

## CHAPTER 8 – CONSTRUCTION COST ESTIMATES FOR ALTERNATIVES

### 8.1 Introduction

This chapter of presents the order-of-magnitude construction cost estimates for the 23 conceptual alternatives. Because of the limited nature of engineering design completed during screening, it is not possible to develop construction cost estimates using the detailed estimation methodology of calculating specific quantities of design components and applying weighted average bid prices. It is for this reason that a planning level construction cost estimate methodology was developed for use on this project. This methodology is described in the following section.

The cost estimates developed do not include any costs associated with environmental mitigation or any aspect of right-of-way acquisition. In addition, for the combined TDM and Public Transportation alternative (Alternative 1), all costs other than the dedicated bus lanes have not been included.

### 8.2 Methodology

Each conceptual alternative under consideration can be categorized by construction type and functional class. Therefore, the first criterion used for developing cost estimates was to distinguish between alternatives involving the construction of new roadways and those involving improvements (i.e., widening and reconstruction) of existing roadways. The second criterion used the availability of historical cost data for similar types of projects. For this criterion, VTrans staff provided a list of sample projects, located mostly within Chittenden County, for which construction bids were solicited over the past three years. For each of these sample projects, the bid tabulations were provided along with a project description sufficient to develop a variety of order-of-magnitude cost data.

For each of the sample projects, the winning bid was sorted into the general unit cost categories of work identified below:

- Drainage
- Earthwork
- Roadway
- Traffic
- Utilities-lighting
- Streetscape

Each of these cost categories was then analyzed to determine a unit cost based on one lineal foot of route length. By compiling the bid tabulations in this manner, it was possible to identify a reasonable range of unit costs for use by general functional class and type of alternative. For roadway costs it was found that the cost for bituminous concrete pavement and sub-base materials represented on average 75% of the itemized roadway costs. This allowed the development of roadway costs specific to the typical sections being used for any given alternative.

The cost estimates presented in Table 8-2 at the end of this chapter are presented for each alternative as a low cost and a high cost, this is intended to provide a range within which the cost to build the alternative could be expected to fall. It is important to recognize that these

estimates have been developed with only a very limited level of design and are not intended to represent anything other than an order of magnitude costs.

In addition, several categories of work were considered to be highly variable and were removed from the unit cost estimate; they were instead applied as a percentage of the total costs derived from the lineal foot based estimates. These categories included mobilization and traffic control and were supplemented with a project delivery item, these are discussed in more detail below.

- Mobilization was included by adding 10% to the unit rate. The typical range on transportation projects is within 3% to 8%, the bid tabulations were checked to confirm typical rates experienced in Vermont on recent projects. It was found that the Mobilization percentage varied in a range of 2.5% to 20% with several in the 10% range, discarding the high and low resulted in an average around 10%.
- Traffic control was included by adding 15% to the unit rate, this is a higher than normal percentage since generally if little is known about a job a preliminary estimate would carry a 10% rate. The 15% was used based on recent experience on transportation projects where Traffic Control costs have been running significantly higher than the Engineer's Estimate.
- Construction Engineering was included by adding 15% to the unit rate. This item is intended to cover the costs associated with construction engineering, on the job training and other costs that may be typically allocated to the project during construction.

Other components of the alternatives that were factored into the cost estimates were intersection improvements and major structures. For intersections, the number of intersection locations was identified for each alternative and a range of unit rates were developed. For major structures, the location of each major structure was identified, and a deck area was estimated and a range of reasonable unit costs was developed.

Since each alternative was developed in ArcView for the environmental screening evaluation, a similar GIS methodology was used to determine the route length of each alternative, including the length of interchange ramps. Intersections were quantified by cross referencing the GIS street layer for the project area with the listing of intersections for which traffic analysis was undertaken. Bridge locations, span lengths, and deck widths were estimated by reviewing the alternatives overlain upon the County-wide digital orthophotography. Table 8-1 summarizes the components used for estimation purposes for each alternative.

