West Avenue Multimodal Retrofit (WAMR)

Benefit Cost Analysis (BCA) -- Overview

Project Summary

Currently, Norwalk's downtown -- the West Avenue Corridor -- is the city's densest zone, and 5 development projects in the pipeline are expected to make it even denser. While the downtown zone also has the highest transit usage of the city, its two transit hubs -- the Wall Street bus hub and the South Norwalk Rail Station -- lie on opposite ends of the 2-mile corridor. The **infrastructure baseline** is a projection of current conditions alongside a Single-Occupancy Vehicle ('SOV')-oriented redevelopment of the corridor. In other words, the No Build' scenario would still render the development projects, but transportation to, from, and among the projects would be entirely via SOVs, and Norwalk's two transit hubs would remain disconnected.

The **proposed project** -- the West Avenue Multimodal Retrofit ('WAMR') -- would provide an innovative multi-modal transportation infrastructure ahead of expected redevelopment, shifting its tone to a more pedestrian-friendly, transit-oriented format, and connect the two transit hubs, achieving game-changing efficiencies and inducing additional smart growth in the city's mixed-use center.

The **project's justification** stems from its connection to, retrofit, and better utilization of two existing transit hubs and its transformative influence on the shape of historic development volume in downtown Norwalk. Without WAMR, downtown transportation inefficiencies will not only continue, but dramatically worsen. Norwalk is on the threshold of a downtown redevelopment of historic proportions; if that new development fails to produce a multimodal environment, it will suffocate in traffic, setting Norwalk's local economy back a generation, with environmental and economic ripples throughout the region.

The **project's users** include residents, workers, shoppers, and visitors of all kinds within downtown Norwalk and also the region. The WAMR area already includes a sizeable portion of Norwalk's population, cultural and economic activity. With expected redevelopment, this will only intensify. The next iteration of downtown Norwalk, with WAMR, will be denser, healthier, more efficient and convenient, and less car-dependent.

Economic effects of the project will be significant. In addition to direct job creation, WAMR is expected to re-shape imminent development, estimated in the hundreds of millions of dollars, in a more environmental and efficient manner, as well as induce future, unplanned development, bringing more jobs, conveniences, and general economic activity. As noted in the following pages, WAMR will also bring efficiencies to the labor force, better preserving their time, money, and good health.

What's Where / Contents

The BCA is organized in the worksheet tabs below. The "Summary" tab provides an overview of the benefit categories chosen for this analysis, as well as a 'tree-top' summary of those benefits. The "Assumptions" tab exposes the analysis' warts for its reviewers, discussing how each component was approached, and acknowledging its flaws. The "Calculations" tab is a step-by-step, source-referenced version of the "Summary" tab, providing the reviewer with an understanding of the derivation of each input. The NPV tab flows the various benefits into a 20-year, discounted projection of Net Present Value ('NPV'). Finally, "Other Benefits," tab calls attention to benefits that were either difficult/impossible to quantify, or for which the quantification demanded more time than was available, but that are considered nevertheless to be significant.

BCA Summary

Livability

This BCA component intends to show the benefits associated with "livability" improvements resulting from the WAMR project. Specifically, WAMR will dramatically expand heretofore neglible non-SOV access to Norwalk's downtown, and to existing regional and metropolitan transit networks for current and future populations whose access has/would have been restricted to one network or the other -- or neither -- because of the lack of connectivity between the two. The benefit is measured in mode-associated time-savings attributed to a calculated estimate of ridership, and monetized in the case of the former in accordance with DOT guidance on the value of time.

	No Build		Build	
Ridership	0.00		3000	per day
Time Saved	($24)		23.87	minutes per day
Value	($55,077)		$ 55,077	per day
	($14,320,131.72)		$ 14,320,131.72	per year
Deduct	n/a		0.5	for place restriction
Benefit	n/a	**$ 7,160,065.86**		

Economic Competitiveness

This BCA component intends to show the benefits associated with "economic competitiveness" improvements resulting from the WAMR project. Specifically, WAMR will result in cost efficiencies associated with modal diversion as a result of ridership that previously paid the costs associated with transport via single-occupancy vehicles. The benefit is measured using a calculated estimate of ridership and applying a calculated average trip distance and cost under 'build' and 'no-build' scenarios. Further, local planning analysis has demonstrated that the development of WAMR will curtail the need for planned parking facilities in the corridor totaling between 1,500 and 3,000 structured spaces at a cost of $22,000/space.

