Concord Downtown
Complete Streets Improvement Project

Benefit/Cost Savings Analysis – Economic Competitiveness
Expected Travel Time Savings: Analysis and Estimation

Background

The traffic operations analysis in the *Rethinking Main Street Report (RMSR)*[1] reported substantial reduction in vehicle delay at the Main/Pleasant intersection due to proposed lane use and signalization improvements. Reduced vehicle delay translates into user savings considering the value of user time as well as the savings in fuel consumption due to less stopped/idling time. The referenced traffic analysis estimated values of intersection peak-hour vehicle delay and fuel consumption using the Synchro traffic analysis software. Output values from the study's reported 2013 and 2023 build/no-build analyses are assumed (for simplicity) to compare to the 2015 and 2025 years of this TIGER application.

Estimated Road-User Travel-Time Savings

Signalized intersection delays were reported in the RMSR for the weekday PM peak hour condition. These values are summarized in Table 1 for the four project evaluation scenarios. Review of historic traffic count data in the close vicinity of the Main/Pleasant intersection indicates that weekday hourly traffic volumes between 12:00 PM and 5:00 PM are generally within 3 percent of the PM Peak Hour value. For purpose of this cost analysis, it is assumed that the computed intersection delays for the 4:00 – 5:00 PM peak are generally similar to those that would occur during the preceding hours after 12:00 PM. Thus a 5-hour analysis period is developed (12:00 to 5:00 PM on weekdays) for purpose of estimating user savings based on the referenced traffic analysis. For the remaining hours of the day, the computed intersection delays for the 5:00 PM to 7:00 AM non-peak hours is used in estimating user savings in the remaining 19-hour non-peak analysis period.

The computation of annual costs associated with intersection delays are summarized in Table 1 for the four analysis scenarios. Additional assumptions include:

- Assumed average vehicle occupancy of 1.2 persons per vehicle.
- Hourly value of travel time savings of $13.90 per hour (2011 dollars) based on data published in a US Department of Transportation memorandum[2] recommending an $11.20 per hour (2000 dollars) composite rate for local, all-purpose travel and inflating the cost to 2011 dollars assuming a 2 percent annual increase.
- Values for 2035 estimated based on linear extrapolation from computed values for 2015 and 2025.

[1] Hoyle Tanner & Associates, *Rethinking Main Street – Final Report* (Concord NH, June 1, 2011), Appendix E, Traffic Volumes and Operations Analysis.

[2] U.S. Department of Transportation memorandum, *Departmental Guidance for the Valuation of Travel Time in Economic Analysis*, Revision 1, February 11, 2003, Table 4.

Table 1. Estimated User Travel Time Costs and Savings: Main @ Pleasant Intersection Improvements						
	2015			2025		
Peak-Hour Analysis	No-Build	Build	**Savings**	No-Build	Build	**Savings**
Average Delay (seconds per vehicle)						
4-5 PM Peak Hour (per Synchro Model)	58.8	42.5	**16.3**	87.0	52.8	**34.2**
Intersection Traffic Volumes						
4:00 - 5:00 PM Weekday Peak Hour	1673	1673		1877	1877	
12:00 - 5:00 PM Average Hour (3% less than peak per historic traffic data)	1623	1623		1821	1821	
12:00 - 5:00 PM Weekday Estimated 5-hour Total	8114	8114		9103	9103	
	2015			2025		
Non-Peak Hour Analysis	No-Build	Build	**Savings**	No-Build	Build	**Savings**
Average Delay (seconds per vehicle)						
5 PM - 7 AM Non-Peak Hour (per Synchro Model)	37.5	18.9	**18.6**	39.2	19.5	**19.7**
Intersection Traffic Volumes						
5:00 PM - 12:00 Noon Weekday Estimated 19-hour Total	12691	12691		14238	14238	
Estimated Annual Travel Time Savings - Peak Hour						
2015 Weekday Peak Period (12:00 - 5:00 PM)	(8114 veh) x (16.3 sec/veh) x (1.2 persons/veh) x (1 hr/3600 sec) x (261 wdays/yr) x ($13.90/Hr) = **$159,940**					
2025 Weekday Peak Period (12:00 - 5:00 PM)	(9103 veh) x (34.2 sec/veh) x (1.2 persons/veh) x (1 hr/3600 sec) x (261 wdays/yr) x ($13.90/Hr) = **$376,565**					
2035 Weekday Peak Period (12:00 - 5:00 PM)	**$593,190** (estimation based on linear extrapolation from prior period values)					
Estimated Annual Travel Time Savings - Non-Peak Hour						
2015 Weekday Peak Period (5:00 PM - 12:00 Noon)	(12691 veh) x (18.6 sec/veh) x (1.2 persons/veh) x (1 hr/3600 sec) x (261 wdays/yr) x ($13.90/Hr) = **$285,459**					
2025 Weekday Peak Period (5:00 PM - 12:00 Noon)	(14238 veh) x (19.7 sec/veh) x (1.2 persons/veh) x (1 hr/3600 sec) x (261 wdays/yr) x ($13.90/Hr) = **$339,269**					
2035 Weekday Peak Period (5:00 PM to 12:00 Noon)	**$393,079** (estimation based on linear extrapolation from prior period values)					

