

F.E. EVERETT TURNPIKE WIDENING FEASIBILITY REPORT

Feasibility of Widening the
2-Lane Segments of the Turnpike
to 3-Lanes in Each Direction
from Nashua to Bedford



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I. INTRODUCTION

This report presents the findings of a study which evaluates the feasibility of widening the 2-lane segments of the F. E. Everett Turnpike (FEET) to 3-lanes in each direction from the Massachusetts/New Hampshire state line northerly to the Interstate 293 interchange in Bedford, a total distance of approximately 20 miles. Within these study limits the Turnpike passes through the communities of Nashua, Merrimack and Bedford. See Figure 1 for a graphic of the study area. The goal of the study is to evaluate the need for widening the narrow segments, identify pertinent issues and constraints, and estimate the cost of the potential improvements.

The existing Turnpike is at least 3 lanes in each direction through virtually all of Nashua, and between Exit 10 and Exit 11 in Merrimack. It is also currently being widened to 3 lanes in each direction in the vicinity of the Manchester Airport Access Road (MAAR) interchange in northern Merrimack and southern Bedford. This leaves three segments of 2-lane highway:

- Southern Segment – in Nashua and Merrimack between Exit 8 and Exit 10
- Middle Segment – in Merrimack between Exit 11 and the southern limit of work of the MAAR project
- Northern Segment – in Bedford between the northern limit of work of the MAAR project and the I-293 interchange

The locations of the three 2-lane segments are depicted on Figure 2.

II. PROJECT NEED

Improved Capacity

The average annual daily traffic (AADT) volumes on various segments of the highway are noted in the table below. Existing volumes from 2009 are listed in the first column and these volumes were projected to a design year of 2030 using an assumed 1.5% annual growth rate. Traffic volumes may increase to a greater degree when the MAAR opens to traffic, which is currently scheduled for the Fall of 2011 or Spring of 2012.

<u>Location</u>	<u>2009 AADT</u>	<u>Projected 2030 AADT</u>
Between Exit 8 and Exit 10	54,100	74,000
Between Exit 11 and Exit 12	54,900	75,000
Between Exit 12 and I-293 (Bedford toll plaza)	47,400	64,800

Level-of-service (LOS) analyses were run using methodologies from the Highway Capacity Manual published by the Transportation Research Board. Level-of-service is a measure that is used to characterize how well or how poorly a section of highway operates. The scale goes from LOS A, which represents free-flow conditions with no back-ups or delays, to LOS F, which represents extreme congestion and major delays to traffic. The analyses were run based on traffic volumes that would be experienced during the heaviest volumes (peak hour) of the day, which typically represent the morning and evening commuter times during the weekday. The results of the LOS analyses are given below.

<u>Location</u>	2009			2030		
	<u>AADT</u>	<u>LOS 2 Lanes</u>	<u>LOS 3 Lanes</u>	<u>AADT</u>	<u>LOS 2 Lanes</u>	<u>LOS 3 Lanes</u>
Exit 8 to Exit 10	54,100	E	C	74,000	F	D
Exit 11 to Exit 12	54,900	E	C	75,000	F	D
Exit 12 to I-293	47,400	D	C	64,800	F	C

As noted in the table above, the existing 2-lane segments of highway are currently operating at LOS D or E, and are projected to degrade to LOS F by the year 2030. Widening these segments to 3 lanes would improve the current operations to LOS C, and would improve operations in 2030 to LOS C or D. These results show a clear need to widen the 2-lane segments from a capacity perspective, and to improve traffic operations to a satisfactory level.

Improved Safety

Crash data was analyzed for the three 2-lane highway segments, and a comparison was made to all highways within the Turnpike system statewide. The southern and northern segments showed a lower than average crash rate while the middle segment showed a higher than average crash rate.

Projects to widen the highway would include upgrades to safety features such as median shoulder width, roadside recovery area (clear zone), and guardrail. The paved median shoulders would be widened from 4 feet to 11 feet, and the median guardrail would be replaced with a solid concrete barrier. The roadside recovery area would be improved where possible to remove potentially hazardous features such as steep slopes, ledge outcrops, and drainage culvert headwalls.

Another benefit to widening the highway would be to provide more room for traffic to continue to flow when there is an accident or incident on the highway that closes a lane.

