch in late winter or early spring when water returns to the pool."

1. Mile 7.3: Vernal pools were identified both in the STI evaluation work and prior HNTB studies. One vernal pool with a total of 1,750 square feet of resource would be impacted.
2. Mile 8.1: No vernal pools would be impacted at this location.
3. Mile 8.8: Vernal pools were identified both in the STI evaluation work and prior HNTB studies. Two vernal pools with a total of 7,230 square feet of resource would be impacted.
4. Mile 10.0: Vernal pools were identified both in the STI evaluation work and prior HNTB studies. Four vernal pools with a total of 32,480 square feet of resource would be impacted.
5. Mile 13.2: Vernal pools were identified both in the STI evaluation work and prior HNTB studies. Two vernal pools with a total of 7,430 square of resource would be impacted.

Vernal pool data and mapping are provided in Environmental Screening Report.

F. Impacts to Maine DEP Vernal Pools of Special Significance (Column 12)

The Maine Department of Environmental Protection regulates vernal pools differently than the USACE. In Maine, a vernal pool is defined by meeting a prerequisite number of egg mases as opposed to the USACE who may regulate all vernal pools regardless of the number egg masses present. The following provides a summary of MDEP vernal pool impacts.

1. Mile 7.3: No MDEP regulated vernal pools were identified.
2. Mile 8.1: No MDEP regulated vernal pools were identified.
3. Mile 8.8: One MDEP regulated vernal pools was identified totaling 950 square feet of impact.
4. Mile 10.0: Four MDEP regulated vernal pools were identified totaling 32,480 square feet of impact.
5. Mile 13.2: No MDEP regulated vernal pools were identified.

G. FEMA Floodplain (Column 13)

The FEMA Flood Map Service Center is the official public source for flood hazard information produced in support of the National Flood Insurance Program (NFIP). This information was referenced to assess the potential impacts to federally regulated flood areas. In addition, mapped flood hazard areas were wetlands are present are considered Wetlands of Special Significance by the MDEP.

1. Mile 7.3: The project area is mapped as a Zone "A" 100-year flood hazard area. No specific elevation information is available from FEMA suggesting a flood elevation study has not been completed. Approximately 1.0 acres of floodplain would be impacted.
2. Mile 8.1: Approximately 0.5 acres of floodplain would be impacted.
3. Mile 8.8: Approximately 0.3 acres of floodplain would be impacted.
4. Mile 10.0: No flood hazard mapping was identified in the project area. A zone "A" 100-year flood hazard area is mapped easterly of the project area but does not appear to be within the limits of direct impact as referenced from FEMA flood hazard mapping.
5. Mile 13.2: The project areas adjacent the MTA is mapped as a Zone "A" 100-year flood hazard area. No specific elevation information is available from FEMA suggesting a flood elevation study has not been completed.

H. Cultural / Historical Resources (Column 14)

The Maine Historic Preservation Commission (MHPC) was contacted and provided locations of the proposed tolling plazas. MHPC responded on January 7, 2015 and determined no archaeological sites have been identified for any of the alternative locations. We would note that once a preferred location is identified and a preliminary design completed, the MHPC should be contacted to confirm the original findings. Also included is a 2010 "Historic Architectural Reconnaissance Survey for the York Toll Plaza Project" prepared for HNTB by PAL. The report addresses area of potentially eligible listings in the National Register together with Drive and Indirect impacts. PAL concluded not effect on historic architectural portions and no further work is necessary for the areas studied in the report.

I. Potential Threatened / Endangered Species Habitat (State Listed) (Column 15)

The Maine Natural Areas Program was consulted along with the Maine Department of Inland Fisheries and Wildlife (IF&W) to obtain database information on habitats for rare, threatened, endangered and special concern species that may be relevant to each alternative location. The following is a general summary of the database findings.

Table 2: Potential State Threatened/Endangered Species Habitat Summary

	Maine Natural Areas Program			**Maine Inland Fisheries and Wildlife**			
Mile	Sweet Pepperbush	Spicebush	Smooth Winterberry Holly	IWWH [1]	Ribbon Snake	Spotted Turtle	Redfin Pickeral/ Swamp Darter
7.3	X	X		X			
8.1	X	X		X	X	X	
8.8	X		X	X	X	X	
10.0	X			X			X
13.2							

Note: "X" indicates mapped habitat within the project vicinity.
(1) "IWWH" – Inland Waterfowl & Wading Bird Habitat.

1. Mile 7.3: Maine Natural Areas Program: Database information suggests no rare and exemplary botanical features are mapped in the project area. Spicebush and Sweet Pepper-bush were mapped northerly of the project area (3 locations) but are not within the project area.
   IF&W requires a 100 foot vegetated stream buffer which includes the Little River. In addition, IF&W identified an Inland Waterfowl and Wading Bird habitat along the Little River.
2. Mile 8.1: Maine Natural Areas Program: Database information from the Maine Natural Areas Program suggests rare and exemplary botanical features are mapped in the project area. Spicebush and Sweet Pepper-bush were mapped easterly of the project area. These areas do not appear to be directly within the project area but may warrant field verification should this location be advanced for further study.
   IF&W: Stream protection was identified together with Inland Waterfowl and Wading Bird habitat. Database information indicates that there are 3 habitat areas (Ribbon Snake, Spotted Turtle and Inland Bird Wading Habitat) within the general project area.
3. Mile 8.8: Maine Natural Areas Program: Database information suggests rare and exemplary botanical features are mapped in the project area. Sweet Pepper-bush (4 locations) and Smooth Winterberry Holly (1 location) were mapped in the project area. Some of the mapped areas may be directly within the project and will warrant field verification should this location be advanced for further study.