Project-Life Savings Benefit

Annualized road-user savings in travel time cost is computed in Table 2 based on values input from Table 1 for years 2015, 2025 and 2035. Values for intervening years are computed based on linear interpolation. The present worth (2011) of the project's future user-cost savings over a 20-year service life is $5,562,808 (7% discount rate). The discounted value of the project life benefit discounted at 3% IS $9,202,200.

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]
- Effects of potential cost inflation are not included

Table 2. Annualized User Travel Time Cost Savings: Main @ Pleasant Improvements

				7% Discount Rate		3% Discount Rate	
Year	Annual Peak-Hour Travel Time Savings	Annual Non-Peak Hour Travel Time Savings	Total Annual Travel Time Savings	Rates	Present Worth (2011 Dollars)	Rates	Present Worth (2011 Dollars)
2013				0.934579		0.970874	
2014				0.873439		0.942596	
2015	**$159,940**	**$285,459**	$445,399	0.816298	$339,793	0.915142	$395,731
2016	$181,603	$290,840	$472,443	0.762895	$336,845	0.888487	$407,533
2017	$203,265	$296,221	$499,486	0.712986	$332,829	0.862609	$418,312
2018	$224,928	$301,602	$526,530	0.666342	$327,896	0.837484	$428,117
2019	$246,590	$306,983	$553,573	0.622750	$322,184	0.813092	$436,996
2020	$268,253	$312,364	$580,617	0.582009	$315,817	0.789409	$444,994
2021	$289,915	$317,745	$607,660	0.543934	$308,903	0.766417	$452,156
2022	$311,578	$323,126	$634,704	0.508349	$301,543	0.744094	$458,523
2023	$333,240	$328,507	$661,747	0.475093	$293,824	0.722421	$464,136
2024	$354,903	$333,888	$688,791	0.444012	$285,823	0.701380	$469,033
2025	**$376,565**	**$339,269**	$715,834	0.414964	$277,613	0.680951	$473,251
2026	$398,228	$344,650	$742,878	0.387817	$269,253	0.661118	$476,825
2027	$419,890	$350,031	$769,921	0.362446	$260,799	0.641862	$479,789
2028	$441,553	$355,412	$796,965	0.338735	$252,298	0.623167	$482,176
2029	$463,215	$360,793	$824,008	0.316574	$243,794	0.605016	$484,018
2030	$484,878	$366,174	$851,052	0.295864	$235,323	0.587395	$485,343
2031	$506,540	$371,555	$878,095	0.276508	$226,916	0.570286	$486,180
2032	$528,203	$376,936	$905,139	0.258419	$218,603	0.553676	$486,556
2033	$549,865	$382,317	$932,182	0.241513	$210,406	0.537549	$486,499
2034	$571,528	$387,698	$959,226	0.225713	$202,346	0.521893	$486,032
2035	**$593,190**	**$393,079**	$986,269	0.210947		0.506692	
20-Year Project Lifetime					**$5,562,808**		**$9,202,200**

[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*.