Address Bridges

There are five bridges within the three widening segments that have not been addressed in a significant way since their construction as part of the original Turnpike construction in the mid-1950s. None of these bridges are currently on the Department's Red List, but all are at the point where rehabilitation or replacement will be needed in the near future. These bridges include:

- FEET northbound over Pennichuck Brook (Nashua/Merrimack)
- FEET southbound over Pennichuck Brook (Nashua/Merrimack)
- Baboosic Lake Road over FEET (Merrimack)
- Wire Road over FEET (Merrimack)
- FEET northbound and southbound over Baboosic Brook (Merrimack)

All of these bridges would be widened and rehabilitated or completely replaced as part of the highway widening.

III. EXISTING ROADWAY EVALUATION

Using record plans of the original highway construction, the existing Turnpike was evaluated for compliance with current design standards. No deficiencies were found that would require major changes to the horizontal alignment or vertical profile of the roadway. Information was not available to evaluate the existing pavement superelevation (banking) in the curves.

Based on the existing roadway evaluation, it is assumed that the existing roadway could simply be widened by 12 feet on each side to add the third lane in each direction. Typical sections of the existing and widened roadway are shown in Figure 3. More substantial reconstruction could be required in some areas if superelevation deficiencies exist. Conceptual plans of the potential widening can be found in the Appendix. The concept plans are based on two-dimensional layouts using aerial photos as the base plans and previous highway construction plans as a reference.

IV. SOUTHERN SEGMENT

Segment Limits

The southern segment begins approximately 2000 feet north of the Exit 8 overpass bridge in Nashua and runs northerly for approximately 1.5 miles, ending approximately 1000 feet south of the Exit 10 overpass bridge in Merrimack. There is currently no Exit 9 interchange on the Turnpike as this was envisioned for the

northern terminus of the unbuilt Circumferential Highway around Nashua and Hudson.

Design Considerations

The two bridges over Pennichuck Brook would require widening and rehabilitation, and retaining walls may be required along the roadway approaches to the bridges to minimize impacts into the open water. Pennichuck Brook is an environmentally sensitive area and is the drinking water source for the City of Nashua. Careful attention to erosion control and stormwater management will be required both during and after construction.

A portion of the Exit 10 southbound on-ramp would require reconstruction, however the Exit 10 ramp toll plazas would not be impacted.

Cost

The estimated cost of the southern segment, including engineering and right-of-way, is \$14 million.

Concept Plans

Concept plans of the potential widening of the southern segment can be found in the Appendix.

V. MIDDLE SEGMENT

Segment Limits

The middle segment begins just north of the bridges over Continental Boulevard at Exit 11 and runs northerly for approximately 5.3 miles, ending at the southern limit of work of the MAAR project. This segment includes the Exit 12 interchange and is entirely within Merrimack.

Design Considerations

Portions of the Exit 11 northbound on-ramp and southbound off-ramp would require reconstruction. No impacts to the Exit 11 ramp toll plazas are required.

The FEET bridge over the Souhegan River is currently being widened and rehabilitated as part of the Merrimack 12105 project. This project is expected to be completed in the Summer of 2011. Although the project will not provide any additional lanes on the Turnpike, the bridge and approach roadway within a few hundred feet of the bridge are being widened to accommodate three lanes in each direction in the future. No additional widening of this bridge would be required once

the bridge project is completed to accommodate three lanes in each direction on the Turnpike.

Two overpass bridges between Exit 11 and Exit 12 will require complete replacement as their spans are not long enough to accommodate an additional lane in each direction on the Turnpike underneath the bridge. The bridges carry Baboosic Lake Road and Wire Road over the Turnpike. Both roads are town-maintained, Class V roads. The concept plans in the appendix show construction of temporary detour bridges and roadways to maintain traffic on the town roads while the bridges are being replaced. Other options could be considered such as constructing the new bridges adjacent to the existing bridges and permanently realigning the roads, or closing the roads temporarily during construction of a new bridge. Developing a preferred alternative should be done in close coordination with the Town of Merrimack.

The bridge that carries the FEET over Baboosic Brook (just north of the Wire Road overpass) would require widening on each side. This will likely be another environmentally sensitive area requiring a greater emphasis on erosion control and stormwater management during and after construction.