IF&W: Stream protection was identified together with Inland Waterfowl and Wading Bird habitat. Database information indicates that 3 habitat areas (Ribbon Snake, Spotted Turtle and Inland Waterfowl and Wading Bird Habitat) with potential threatened or endangered species are located within the identified project area.

4. Mile 10.0: Maine Natural Areas Program: Database information suggests rare and exemplary botanical features are mapped in the project area. Sweet Pepper-bush was mapped on the west side of the turnpike but are depicted outside of the project area. Field verification will be warranted to confirm that both of the species are or are not within the project area.
   IF&W: Stream protection was identified along together with Inland Waterfowl and Wading Bird habitat and a potential Redfin Pickerel/Swamp Darter habitat. A total of 160 linear feet of stream impacts is anticipated. Database information indicates that 2 habitat areas with potential threatened or endangered species are located within the identified project area.
5. Mile 13.2: Maine Natural Areas Program: Database information suggests no rare and exemplary botanical features are mapped in the project area.
   IF&W: Stream protection was identified on the resource mapping. A total of 140 linear feet of stream impacts is anticipated. Database information indicates that Spotted Turtle Habitat is located easterly of the project area but does not appear to be directly within the limits of direct impacts.

New England Cottontail Rabbit

The New England Cottontail is identified by the Maine Department of Inland Fisheries and Wildlife Service as a candidate for listing as an endangered species. The New England Cottontail is limited to York and Cumberland County Maine, although their range once extended as far north as Augusta according to IF&W information. The IF&W reports that in recent years cottontails have been found in Berwick, Biddeford, Cape Elizabeth, Cumberland, Dayton, Elliot, Falmouth, Gorham, Kittery, Portland, Saco, Scarborough, South Berwick, South Portland, Wells, Westbrook, Windham, and York. As part of the permitting, IF&W will require a review of each site for potential habitat and indications of Cottontail presence. Should the species be identified, mitigation for associated impacts will likely be required. In 2010, a New England Cottontail Pellet Study (July 2010 by Normandeau Associates, Inc.) was completed in the area of mile 7.3 and 8.7. The study noted that no conclusive signs of the New England Cottontail were observed.

J. US Fish & Wildlife Threatened and Endangered Species

The Environmental Screening Report includes a listing from the US Fish and Wildlife Service (USF&W) of threatened and endangered species. The listing identified one species that may exist within the project area (Northern Long-Eared Bat). This is based upon the data obtained from the Environmental Conservation Online System (ECOS) and the Information, Planning, and Conservation System (IPaC) administered by the US Fish and Wildlife. The USF&W does not list the New England Cottontail as a threatened or endangered species.

Northern Long-Eared Bats

As part of the federal permitting (USACE) process, the USF&W is expected to require that all sites with tree clearing be surveyed for the presence of Northern Long-Eared Bats. When tree clearing is required, the U.S. Fish and Wildlife will most likely recommend that clearing be completed between October 16 and April 19, during which bats are most likely to be in their hibernacula (caves or mines) where they hibernate over the winter. Tree clearing during this time period will most likely avoid any direct effects to bats that may be roosting in trees during the late spring, summer, and early fall. The alternative is to undertake a field study to determine if Northern Long-Eared Bats are present through an acoustical listening study. Should the bats be present, the timing of clearing will important and may be subject to restrictions.

ABUTTER IMPACTS

A. Potential Right-of-Way Impacts (Column 16)

The alternatives were designed to avoid and minimize the impact to properties. The conceptual design of the alternatives included an estimation of land that would need to be acquired and used as a right-of-way for the new toll facility. The limits of the proposed right-of-way are irregular because they are a function of topography, earth-moving activities (i.e., cutting and filling), slopes, existing property boundaries, viability of remaining portions of properties acquired, and continued access to individual properties. Right-of-way impacts may include construction of a new administration building, parking lot, highway widening or retaining wall. The amount of land to be acquired for the construction and operation of the alternatives would be minimized wherever possible.

Potential right-of-way impacts ranging from 0 to 0.9 acres are considered low impacts, potential right-of-way impacts ranging from 1.0 to 3.0 acres are moderate impacts and potential right-of-way impacts greater than 3.01 acres are high impacts.

Mile 10.0 has 3.5 acres of potential right-of-way impact identified as a high impact. Mile 8.1 has 2.0 acres and mile 13.2 has 2.5 acres of potential right-of-way impact identified as a mid-range impact. Mile 7.3 has 0.1 acres and mile 8.8 has 0.3 acres of potential right-of-way impact identified as a low impact.

B. House Displacement (Column 17)

Certain houses and businesses may need to be acquired for the highway and toll facility right-of-way. Displacements are counted where the existing residence or commercial building is within 75 feet of the direct impact line. In addition, lot size was considered during the determination of house displacement. If a majority of a lot is needed for the project, the house on the subject lot was also considered as a displacement. This does not imply that a house requires displacement. No houses within 75 feet of the direct impact line are considered a low impact. Houses within 75 feet of the direct impact line is identified as a displacement and considered a high impact.

There is one house displacement anticipated for alternative at mile 13.2. There are no house displacements anticipated for alternatives at mile 7.3, mile 8.1, mile 8.8, and mile 10.0.

