



# MEMORANDUM

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**To:** Chris Bibbo, Public Works Superintendent  
**From:** John Vancor, P.E.  
**Subject:** Lincoln Roadway Project  
**Job No.** 250-2  
**Date:** September 19, 2008

In response to a request from Jason Felsch, I am writing to summarize the quantities that we developed while preparing the projections of probable construction cost for the various roadway segments.

### **Methodology**

The goal of this effort has been to develop an “order of magnitude” estimate. The extent of our field efforts has varied depending on the complexity of the various segments.

The level of analysis for pavement rehabilitation has been significantly more detailed than for other items of work. We consider this appropriate since the pavement rehabilitation represents the largest component of cost for the program.

For other work, we looked at each of the following components:

#### Curbing and Bituminous (Asphalt) Berm:

Generally we assume that existing curb and berm locations will continue to be curbed in this program. Where granite exists, it will be retained. We will strive to avoid the need to remove and reset granite.

At locations where there is existing asphalt berm, we anticipate construction of new berm. At several locations where the berm is in very good condition and the recommended improvement calls for milling and overlay (as opposed to reclamation), we anticipate retaining the existing berm.

Where new berm is constructed, we understand that the preference is for low “Cape Cod” type berm. In some areas where high gutter flow is evident (based on observation of washing out of material behind the berm) we will specify a higher berm during our final design efforts.

#### Guardrail:

We have included lengths of guardrail to be replaced. In many locations we have identified specific locations where we consider replacement to be a high priority and have included this rail in our estimates. In other locations we have estimated a percentage of the guardrail that would be included in this program.

It is important to note that the program estimate does not include replacement of all guardrails. This should not imply that we have inspected other sections and consider existing guardrail to be fully



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satisfactory. We have not made this determination and note that such a determination would involve a level of effort much greater than our scope of work includes.

Rather than a full evaluation of conditions, our effort is aimed at identifying a reasonable program to address the highest priority guardrail locations. Toward this end, we have consulted with Public Safety and Public Works and anticipate further coordination during final design efforts to finalize limits of guardrail replacement.

## Shoulder Grading and Restoration

An important factor in preserving pavement condition is to include provisions in order to avoid puddling. Over years, sand has built up on the roadway edges at many locations along the roads in this program. This sand acts as a berm that can either hold water in a puddle or cause concentrated gutter flow where stormwater previously ran directly off the side slopes. Locations where this concentrated flow eventually outlets can be subject to significant erosion. In our program estimates we have identified many locations where this sand should be removed and the shoulder restored.

The locations identified are areas where a specific drainage runoff improvement will result. It is noted that this criteria does not address all locations where sand has accumulated, but as a review of the quantities listed for each segment will confirm, this criteria has led to a recommendation for restoration of many linear feet.

## Drainage

We have included allowances for drainage improvements that vary from construction of new catch basins and piping that connect into existing systems, to reconstruction of entire roadway systems. These recommendations are based on our field observations as well as input from Public Works.

We note that these improvements will address specific existing issues. Record plans are available only for approximately one third of the program, so in many cases specific information regarding the system (pipe sizes, materials and slopes) is not available. We are not calling for wholesale replacement of all catch basins to incorporate deep sumps, nor are we analyzing existing systems to evaluate performance for a “design storm”.

We have also included allowance for specific areas where we consider that it may be possible to construct small roadside swales to provide water quality treatment. Because of the narrow right-of-way and location of trees and walls, the number of these locations is extremely limited.

## Other

Within the other category are allowances for intersection improvements, traffic calming, landscaping and limited tree removal.

## Contingencies

The estimate presented is for construction cost. The numbers presented for pavement rehabilitation include a contingency allowance of 15%. Other items of work include a contingency allowance of 20%. This allowance reflects the uncertainty of specific limits of work at this time and allows for



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incorporation of traffic calming features such as speed humps and raised crosswalks as the design progresses.

### Sidewalks and Roadside Paths

The program included in the estimates includes very little provision for sidewalk improvements and no work on the separate roadside paths. Needless to say, if the Town desires, additional sidewalk and path work can be added to the program, but these enhancements will raise the project's program costs higher.

### **Summary of Quantities**

#### Bedford Road Route 2A to Route 2

Asphalt Berm	1,080 LF
Guardrail	0
Shoulder Restoration	1,625 LF
Drainage	\$70,000

The drainage allowance includes improvement to a culvert near Route 2A, new catch basins at several locations and anticipated improvements to a system near Acorn Road.