Portions of the Exit 12 northbound off-ramp and southbound on-ramp would require reconstruction, however the ramp toll plazas would not be impacted. The bridge that carries Bedford Road over the Turnpike at Exit 12 is already wide enough to accommodate an additional lane of widening on each side of the Turnpike. In 2004, the Nashua Regional Planning Commission (NRPC) published a study outlining some of the issues involved with potentially completing the Exit 12 interchange. This would require construction of a northbound on-ramp and a southbound off-ramp. The improved access to the Turnpike would result in traffic pattern changes and would require significant property acquisition. The study can be found on the NRPC website. Completion of the MAAR interchange to the north of Exit 12 is expected to alleviate some of the demand for completing Exit 12. Widening the Turnpike through the Exit 12 area would not require the completion of Exit 12, nor would it preclude the ability to complete the interchange as part of the widening, or at a future date.

The northern limit of the middle segment would match into the 3-lane Turnpike widening currently being done by the MAAR project. Completion of the Turnpike widening portion of the MAAR project is expected in the Fall of 2011.

Cost

The estimated cost of the middle segment, including engineering and right-of-way, is \$45 million.

Concept Plans

Concept plans of the potential widening of the middle segment can be found in the Appendix.

VI. NORTHERN SEGMENT

Segment Limits

The northern segment begins approximately 0.8 miles south of the US Route 3 overpass bridge and runs northerly for approximately 1.3 miles, ending within the I-293 interchange.

Design Considerations

The southern limit of this segment will match into the Turnpike widening currently being done by the MAAR project. Further analysis will be required to determine if three lanes in each direction is adequate between the MAAR interchange and the I-293 interchange, or if a fourth lane is required in one or both directions. Widening of some of the I-293 interchange ramps from one lane to two lanes may be necessary to accommodate the potential increase in traffic volume when the MAAR interchange opens.

The bridge carrying US Route 3 over the FEET is scheduled to be replaced by the Bedford 13527 project, with a target completion date of Fall 2013. This bridge is being designed to accommodate a potential future widening on the Turnpike of up to four lanes in each direction. Ledge removal is being done in the immediate vicinity of the new bridge, however, additional ledge removal will be required when the turnpike is widened in the future.

Cost

The estimated cost of the northern segment, including engineering and right-of-way, is \$11 million.

Concept Plans

Concept plans of the potential widening of the northern segment can be found in the Appendix.

VII. FUTURE STEPS

Once support for widening the Turnpike is apparent and a decision is made to move forward with the widening of one or more of the existing 2-lane segments, detailed design layouts must be developed. This would include collection of survey, development of design plans using the concept plans in this report as a starting point, and coordination with the local communities and the general public through a series of public meetings or hearings.

Specific issues to be considered during design and project development include:

Identify Property Impacts: Although much of the basic highway widening can likely be done within the Turnpike's existing 300 foot wide right-of-way, both temporary and permanent property acquisitions and easements may be required in some locations. Potential areas of property impacts include, but are not limited to, the interchange ramp reconstructions, Baboosic Lake Road and Wire Road bridge replacements, and stormwater treatment areas (locations to be determined).

Identify Environmental Impacts: Environmental concerns are expected to include the Pennichuck Brook area, potential corridor-wide wetland and archaeological impacts, and incorporating appropriate stormwater treatment measures.

Stormwater Treatment Design: Widening the highway from two lanes to three lanes will result in a substantial increase in impervious pavement surface. Treatment of roadway runoff by constructing stormwater treatment areas throughout the corridor will be required.

Noise Abatement Design: There are several residential areas in proximity to the widening segments. All of these areas would be evaluated to determine if they meet the NHDOT policy regarding noise abatement. If so, noise abatement measures, typically in the form of sound walls or berms, would be constructed.

VIII. SUMMARY & FUNDING

Improving the F. E. Everett Turnpike (FEET) to provide at least three lanes in each direction from the Massachusetts/New Hampshire state line northerly to the I-293 interchange in Bedford would require widening three separate segments of the highway at the estimated costs (in 2010 dollars) listed below.