C. Houses within 1000 feet of direct impact line (Column 18)

Houses 1000 feet of the direct impact line were identified for each alternative. This was to quantify the number of houses that may experience a change in noise and a change in scenic view. Noise measurements were not conducted. The noise in some areas would be altered by the alternative. The scenic view of some areas would be altered by the build alternative and the loss of aesthetic resources such as vegetation, forestland, farmland, pastures, and/or streams. The quality of the view is a very subjective determination; nevertheless, this is an important discriminator between the alternatives. The metrics of 1000 feet was used to tabulate the number of homes for each alternative. This metric was used based on our professional judgement for evaluating the alternatives but are not used as part of the impact assessment, since there is no regulation to enforce it. The existing houses that would be displaced (acquired for the highway right-of-way) are excluded from this count. Houses within 1000 feet of the direct impact line ranging from 0 to 10 are considered a low impact. Houses within 1000 feet of the direct impact line ranging from 11 to 30 are considered a moderate impact. Houses within 1000 feet of the direct impact line ranging from 31 or greater are considered a high impact.

Mile 7.3 has 47 houses, mile 10.0 has 46 houses and mile 13.2 has 41 houses within 1000 feet of the direct impact line identified as a high impact. Mile 8.1 has 6 houses and mile 8.8 has 4 houses within 1000 feet of the direct impact line identified as a low impact.

LOGISTICS DURING CONSTRUCTION

A. Constructability (Column 19)

Constructability is optimizing cost, time, and quality factors with the material, equipment, construction means, methods, and techniques used on a project; accomplished by matching owner values with available construction industry practices. Constructability is a project management technique for reviewing construction processes from start to finish during the pre-construction phrase. It will identify obstacles and constraints before a project is actually built to reduce or prevent error, delays and cost overruns. Constructability constraints for this project may include poor soils conditions, environmental impacts, traffic management or maintaining the existing toll facility while the new toll facility is being constructed in close proximity. Traffic movement through the work zone during all construction phases and the geometric constraints of temporary construction features (e.g. shoring and bracing) can be another constructability issue.

Alternatives following the standard construction industry practice and with minimal construction constraints is considered conventional. Alternative with difficult construction constraints is considered difficult.

Mile 7.3 is complicated construction phasing due to close proximity of new plaza, 400 feet away, while maintaining operations at existing plaza. This alternative may require temporary booths or E-ZPass lanes to maintain tolling lanes in each direction during construction. This alternative has poor soil conditions and will require the removal of material up to 5 feet in depth and replaced with a lightweight aggregate fill to bottom of proposed roadway subbase. Wick drains would be installed in the new roadway areas and spaced 4 to 5 feet on center in a triangular grid. Where wick drains are installed, the area would be surcharged for 4 to 7 months. The wick drains would help speed up the consolidation of the clay.

There are no constructability constraints or issues anticipated for alternatives at mile 8.1, mile 8.8, mile 10.0 and mile 13.2

B. Safety of Toll Collectors (Column 20)

Making sure the MTA employees, toll collectors and maintenance staff who perform work in the immediate vicinity of the existing plaza (including electrical work, construction, and other repairs) are safe during construction is a critical element to MTA. Safety of toll collectors is a high priority and all alternatives will have appropriate safety measures. This category differentiates the level of conflict areas and how difficult protection of toll collectors will be during construction.

The most aggressive mitigation strategy to protect workers from vehicular traffic is to provide workers access to booths without requiring them to cross active traffic by-pass toll lanes. This is accomplished with the use of a tunnel. However, with the construction phasing and removal of poor soil, there may be some disruption to the existing tunnel.

Low-range of impacts are applied to alternatives providing safe practice and measures during construction with minimal changes to toll collector's normal routines and are separated from the construction zone. Mid-range impacts are applied to alternatives with moderate changes to toll collector's normal routines and minor or moderate overlap through construction areas. High-range of impacts are applied to alternatives with major changes to toll collector's normal routines and major overlap through construction areas.

Mile 7.3 has some mid-range constraints due to close proximity to the existing toll plaza. The construction zone for this alternative falls within the existing toll plaza.

Alternatives at mile 8.1, mile 8.8, mile 10.0 and mile 13.2 are considered good since there are no safety constraints or issues anticipated.

C. Traveler Impacts (Column 21)

Construction for a new toll facility will have impacts to travelers. Impacts may occur at the construction work zone and/or at the existing toll plaza. Travelers must access the dedicated toll lanes via the toll plaza approach area. Excessive vehicle queue in the approach area impacts access and efficiency of dedicated toll lanes. Traveler impacts may include queueing (traffic backup) and delays at the existing toll facility in proximity to the new toll facility being constructed.

Traveler impacts are a measure of the complexity of traffic management and to what level of inconvenience it affects vehicles traveling on the turnpike during construction. The higher level of Alternatives with construction in close proximity to the existing plaza will have more complex traffic management which may affect travelers more than alternatives with no overlap of the existing plaza.
Low-range of impacts is applied to construction at existing grade and minor traffic shifts. Mid-range impacts are applied to construction at or near existing grade and traffic shifts requiring more complexity. High-range impacts are applied to construction at a significantly higher or lower new grade requiring very complex traffic management.

Alternatives at mile 7.3 and mile 8.1 are considered mid-range impacts due to more complex traffic management with ramp traffic and proximity to the existing toll plaza. Alternatives at mile 8.8, mile 10.0 and mile 13.2 are rated as low-range of impacts due to minimal traffic management efforts.

COSTS

Construction costs are based on known high cost items such as common excavation, hot mix asphalt, toll booths, tunnel etc. and a contingency for smaller item costs not typically quantified until final design. Costs for wetland, stream and ROW impacts are included for each alternative. Additional costs added to each alternative are 10% contingency, 10% design engineering and 8% construction engineering. Costs for maintenance of traffic are included and are commensurate with complexity of alternative location. Soil conditions are a factor in the construction sequencing and cost. Multiple borings were taken near mile 7.3 so this estimate is more refined concerning soil remediation. Other alternatives consist of visual determination of site conditions with appropriate cost estimating.