It is noted that the program as estimated does not call for changes or wholesale reconstruction of the sidewalk/roadside path.

#### Bedford Road Route 2 to Trapelo Road

Sloped Granite Curb Remove & Reset	560 LF
Asphalt Berm	6,260 LF
Guardrail	800 LF
Shoulder Restoration	600 LF
Drainage	\$62,000

The drainage allowance includes erosion repairs on the side slope near Route 2, some new catch basins and improvements at a cross culvert.

#### Lincoln Road – Trapelo Road to Route 117

Sloped Granite Curb Remove & Reset	500 LF
Asphalt Berm	3,550 LF
Guardrail	880 LF
Shoulder Restoration	2,280 LF
Drainage	\$60,000

The drainage allowance includes several possible new catch basins, possible repairs at cross culvert and minor swale construction.



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Other improvements include:

- Sidewalk alternative at St. Joseph’s Church.
- Limited tree removal for sight distance at Ballfield Road and at the raised crosswalk, as well as one tree between Codman Road and the railroad tracks, and one tree across from the fire station.
- Improvements to Codman Road intersection including reduction of the corner radius, raising the crosswalk and installation of a flashing beacon.
- A \$25,000 allowance for landscaping.

## Trapelo Road

Asphalt Berm	7,305 LF
Guardrail	1,020 LF
Shoulder Restoration	6,615 LF
Drainage	\$528,000

Drainage includes reconstruction of the system from the 5-way intersection to the pond; reconstruction of the system near the reservoir; and roadside and culvert improvements at several other locations.

Other improvements include an allowance for landscaping.

## Sandy Pond Road

Asphalt Berm	3,000 LF
Shoulder Restoration	3,000 LF
Drainage	\$24,000

Drainage includes an allowance for more extensive roadside work to improve clearing of runoff from pavement.

## Baker Bridge Road

Shoulder Restoration	3,400 LF
Drainage	\$24,000

Drainage includes replacement of roadway cross culvert.

## Route 117 from Concord Town Line to Lincoln Road

Asphalt Berm	6,700 LF
Guardrail	2,400 LF
Shoulder Restoration	8,800 LF
Drainage	\$63,000

Drainage includes improvements to cross culvert, catch basin improvements and repair to slope erosion.

Other improvements include:



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- New mast arm at signalized intersection.
- Realignment of corners at intersection with Route 126.
- Realignment of traffic islands.

Note: Although costs are not reflected in the proposal, we consider a roundabout intersection at Route 117 and Route 126 worthy of consideration. Generally, the geometry is favorable and this treatment could help preserve and redefine the roadway character.

While rehabilitation of the intersection pavement at the intersection with Route 117 is included, wholesale reconstruction of this intersection is not.

Although the geometry is more complicated here than at Route 126, we believe that a roundabout intersection is worthy of consideration. The costs for roundabouts vary greatly, but this variance comes not from the pavement but rather from the streetscape and landscape features incorporated, particularly in the center circle.

### Route 117 Lincoln Road to Weston Town Line

Asphalt Berm	2,000 LF
Guardrail	1,750 LF
Shoulder Restoration	6,500 LF
Drainage	\$36,000

Drainage includes an allowance for new catch basins and piping, as well as spot improvements to existing system.

Other improvements include:

- Channelization island at Tower Road intersection.
- Realignment of curve at Codman Road intersection.
- Limited tree removal to improve sight distance at Tower Road intersection.

The costs projected for this segment do not include construction of median islands at the railroad crossing which we understand will be performed in a separate effort.

### Route 126 – Concord Town Line to Route 117

Granite Curb Remove and Reset	500 LF
Asphalt Berm	5,000 LF
Guardrail	2,000 LF
Shoulder Restoration	2,500 LF
Drainage	\$180,000

Drainage includes improvements to a roadway culvert and also improvements at other locations including a closed system south of the railroad bridge and a closed system near the Baker Bridge Road intersection.



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It is noted that no special provisions have been made for improvements to the railroad bridge.

Route 126 – Route 117 to Wayland Town Line

Asphalt Berm	1,400 LF
Guardrail	550 LF
Shoulder Restoration	3,000 LF
Drainage	\$132,000

Drainage includes rehabilitation and expansion of small closed systems at two locations.

I hope that this summary is helpful. Please call me with any questions regarding this information.