

STATE OF NEW HAMPSHIRE  
INTER-DEPARTMENT COMMUNICATION

**FROM:** Michael J. Dugas, P.E. *MJD* **DATE:** June 30, 2010  
Chief of Preliminary Design **AT (OFFICE):** Bureau of Highway Design

**SUBJECT:** BEDFORD  
13527  
(US 3 - Replace bridge over F.E.E.T.)

**TO:** Keith A. Cota, P.E. *KAC 7/2/10*  
Chief Project Manager

**THRU:** Craig A. Green, P.E. *CAG 7/2/10*  
Administrator, Bureau of Highway Design

**ATTN:** Alex V. Vogt, P.E. *AVV 7/20/10*  
Project Manager

**ENGINEERING REPORT**

I. INTRODUCTION

Beginning at a point in the travel way of US 3 at the Target/Lowe's drive and running southerly along US 3 approximately 0.6 mi. This project involves the replacement of the US 3 bridge over the F.E. Everett Turnpike. The proposed bridge will shift US 3 north of the current location and allow traffic to be maintained on the existing bridge during construction.

As part of this work, it is proposed that 5' shoulders and 5' sidewalks will be added to both sides of US 3 from the Target/Lowe's intersection south to Hawthorne Drive (north).

II. EXISTING CONDITIONS

A. US 3 – South River Road

1. Functional Class: Urban Minor Arterial
2. Roadway – Two 12 ft travel lanes with 4 ft wide shoulders.
3. Alignment – Minimum horizontal curve = 650 ft [Acceptable for 40 mph]
4. Profile – Maximum Grade = 6.3%

Minimum Vertical Curves:

- Crest K = 98 [Acceptable for 50 mph]
- Sag K = 39 [Acceptable for 30 mph]

5. Posted Speed: 35 mph

6. NH Bridge No. 189/121

- Type: I-Beams with Concrete Deck
- Built 1955
- Length: 150 ft (2 Spans)
- Width: 41.5 ft (30 ft curb-to-curb; sidewalks on both sides)
- Federal Sufficiency Rating: 10.6 (Inspected 11/2009)
- State Redlist – Structurally Deficient

B. F.E. Everett Turnpike

1. Functional Class: Urban Freeway
2. Roadway – Four-lane divided highway; each direction includes two 12 ft travel lanes, a 4 ft wide median shoulder, and a 10 ft wide outside shoulder.
3. Alignment – Minimum horizontal curve = 11,172 ft [Acceptable for 65+ mph]
4. Profile – Maximum Grade = 3.0%

Minimum Vertical Curves:

- Crest K = 332 [Acceptable for 65 mph]
- Sag K = N/A [No sag within project limits]

5. Posted Speed: 55 mph

C. Station Road

1. Functional Class: Urban Local Road
2. Roadway – Two 9 ft travel lanes.
3. Alignment – Tangent approach with an approximate 90° intersection angle.
4. Profile – Maximum Grade = 9.11% ascending to intersection

Minimum Vertical Curves:

- Crest K = 6 [Acceptable for 15 mph]
- Sag K = 10 [Acceptable for 15 mph]

5. Posted Speed: None
6. Stop sign control
7. Intersection Sight Distance: 450 ft [Acceptable for 40 mph]

D. Hawthorne Drive (north)

1. Functional Class: Urban Local Road
2. Roadway – Two 12 ft travel lanes with 2 ft wide shoulders.
3. Alignment – Curved approach with an approximate 90° intersection angle.
4. Profile – Maximum Grade = 2.9% ascending to intersection

Minimum Vertical Curves:

- Crest K = N/A [No crest within project limits]
- Sag K = N/A [No sag within project limits]

5. Posted Speed: 30 mph
6. Signal control
7. Intersection Sight Distance: 400 ft [Acceptable for 40 mph]

### III. PROBLEMS AND SOLUTIONS

**Problem:** The existing bridge is structurally deficient and cannot be rehabilitated.

**Solution:** A new bridge will be constructed north of the existing bridge. The existing bridge will be used to maintain traffic until the proposed bridge is complete.

**Problem:** Future widening of the FE Everett Turnpike is constrained by the current bridge 150 ft length (two spans) and ledge cuts on both sides of the roadway.

**Solution:** The proposed 200 ft bridge length (two spans) will accommodate anticipated widening of the Turnpike and associated ramp improvements. A minimum vertical clearance of 16.5 ft will be provided. The existing bridge and abutments will be removed. The ledge will be cut back from where it begins north of the bridge to just south of the existing bridge location.

**Problem:** The current two-lane roadway will not provide sufficient capacity for anticipated traffic growth on the US 3 corridor in Bedford. The *US Route 3 Department Policy In The Towns Of Bedford & Merrimack* dated October 1988 recommends an optimum typical section to include “two (2) through lanes in each direction separated by a raised median (or barrier), with provisions for left turn lanes at major intersections.”

**Solution:** In order to accommodate current and future traffic capacity requirements, the US 3 typical section will provide a four-lane divided roadway from the Lowe’s/Target site south to the intersection with Hawthorne Drive (north). The curbed median will be 14 ft wide with an additional 2 ft for lane markings on either side (total width of 18 ft).