A. Initial Capital Costs (Column 22)

Capital costs consist of estimations for a complete plaza with contingencies of 10% for lower cost items to be defined during final design. The estimated cost includes: all construction items, new toll facility, access road, utilities, utilities removed from existing toll facility, demo of the existing toll facility and reconfigure to a highway, wetland mitigation, maintenance of traffic; demolition of toll plaza, tunnel, building; toll equipment and systems, new Right of Way acquisition, design and construction engineering. The initial capital cost does not include prior Right of Way acquisitions along the turnpike. This cost includes the reconfiguration of the existing plaza location for all alternatives regardless of distance to alternative site. The project limits of alternative at mile 7.3 include the removal and all work associated with reconfiguration at the existing toll plaza, however all other alternatives will require removal of the existing plaza and reconfiguring the roadway with standard ramp designs. The reconfiguration and removal cost at the existing plaza site will be the same for alternatives with no overlap in the layout, however alternatives with an overlap area will benefit from a reduced cost for reconfiguration. These costs are incorporated into initial capital costs for each alternative.

1. The initial capital costs for mile 7.3 is approximately $60.4 million.
2. The initial capital costs for mile 8.1 is approximately $39.7 million.
3. The initial capital costs for mile 8.8 is approximately $40.8 million.
4. The initial capital costs for mile 10.0 is approximately $42.6 million.
5. The initial capital costs for mile 13.2 is approximately $46.6 million.

B. Revenue Loss during Construction (Column 23)

This evaluation of revenue loss during construction only considers the complexity of maintenance of traffic. Alternatives constructed at existing grade will have minor effects on the flow of traffic, however construction at a new grade will require shifting traffic multiple times through the workzone. The likelihood of the traveling public diverting to other routes avoiding tolls will increase.

Low-range of impacts is applied to construction at existing grade. High-range impacts is applied to construction at a new grade.

Alternatives at mile 8.1, mile 8.8, mile 10.0 and mile 13.2 are all rated as low-range impacts. Alternative at mile 7.3 is rated as high-range impact.

C. Life-Cycle / Operation Costs (Column 24)

The life-cycle costs are determined by settlement and associated maintenance issues. Paving operations at mile 7.3 will be required on a 6 year cycle rather than the 10 year cycle based on future settlement due to poor soil conditions.

Low-range impacts are applied to normal conditions requiring normal maintenance procedures and life cycle. Mid-range impacts are applied to a slight increase in maintenance costs or reduced life cycle. High-range impacts are applied to a significant increase in maintenance costs or significant reduction in life cycle.

Alternatives at mile 8.1, mile 8.8, mile 10.0 and mile 13.2 are all rated as low-range impacts. Alternative at mile 7.3 is rated as a mid-range impact due to an increase in maintenance costs.

CONCLUSION

Each of the alternatives had some categories of impacts that had similar results as the recommended alternative but overall we believe that the net positive attributes of alternative mile 8.8 make it the desirable choice for further study and evaluation. Clearly, the alternative that locates the new plaza at approximately mile 8.8 has superior Engineering and Safety benefits while minimizing environmental and abutter impacts compared to a reconstruction of the toll plaza in the vicinity of mile 7.3. The reconstructed toll plaza at mile 7.3 site would still have less than ideal geometric and safety characteristics because of the horizontal and vertical curves leading to the toll plaza and the poor safety record that has classified the approaches and departure zones as a high crash location according to Maine DOT historic records. Based on our teams' field investigation and research efforts, the wetland and stream impacts for the existing mile 7.3 alternative compared to the recommended location, range from 3 to 5 times higher. Additional benefits of the recommended alternative consist of less disruption to the travelling public, reduced construction time, and significant cost savings in the range of $20 million. Jacobs recommends continuation of the development and refinement of alternative for mile 8.8 to continue pre-permitting activities and design refinement of this alternative. See Appendix C, for the memorandum on the Recommended Alternative.

