Concord Downtown
Complete Streets Improvement Project

Benefit/Cost Analysis - Safety
Expected Crash Reduction and Safety Benefit: Analysis and Estimation

Background

The downtown section of Main Street is currently four lanes, with two travel lanes in each direction and no turning lanes. The proposed project will convert a substantial portion of Main Street to a three-lane section, with one travel lane in each direction and a center lane area for left turns or median islands. Commonly referred to as a 'road diet', such a roadway conversion has demonstrated substantial crash reduction in communities across the country. The American Association of State Highway and Transportation Officials' *Highway Safety Manual*[1] indicates that such lane-conversion projects can reduce crashes by about 29 percent.

The proposed project will convert about 0.6 miles of Main Street to the three-lane section. The conversion will occur along two roadway sections: North Main Street between the signalized North Main/Loudon/Centre intersection and the signalized North Main/Pleasant intersection; and South Main Street between the Main/Pleasant intersection and the signalized South Main/Storrs intersection.

Estimated Crash Reduction and Savings Benefit

Concord Police Department crash records for the subject roadway sections were summarized for the five-year period from 2006 to 2010. Crashes related to the three signalized intersections adjacent to each roadway section were removed from the data base as well as unrelated crashes such as in off-street parking areas. The resulting crash history, tabulated by crash severity, is summarized in Table 1. Computed annual average crash incidence is also included.

Also shown in Table 1 are the expected crash-reduction benefits of the proposed roadway lane conversion. Annual crash reduction is based on the referenced AASHTO crash modification factor. Cost per severity of crash is based on 2011 values provided by the New Hampshire Department of Transportation.[2]

[1] American Association of State Highway and Transportation Officials, *Highway Safety Manual, First Edition*, (Washington D.C., 2010), Section 13.4.2.3, CMF = 0.71.

[2] New Hampshire Department of Transportation, Bureau of Planning and Community Service.

Table 1. Crash Reduction and Estimated Benefits					
Crash History			Estimated Crash Reduction Benefits (2011)		
Crash Type	5-Year Period (2006-2010)	Average Annual Crashes	Expected Annual Crash Reduction	Cost per Crash	Annual Benefit
Fatal	0	0.00	0.000	$5,800,000	$0
Injury - Incapacitating	1	0.20	0.058	$402,000	$23,316
Injury -Non-incapacitating	40	8.00	2.320	$80,000	$185,600
Injury - Possible	20	4.00	1.160	$42,000	$48,720
Property Damage Only	186	37.20	10.788	$4,000	$43,152
Total	247	49.40	14.326		$300,788

Project-Life Savings Benefit

Annualized savings of future crash reduction is computed in Table 2. The present worth (2011) of the project's future crash reduction savings over a 20-year service life is $2,913,927. Assumptions include:

- 2011 base-year costs and benefits per Table 1
- 20-year service life (2015 through 2034)
- Discount rate of 7 percent per guidance in OMB Circular A-94[3]
- Increase in future crash frequency of 1 percent per year based on projected corridor traffic growth of 1 percent per year[4]
- Effects of potential cost inflation are not included

[3] Executive Office of the President, Office of Budget and Management, *Circular A-94 Guidelines and Discount Rates for Benefit-Cost Analysis for Federal Programs*.

[4] Hoyle Tanner & Associates, *Rethinking Main Street – Final Report*, (Concord NH, June, 2011), Appendix E, Traffic Volumes and Operations Analysis.

Table 2. Annualized Benefits of Crash Reduction					
		7% Discount Rates		3% Discount Rates	
Year	Annual Benefit	Rates	Present Worth (2011 $)	Rates	Present Worth (2011 $)
2011	$300,788				
2012					
2013		0.934579		0.970874	
2014		0.873439		0.942596	
2015	$312,820	0.816298	$238,648	0.915142	$277,936
2016	$315,948	0.762895	$225,266	0.888487	$272,539
2017	$319,107	0.712986	$212,635	0.862609	$267,247
2018	$322,298	0.666342	$200,711	0.837484	$262,058
2019	$325,521	0.622750	$189,456	0.813092	$256,969
2020	$328,776	0.582009	$178,833	0.789409	$251,980
2021	$332,064	0.543934	$168,805	0.766417	$247,087
2022	$335,385	0.508349	$159,339	0.744094	$242,289
2023	$338,739	0.475093	$150,404	0.722421	$237,585
2024	$342,126	0.444012	$141,970	0.701380	$232,971
2025	$345,547	0.414964	$134,009	0.680951	$228,448
2026	$349,003	0.387817	$126,495	0.661118	$224,012
2027	$352,493	0.362446	$119,402	0.641862	$219,662
2028	$356,018	0.338735	$112,706	0.623167	$215,396
2029	$359,578	0.316574	$106,386	0.605016	$211,214
2030	$363,174	0.295864	$100,420	0.587395	$207,113
2031	$366,805	0.276508	$94,790	0.570286	$203,091
2032	$370,474	0.258419	$89,474	0.553676	$199,148
2033	$374,178	0.241513	$84,457	0.537549	$195,270
2034	$377,920	0.225713	$79,721	0.521863	$191,489
2035		0.210947	-	0.506692	-
20-Year Project Lifetime			$2,913,927		$4,643,505