<u>Segment</u>	<u>Location</u>	<u>Length</u>	<u>Cost</u>
Southern	Nashua/Merrimack, Exit 8 to Exit 10	1.5 miles	\$14 million
Middle	Merrimack, Exit 11 to MAAR project	5.3 miles	\$45 million
Northern	Bedford, MAAR project to I-293	1.3 miles	\$11 million

Total Planning-level Cost Estimate:	\$ 70 million
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Currently, there is no funding available for widening these three segments of the F. E. Everett Turnpike within the Turnpike system's capital improvement program (2008 – 2018), nor is the project included in the current Ten Year Transportation Improvement Plan (TYP) 2011 – 2020. Legislative authorization with an appropriation of funds for carrying out the widening and project improvements would be required, as well as additional revenue (i.e. toll increase, recapture of projected loss of revenue due to the MAAR opening) would need to be added to the Turnpike Capital Program to fund the project costs.

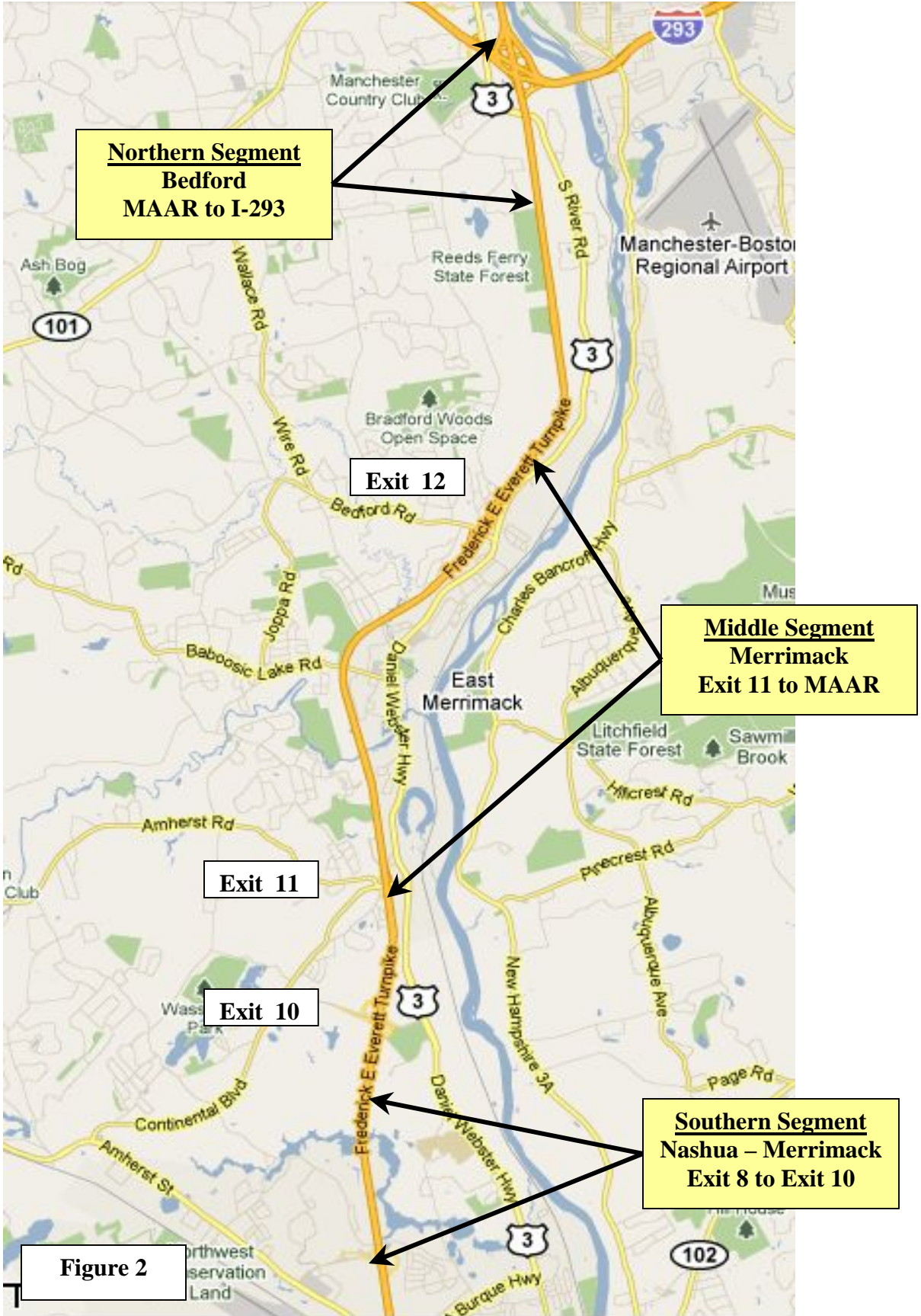


Figure 2

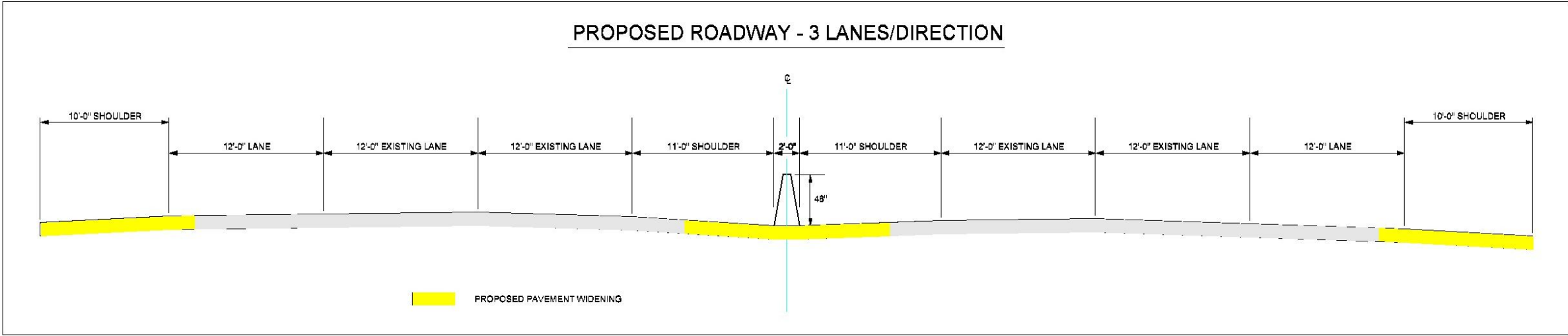
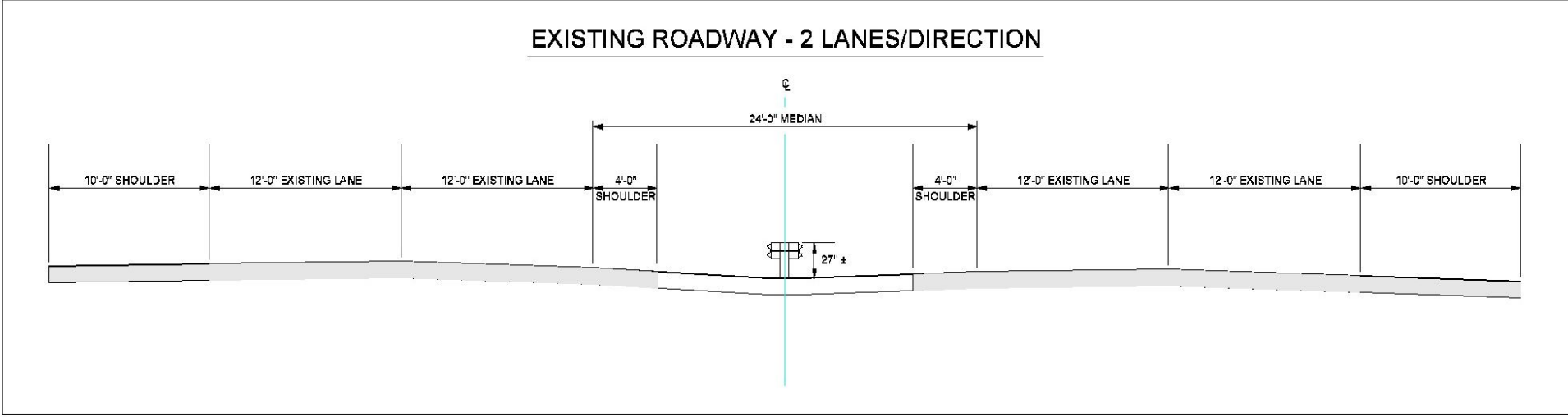


Figure 3

F.E. EVERETT TURNPIKE
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APPENDIX

CONCEPT PLANS

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