FIGURES

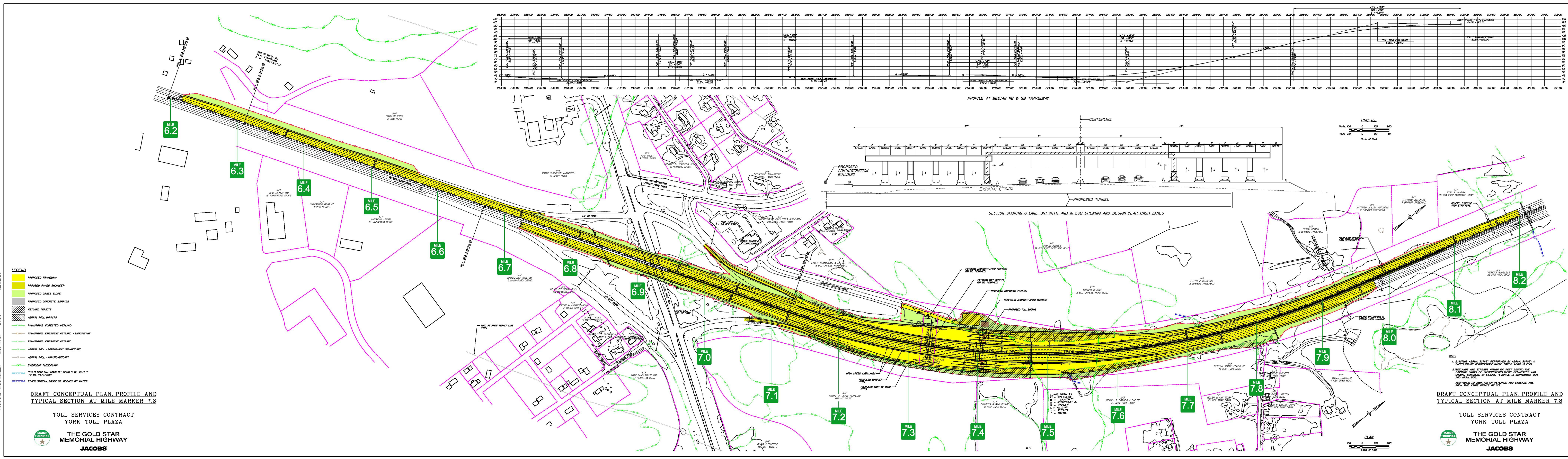

FIGURE 1 - Conceptual Plan, Profile and Typical Section at Mile 7.3

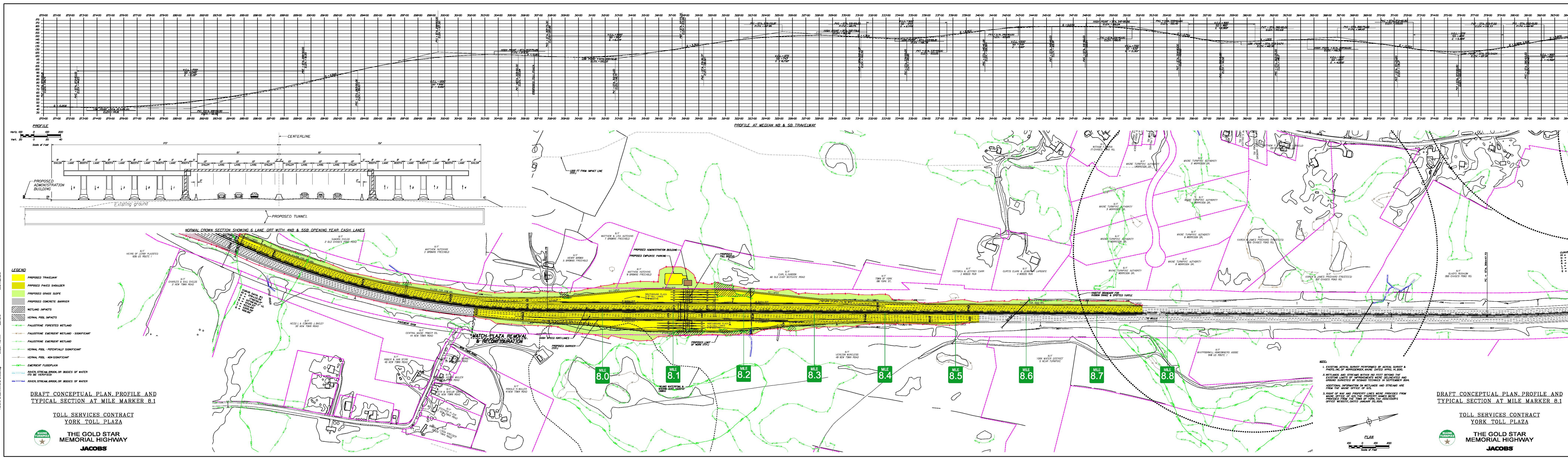

FIGURE 2 - Conceptual Plan, Profile and Typical Section at Mile 8.1

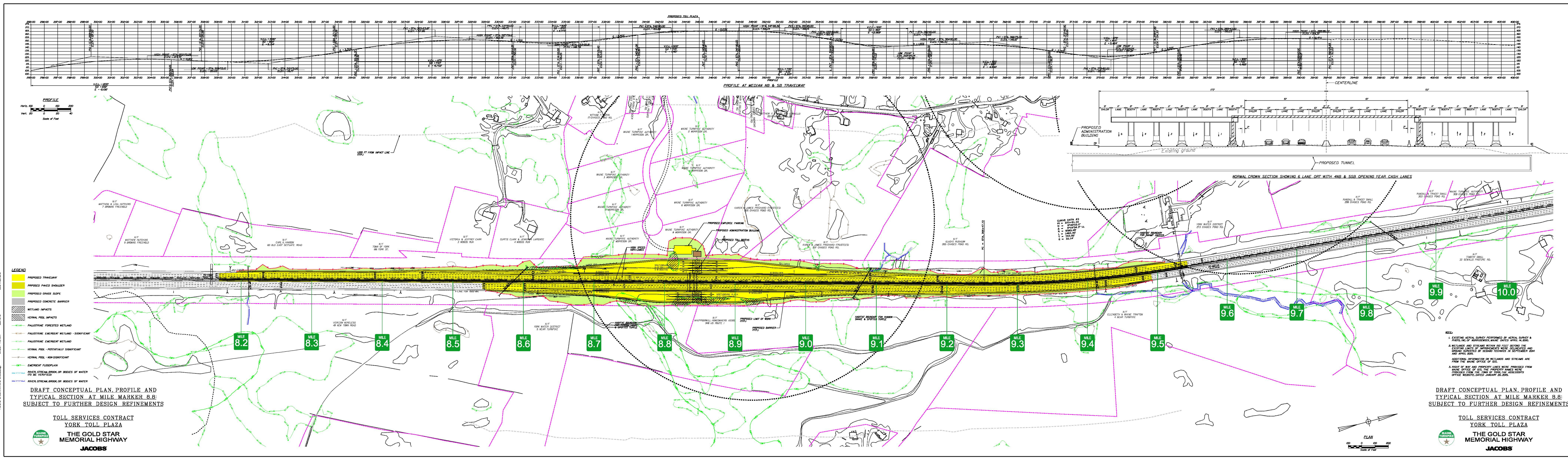

FIGURE 3 - Conceptual Plan, Profile and Typical Section at Mile 8.8

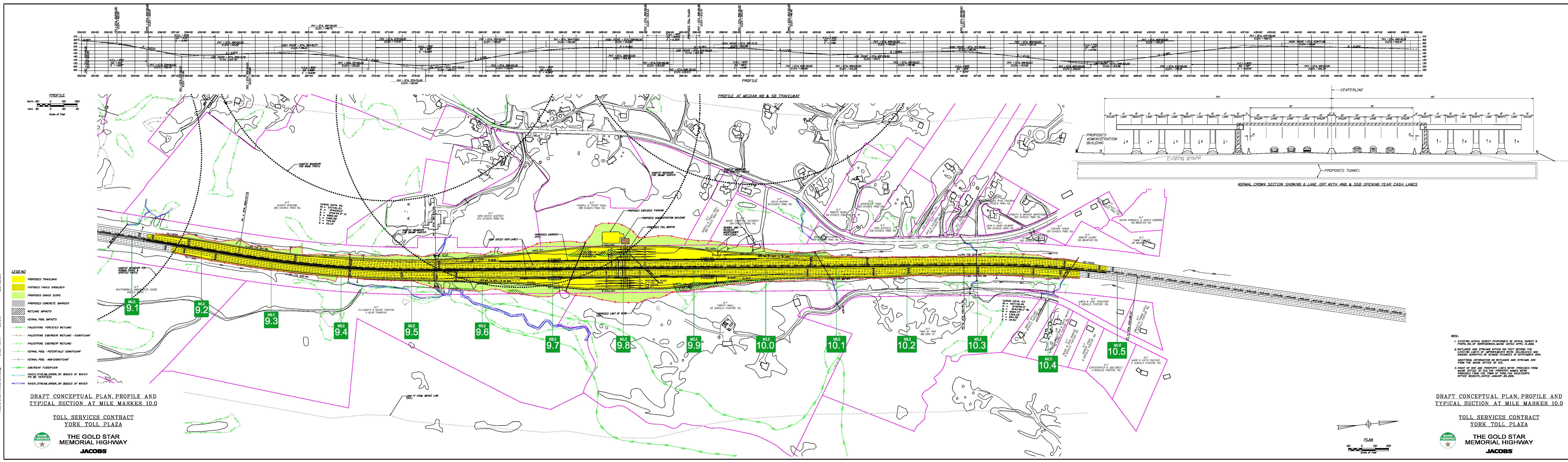

FIGURE 4 - Conceptual Plan, Profile and Typical Section at Mile 10.0

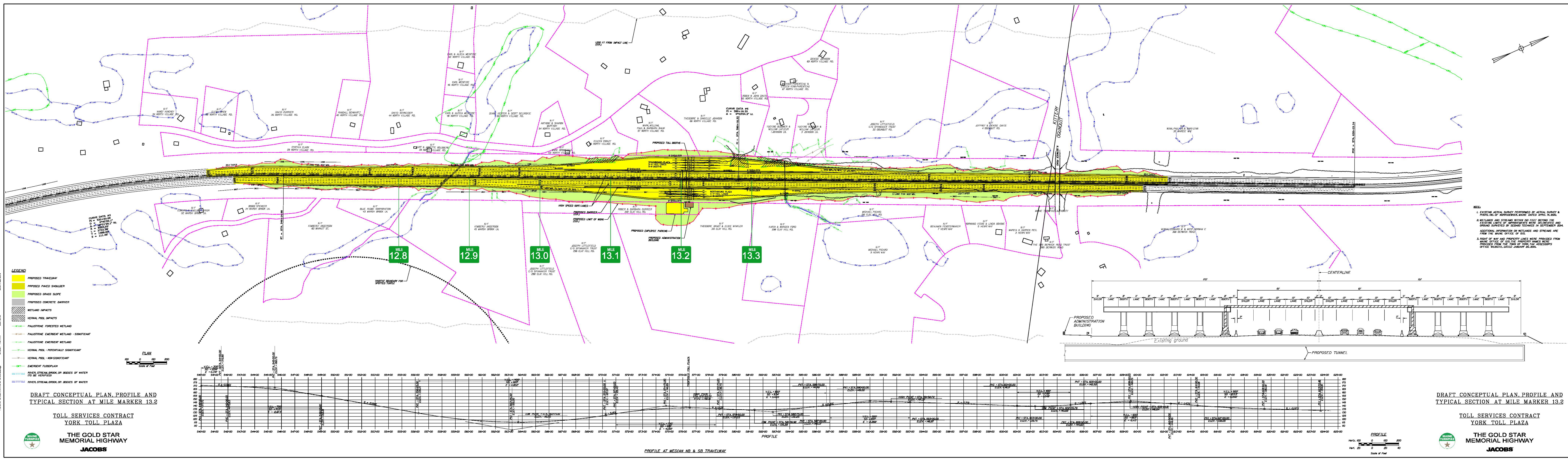

FIGURE 5 - Conceptual Plan, Profile and Typical Section at Mile 13.2

APPENDIX A

EVALUATION MATRIX

EVALUATION MATRIX

Approximate Location \ Evaluation Parameter	1	2			3	4	5	6	7	8	9	10	11		12		13	14	15
	ENGINEERING / SAFETY								ENVIRONMENTAL										
	Horizontal Alignment (1)	Vertical Alignment (1)			Sight Distance (2)	Separation from Interchange (>1 mile) (1)	Historic Crash Data (3)	Geotechnical (4)	Wetland Impacts (Total) (5)	Impacts to Maine DEP Wetlands of Special Significance (5)	Wetlands Relative Function and Value (6)	Stream Impacts (7)	Vernal Pool Impact (Total) (8)		Impacts to Maine DEP Vernal Pool of Special Significance		FEMA Floodplain (9)	Cultural / Historical Resources (10)	Potential Threatened / Endangered Species Habitat (State Listed)(11)