**Problem:** The existing sidewalk located on the bridge is not connected to other nearby sidewalks.

**Solution:** The project will include 5 ft sidewalks with 5 ft shoulders on both sides of US 3 from the Lowe’s/Target site to the intersection with Hawthorne Drive (north). The proposed sidewalk will connect to an existing network on Hawthorne Drive (north) and with a commercial development opposite the Lowe’s/Target site.

### IV. DESIGN RECOMMENDATIONS AND CONSIDERATIONS

#### A. Design Speeds:

US Route 3 – 35 mph,  $e_{\max} = 0.04$

Station Road – 20 mph,  $e_{\max} = 0.04$

B. Typical Section:

Road	Type	Typical Section	Pavement Depth		Structural Section
			Travel Way	Shoulder	
US Route 3	Primary	Four 12' travel lanes One 18' median (14' raised) Two 5' shoulders Two 5' sidewalks	6.5"	6.5"	12" Crushed Gravel 12" Gravel 12" Sand
Station Rd	Secondary	Two 9' travel lanes	3.5"	3.5"	8" Crushed Gravel

C. Design Exceptions: None

D. Traffic Control Plan:

Two-way traffic and access to all side streets and driveways will be maintained at all times. Turnpike traffic will be subject to infrequent rolling roadblocks during off-peak hours to accommodate ledge and structure removal and when placing steel on the proposed bridge.

A memo dated 1/12/2009 was provided to the Traffic Control Committee (TCC) to determine the "Significant" status of the project. The TCC met on 7/17/2009 and determined a "non-Significant" status and that regular public outreach should be provided.

E. Drainage and Stormwater Treatment:

The proposed curbed roadway section will require multiple closed drainage systems with treatment areas. Preliminary treatment locations are shown on parcels 8, 9, 11, and 20. Outlet protection will be provided.

F. Environmental:

1. Wetlands – Currently there are no wetland areas impacted within the project limits. However, wetland impacts could result from increased roadway and drainage work on US 3 south of Hawthorne Drive (north). Additional topographic survey has been requested.
2. Historic Resources – No historic resources have been located within the project limits.
3. Archeological Resources – No archeological resources have been located within the project limits.
4. Stonewalls – One stonewall is located perpendicular to US 3 at sta. 530+05 right. Approximately 5-10 ft may be impacted by the proposed slope work.
5. Contaminated Soils – No contaminated soils are anticipated.

G. Utilities:

Aerial utilities include power, telephone, and cable. Approximately 11 poles will require relocation. Water and gas lines have been identified within the project limits, but do not cross on the existing bridge.

H. Right-of-Way:

	Total Area (Square Feet)	No. Parcels Impacted
ROW Acquisitions	55,650	11
Permanent Drainage Easements	275,425	12
Temporary Slope Easements	16,721	7
Temporary Drive Easements	6,180	4

I. Traffic<sup>1</sup>:

US 3:

2008 AADT = 18,000 vpd (8.9% trucks)

2011 AADT = 18,700 vpd

2031 AADT = 24,200 vpd

F.E. Everett Turnpike (8/2007)

	<u>Southbound</u>	<u>Northbound</u>
ADT:	28,050 vpd	28,640 vpd
Avg. Weekday AM Peak:	3,230 vph	1,880 vph
Avg. Weekday PM Peak:	2,290 vph	3,675 vph

Projected volumes with Manchester Airport Access Road open:

	<u>Southbound</u>	<u>Northbound</u>
Weekday PM Peak:	2,700 vph	4,325 vph

J. Accidents:

An accident report on file cites 8 accidents between November 2002 and December 2007. All of the crashes were limited to property damage only. One crash involved an animal strike and the remaining seven were attributed to driver errors.

K. Soils:

Preliminary Design has coordinated with the Geotechnical Section to identify boring locations.

L. Earthwork:

Approximate quantities are as follows:

Common Excavation.....	21,500 CY
Rock Excavation.....	12,800 CY
Embankment-in-Place.....	30,600 CY

M. Lighting:

The addition of intersection lighting on US 3 at the intersection of Hawthorne Drive (north) and to light the raised median islands should be provided per the Utility Accommodation Manual.

<sup>1</sup> See Traffic Report on file for further information.

L. Survey:

Existing detail information was collected by SDR and processed by NHDOT. Additional survey areas have been requested. Data collection and processing is anticipated to be completed by September 1, 2010.

M. Estimate:

Construction	\$12,200,000
Right-of-Way	\$375,000
<u>Engineering</u>	<u>\$1,400,000</u>
Total	\$13,975,000

100% Turnpike Funds

N. Available Material:

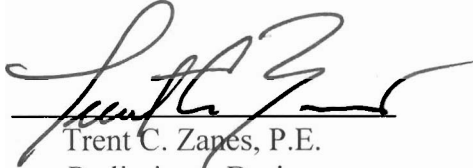
1. CADD (MX and Microstation)

- 1:600 scale base detail with contours
- Existing ROW and property lines in Microstation
- Aerial Photography
- Preliminary plans, profiles, and cross sections for proposed design
- Geometric base plan

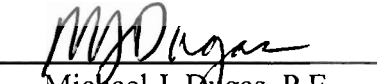
2. Hard Copy Plots

- Utility plans for power, telephone, and water
- CADD plots available per request

Drafted by:

  
Trent C. Zanes, P.E.  
Preliminary Design

Noted by:

  
Michael J. Dugas, P.E.  
Chief of Preliminary Design

cc: C. Green  
C. Hood  
W. Oldenburg  
D. Smith  
C. Schmidt