	No Build		Build	
Transport	3,000		0	
SOVs	3,000		0	
Ridership	0		3000	
Daily Miles	30		30	
SOV costs	0.51	per mile	0	
	$11,934,000	per year	0	
Transit costs	0		$57	Monthly Pass
	0		$2,052,000	per year
Benefit		**$9,882,000**		
Parking				
New spaces	2000		$0	
$ per space	$22,000		$22,000	
Total cost	$44,000,000		$0	
Benefit		$44,000,000	** one time (i.e., not annual) benefit*	
Annualized (20 yrs)		**$2,200,000**		
TOTAL BNFIT		**$12,082,000**		

Safety

This BCA component intends to show the benefits associated with "safety" improvements resulting from the WAMR project. Specifically, WAMR will result in a reduction of injuries and deaths related to modal diversion from a statistically more dangerous mode (cars) to a safer one (transit). The benefit is measured using a calculated estimate of ridership and applying to that number the data for differential fatality rates for the alternative modes. The monetization is based on DOT guidance on value of life and injuries.

	No Build		Build	
Pasngr miles	11,700,000		11,700,000	
Car fatalities	0.93	per 100M miles	0	
Transit fatalities	0		0.1	per 100M miles
Fatalities/yr	0.11		0.01	
Value of Life	$6,200,000		$6,200,000	
Annual loss	$674,622		$72,540	
Benefit		**$602,082**		

Sustainability

This BCA component intends to show the benefits associated with "sustainability" improvements resulting from the WAMR project. Specifically, WAMR will result in a reduction of CO2 emissions as usership shifts from a high-emission travel mode (SOV) to lower ones (transit, bike, ped). The benefit is measured using a calculated estimate of ridership and applying to that number an estimate of carbon emissions for the average SOV trip of that ridership under 'build' and 'no-build' scenario. The "No Build" scenario incorporates the carbon emissions from the same ridership using WAMR. The benefit is monetized (SCC) using guidance from the Interagency Working Group cited in the NOFA.

	No Build		**Build**	
SOVs	3,000		0	
Ridership	0		3000	
Pasngr miles	11,700,000	per year	186,150	per year
Metric tons of CO_2	3,028	per year	234	per year
SCC	$28	per CO_2 ton	$28	per CO_2 ton
Total SCC	$86,153.81	per year	$6,657.86	per year
Benefit		**$79,495.95**		

State of Good Repair

This item is discussed under the "Other Benefits" tab.
While the applicant is confident that signficant benefits in the category of "State of Good Repair" will flow through the project -- primarily through the efficiencies of unifying a currently disconnected system -- there was insufficient time to identify the relevant data and methodology to quantify the argument.

Red type indicates inputs used for this BCA component
Green type indicates how the benefit was monetized

BCA Assumptions

1 No component break-down

For reasons related to time and budgetary constraints on this application, the BCA does not break-down into individual components of the project but is rather analyzed on a wholesale basis. The multimodal retrofit of the two garages, connectivity site improvements at the hubs, and the circulator itself are blended into one comprehensive system which, it is assumed, will, *in toto,* produce a usership that would otherwise be in SOVs. The applicant acknowledges that intermediate gradations of benefit exist under a scenario where, for example, the circulator develops but the multi-modal garage retrofit does not, or vice-versa. It should be noted, however, that no alternative funding for this system or any accepted financial plan for its development other than TIGER exists. Therefore, the applicant is comfortable presenting a total status quo baseline.

2 Ridership based on circulator only

For reasons related to time and budgetary constraints on this application, the BCA has not included in its ridership estimate the numbers of bicycle riders or walkers generated by WAMR. While many of WAMR's users will not be isolated to one category or another but rather be intermodal users, it is a virtual certainty that *some* number of trips in the corridor resulting from WAMR will be on modes not included in the circulator-based ridership estimate. (This serves to make our benefits estimate more conservative.)

3 Ridership estimate is based on conservative mode split

A 2009 feasibility study on the West Avenue Circulator based its mode split assumption mainly on the national journey-to-work data from the US Census arriving at the number of 5%. Based on journey-to-work data at the tract level within the project area (13%) and accounting for ridership beyond journey-to-work, subsequent analysis raised the mode split estimate to 6.6% as a *starting point* , rising as the corridor developed and familiarity with WAMR increased. The 6.6% mode split translates to a ridership estimate of approximately 3,000 daily riders. The two analyses are posted on Norwalk's TIGER Application web-page, at: http://www.connectnorwalk.com/tiger-iii-application/

4 No Build' ridership are all SOVs

Some percentage of drivers carpool. The 2000 census puts this number at 11% in Norwalk (although a January 28, 2011 article in the NYT says carpooling is declining around the country). Another 3% walk or use other means. For purposes of this analysis however, the assumption is that non-transit riders are SOV riders.
For cost-comparison, WAMR ridership is assumed to have the same travel-time to work as the SOVs, i.e, 24 minutes, and their travel costs are calculated based on monthly Metro North fares for that distance.