		Cash Plaza on Crest	Cash Plaza - Approach Grades between +1% and +2%	ORT Lanes on Existing or New					(Acres)	(Acres)		(LF)	No.	(SF)	No.	(SF)	(Acres)		No.
Mile 7.3	On Curve	Average	Poor	New	Average	No	43	Clay	5.5	1.9	High	360	1	1,750	0	0	3.0	No Impact	1
Other Sites Analyzed																			
Mile 8.1	Curve on approach	Average	Poor	Existing	Average	Marginal	23	Ledge	1.0	0.1	Average	50	0	0	0	0	0.5	No Impact	3
Mile 8.8*	On straight	Good	Average	Existing	Good	Yes	13	Ledge	1.0	0.8	Average	80	2	7,230	1	950	0.3	No Impact	3
Mile 10.0	Curve on approach	Average	Average	Existing	Average	Yes	21	Ledge	1.0	1.0	High	160	4	32,480	4	32,480	0.0	No Impact	2
Mile 13.2	On straight	Good	Poor	Existing	Good	Yes	18	Ledge	0.7	0.2	Low	140	2	7,430	0	0	0.0	No Impact	1
Low-Range of Impacts	On straight	Good	Good	Existing	Good	Yes	Low-range	Good	< 0.34	No Impact	Low	No Impact	No Impact		No Impact		No Impact	No Impact	No Impact
Mid-Range of Impacts	Curve on approach	Average	Average	New	Average	Marginal	Mid-range	Marginal	≥0.34 – 3.0	Resource Impacted	Average	Resource Impacted	Resource Impacted		Resource Impacted		Resource Impacted	Resource Impacted	Resource Impacted
High-Range of Impacts	On Curve	Poor	Poor		Poor	No	High-range	Poor	> 3.0		High								