**Table 8-1  
Components Used For Cost Estimates for Alternatives**

Alternative		Route Length	Ramp Length	Inter-sections (#)	Bridge Deck Area
1	Combined TDM and Public Transportation Concepts	19,694	0	0	7,338
2	VT 2A Corridor Improvements with Traditional TSM	20,856	0	11	7,338
3	VT 2A Corridor Improvements with Roundabouts	21,490	0	9	7,338
4	VT 117 Corridor Improvements	42,610	0	2	2,871
5	North Williston Road Corridor Improvements	18,269	13,728	3	16,591
6	Multi-Corridor Improvements with Traditional TSM	25,027	0	15	7,338
7	Multi-Corridor Improvements with Roundabouts	25,661	0	13	7,338
8	Brownell Road Corridor Improvements	11,035	4,752	5	1,914
9	Circ A/B Limited Access Highway	18,797	11,510		71,556
10	Circ A/B Boulevard	18,797	11,510	2	42,356
11	Circ Limited Access Highway (East Alignment)	18,374	14,045		66,214
12	Circ Boulevard (East Alignment)	18,374	10,454	2	42,248
13	Circ A Partial (Circ Street)	8,554	6,864	2	16,609
14	Circ B Limited Access Highway	9,029	4,646	1	25,747
15	Mountain View Road Connector	12,619	0	2	16,704
16	Circ A/B Limited Access Highway with VT 2A Spot Improvements	21,278	11,510	0	71,556
17	Circ A/B Boulevard with VT2A Spot Improvements	21,278	11,510	0	42,356
18	VT 2A Corridor Improvements with Traditional TSM and Circ A Partial (Circ Street)	29,410	6,864	13	16,609
19	VT 2A Corridor Improvements with Roundabouts and Circ A Partial (Circ Street)	30,043	6,864	11	16,609
20	North Williston Road Improvements with Circ B Connector and VT 2A Spot Improvements	21,067	4,488	2	21,695
21	Brownell Road Corridor Improvements with Mountain View Road Connector and VT 2A Spot Improvements	27,034	9,187	6	22,334
22	VT 2A – Williston Improvements with Roundabout at Five Corners	21,100	0	6	0
23	VT 2A – Williston Improvements with Roundabout at Five Corners and Circ A Partial (Circ Street)	8,554	6,864	8	16,609

### 8.3 Construction Cost Estimates

The construction cost estimates for the alternatives are presented in Table 8-2.

**Table 8-2  
Low and High Cost Estimates for Alternatives**

Alternative		Low Cost (millions)	High Cost (millions)
1	Combined TDM and Public Transportation Concepts	\$29.9	\$37.3
2	VT 2A Corridor Improvements with Traditional TSM	\$34.4	\$44.0
3	VT 2A Corridor Improvements with Roundabouts	\$35.1	\$44.7
4	VT 117 Corridor Improvements	\$63.2	\$79.2
5	North Williston Road Corridor Improvements	\$46.6	\$58.4
6	Multi-Corridor Improvements with Traditional TSM	\$41.3	\$53.0
7	Multi-Corridor Improvements with Roundabouts	\$42.1	\$53.7
8	Brownell Road Corridor Improvements	\$23.1	\$29.3
9	Circ A/B Limited Access Highway	\$55.0	\$68.3
10	Circ A/B Boulevard	\$47.7	\$59.5
11	Circ Limited Access Highway (East Alignment)	\$56.8	\$70.6
12	Circ Boulevard (East Alignment)	\$45.7	\$57.1
13	Circ A Partial (Circ Street)	\$23.5	\$29.5
14	Circ B Limited Access Highway	\$24.4	\$30.4
15	Mountain View Road Connector	\$23.5	\$29.5
16	Circ A/B Limited Access Highway with VT 2A Spot Improvements	\$59.2	\$73.5
17	Circ A/B Boulevard with VT 2A Spot Improvements	\$51.1	\$63.6
18	VT 2A Corridor Improvements with Traditional TSM and Circ A Partial (Circ Street)	\$58.0	\$73.5
19	VT 2A Corridor Improvements with Roundabouts and Circ A Partial (Circ Street)	\$58.7	\$74.2
20	North Williston Road Improvements with Circ B Connector and VT 2A Spot Improvements	\$42.7	\$53.4
21	Brownell Road Corridor Improvements with Mountain View Road Connector VT 2A Spot Improvements	\$57.5	\$72.3
22	VT 2A – Williston Improvements with Roundabout at Five Corners	\$25.1	\$32.0
23	VT 2A – Williston Improvements with Roundabout at Five Corners and Circ A Partial (Circ Street)	\$46.3	\$59.1

Notes: 1. The Cost estimate for Alternative 1 above does not include public transportation aspects which will be included subsequently.  
2. The results shown in this table are preliminary for screening purposes only and will be superseded by detailed analysis of the refined short-listed alternatives.