Approximate Location \ Evaluation Parameter	16	17	18	19	20	21	22	23	24
	ABUTTER IMPACTS			LOGISTICS DURING CONSTRUCTION			COSTS / FINANCIALS		
	Potential Right-of-Way Impacts (12)	House Displacement within 75 feet of direct impact line (13)	Houses within 1000 feet of direct impact line (14)	Constructability (15)	Safety of Toll Collectors (16)	Traveler Impacts (17)	Initial Capital Costs (18)	Revenue Loss during Construction (19)	Life-Cycle / Operations Costs (20)
	Acres						$Millions		
Mile 7.3	0.1	0	47	Difficult	Extra Precaution	Intermediate	$60.4	Significant	Not Typical
Other Sites Analyzed									
Mile 8.1	2.0	0	6	Conventional	No Impacts	Intermediate	$39.7	Minimal	Typical
Mile 8.8*	0.3	0	4	Conventional	No Impacts	Minor	$40.8	Minimal	Typical
Mile 10.0	3.5	0	46	Conventional	No Impacts	Minor	$42.6	Minimal	Typical
Mile 13.2	2.5	1	41	Conventional	No Impacts	Minor	$46.6	Minimal	Typical
Low-Range of Impacts	0 – 0.9	0	0 - 10	Conventional	No Impacts	Minor		Minimal	Typical
Mid-Range of Impacts	1.0 – 3.0	NA	11 - 30	Difficult	Extra Precaution	Intermediate		Significant	Not Typical
High-Range of Impacts	>3.01	>0	>31			Major			

* Recommended for 10% design and further analysis.

Footnotes:

1. Horizontal Alignment, Vertical Alignment and Separation from Interchange (>1 mile) values are based on criteria and design policies from the guidelines in the Federal Highway Administration report "State of the Practice and Recommendation on Traffic Control Strategies at Toll Plaza" 2006 and American Association of State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highways and Streets", 2011.
2. Sight Distance value is based on the criteria and design policies from the guidelines in the American Association of State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highways and Streets", 2011.
3. Information is based on MaineDOT's historical crash data and MaineDOT Office of Safety guidelines. Sites with 30 or more crashes were identified as high-range. Sites with 20-30 crashes were identified as mid-range. Sites with less than 20 crashes are low-range.
4. Geotechnical. Green represents mostly stable granular soils, no apparent groundwater impact, and no apparent bedrock excavation (ledge). Yellow represents ledge excavation, possible unstable soils, and minor groundwater impacts. Red represents soft and compressible soils, impacts due to high
5. Wetland Impacts are based on anticipated direct impacts on field delineated wetlands. Severity of impact based on level of USACE permitting required. Category 1 is non-reporting to the Corps. Category 2 requires notification to Corps but meets General Permit requirements. If not Category 1 or 2, a
6. Wetland Relative Function and Value is based on a preliminary comparative assessment of each proposed location in accordance with U.S. Army Corps of Engineers methodology.
7. Stream Impacts are based on anticipated direct impacts to potentially jurisdictional waterways, which could be modified based upon regulatory agency determinations.
8. Vernal Pool Impacts are based on anticipated direct impacts within Significant and Non-Significant Pools.
9. Floodplains are based on anticipated direct impacts.
10. Cultural / Historic Resources are based on anticipated direct impacts.
11. Potential Threatened / Endangered Species Habitat (State Listed) are based on anticipated direct impacts within a State or Federally designated habitat area.
12. Potential Right-of-Way Impacts is land that would need to be acquired and used as a right-of-way for the new toll facility. Right-of-way impacts may include construction of a new administration building, parking lot, highway widening or retaining wall. Right-of-impacts do not include new access road to the new administration building.
13. House Displacement is quantified for houses within 75 feet of direct impact line. The direct impact line is the cut or fill limit shown on the conceptual plans.
14. Houses within 1000 feet from direct impact line.
15. Constructability is measured by construction constraints that may include poor soils conditions, environmental impacts, tolling equipment / installation, traffic management, and/or construction phasing.
16. Safety of Toll Collectors. Identifying the safety of the toll collectors and maintenance staff who may have to walk through a construction zone.
17. Traveler Impacts may include traffic delays or construction of the new plaza being within proximity of the existing toll plaza.
18. Initial Capital Costs. Costs to construct the new toll facility, access road, utilities, utilities removed from existing toll facility, demo of the existing toll facility and reconfigure to a highway, wetland mitigation, toll equipment and systems, ROW acquisition, design/construction engineering and 10%
19. Revenue Loss during Construction. It is anticipated there will be revenue lost if traffic is diverted during construction.
20. Life-Cycle / Operations Costs. The life-cycle costs are associated maintenance issues. Example, paving operations may be on a 6-year cycle rather than a 10-year cycle based future settlement due to poor soil conditions.

APPENDIX B

PROJECT PURPOSE STATEMENT

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

Regulatory Division
CENAE-R-51

July 24, 2015

Sara Zografos
Maine Turnpike Authority
2360 Congress Street
Portland, Maine 04102

Dear Ms. Zografos:

This is in reference to the Authority's continued interest in replacing the southern barrier toll plaza on the Maine Turnpike at York, Maine.

In 2007 the Corps identified a basic project purpose for the project. Based on continued coordination with your office and interested parties since then, we have determined that a revision to the project purpose is now appropriate. The purpose of the project is to replace the existing barrier toll plaza on the Maine Turnpike at York, Maine with highway speed electronic tolling lanes and cash (non-EZ pass) lanes to address safety deficiencies, settling/subsidence, facility deficiencies including substandard tolling equipment, existing and projected traffic volumes, and traveler impacts and expectations. We will use this revised basic project purpose to review future alternatives analyses to avoid and minimize adverse impacts to waters and wetlands and to comply with the Section 404(b)(1) Guidelines.

If you have any questions concerning this matter, please contact Jay Clement at 207-623-8367 at our Manchester, Maine Project Office.

Sincerely,

Jay L. Clement for
Frank J. Del Giudice
Chief, Permits & Enforcement Section
Regulatory Division

Copies Furnished:
Mark Kern – EPA
Thomas Davidowicz – USFWS
Cassandra Chase – FHWA
Robert Green – Maine DEP

APPENDIX C

RECOMMENDED ALTERNATIVE

JACOBS

343 Congress Street
Boston, MA 02210 USA
617.242.9222 Fax 617.242.9824

Memorandum

Date: June 22, 2015

To: Maine Turnpike Authority

From: Rodney Emery, PE, PTOE, FITE

Subject: York Toll Plaza Replacement Project
Recommended Alternative

Jacobs Engineering Group was retained by the Maine Turnpike Authority (MTA) to review locations for a replacement of the existing toll plaza currently located at approximately mile 7.3 on the Turnpike. An extensive review of the corridor yielded a series of alternative sites between mile 8.1 and 13.2 including a site near the existing toll plaza location in York that warranted further evaluation. A significant effort was expended to gather updated environmental data in the form of on the ground surveys of wetlands, vernal pools and streams as well as update information on floodplains, cultural/historical resource impacts and potential threatened/endangered species habitats. A series of evaluation criteria was developed, in collaboration with staff at the Turnpike, that consisted of Engineering/Safety, Environmental, Abutter Impacts, Logistics during Construction and Costs/Financials categories. A rating system was developed for each category of impact which was used to compare the alternatives. The alternative sites north of the existing toll plaza were selected based on engineering and environmental criteria and are located at approximately mile 8.1, mile 8.8, mile 10.0 and mile 13.2. Based on the work to date, this evaluation matrix supports the following recommendation.

Each of the alternatives had some categories of impacts that had similar results as the recommended alternative but overall we believe that the net positive attributes of alternative mile 8.8 make it the desirable choice for further study and evaluation. Clearly, the alternative that locates the new plaza at approximately mile 8.8 has superior Engineering and Safety benefits while minimizing environmental and abutter impacts compared to a reconstruction of the toll plaza in the vicinity of mile 7.3. The reconstructed toll plaza at mile 7.3 site would still have less than ideal geometric and safety characteristics because of the horizontal and vertical curves leading to the toll plaza and the poor safety record that has classified the approaches and departure zones as a high crash location according to Maine DOT historic records. Based on our teams' field investigation and research efforts, the wetland and stream impacts for the existing mile 7.3 alternative compared to the recommended location, range from 3 to 5 times higher. Additional benefits of the recommended alternative consist of less disruption to the travelling public, reduced construction time, and significant cost savings in the range of $20 million.

Recommendation

Jacobs recommends continuation of the development and refinement of alternative for Mile 8.8 to continue pre-permitting activities and design refinement of this alternative.

Jacobs Engineering Group Inc.