5 Transit reduces parking demand

In a local planning study ("The Connectivity Master Plan"), it was determined in an interim report ("Task B Report") that between 1,500 and 3,000 of approx. 8,400 structured parking spaces planned for downtown Norwalk could be eliminated with a functioning circulator. This analysis is based in part upon a Seattle zoning regulation, and is explained at length in the Task B report, online at http://www.connectnorwalk.com/tiger-iii-application/

6 Riding (versus driving) gives you back your time

For purposes of the time-savings analysis, the savings documented is based on the idea that riding transit gives the rider back his/her time, since the riders' hands and attention are freed-up for things other than driving. By the same token, the time is not completely the travelers' own, since they are physically confined to the vehicle conveying him/her. Moreover, SOV drivers also manage (often hazardously) to a lesser degree to multitask. Therefore, only 50% of riders' time has been counted as "saved." We recognize this as simplistic, but are including it since -- for some (perhaps most) portion of the population, it will be true.

7 Time savings based on commutes only

Not all ridership will be commuters, and commute length may vary by census tract. However, for purposes of the time savings analysis, the daily ridership is all assumed to be commuters, and the time spent in transit is estimated according to census travel-time-to-work data for the City average as it was not available by census tract.

8 Operating Costs

The intermodal hubs are managed by the Norwalk Parking Authority. Currently -- and in the future -- they operate at a profit. Therefore, for purposes of this analysis the operating costs associated with that component of the project, as well as for the connectivity site improvements at the hubs, have been excluded, as have their operating revenue. As discussed elsewhere in the application, net income from the hubs' improvements are expected to defray the operating costs of the circulator component of the project. That income has also been excluded. The operating costs associated with the circulator, as estimated in the local feasibility study done for the project, are included in full. Those costs are described in greater detail on page 43 of the study, posted at our TIGER application website: http://www.connectnorwalk.com/tiger-iii-application/

BCA Calculations

Livability			Source
Estimated Usership			
	3000	daily rides (1,500 round trips)	Based on 2 prior local studies. See Assumptions tab.
Norwalker's average commute (one-way)			
	23.87	(minutes)	Census: Aggregate travel time to work, workers 16 y.o. and over, in minutes, divided by total working population, multiplied by 2
Area Median Income			
	46.16	(hourly wage)	huduser.org Stamford/Norwalk Area Median Family Income (adjusted for 1 person hh)
	71596.93	total minutes saved per day	
	1193.28	(in hours)	
$	55,077	montetized	
	260	work days per year	
$	14,320,131.72	dollars of value saved each year	
	0.5	discount for place restriction on time	
$	**7,160,065.86**	Annual value of Transit time savings	

Economic Competitiveness			
SOV versus Transit			
Estimated Usership			
	3000	daily riders	Based on 2 prior local studies. See Assumptions tab.
Norwalker's average commute (one way)			
	23.87	(minutes)	Census: Aggregate travel time to work, workers 16 y.o. and over
Derived miles			
	15	miles (one-way)	Estimate
IRS Mileage Reimbursement Rate 2011			
	$0.51	per mile	http://www.irs.gov/newsroom/article/0,,id=232017,00.html
	45,000	SOV miles/day without WAMR	
	$22,950	cost per day without WAMR	
	260	work days / year	
	$5,967,000.00	expenditures on gas/year without WAMR	
	$57	Monthly Metro North fare for 24 minute rides	
	12	Months	
	$684	Annual transit/rider	
	$2,052,000		
	$3,915,000.00	Annual SOV minus Transit costs	
Parking versus Transit			
Future downtown estimated parking demand without WAMR			Based on local study. See Assumptions tab.
	8,400	spaces	
Future downtown estimated parking demand with WAMR			
	6,400	spaces	
Difference			
	2,000	spaces	
Cost of structured parking			
	$22,000	per space	
WAMR savings on parking			
	$44,000,000		

Safety			
US Passenger Car Accidents 2006			
4,341,688	accidents		http://www.bts.gov/publications/national_transportation_statistics/html/table_02_03.html
US Transit Accidents 2006			
8,710	accidents		ibid
Ratio			
49847%			
Fatality Rates per 100 Million Passenger Miles (1997)			http://www.lightrailnow.org/facts/fa_00015.htm
0.93	cars		
0.1	bus		
Ratio	10.8%		
Passenger Miles Per Year for Ridership			
11,700,000			
Percent of 100 Million			
0.117			
Potential SOV fatalities among ridership per year			
0.11			
Potential transit fatalities among ridership per year			
0.01			
Value of Statistical Life			
$6,200,000	per fatality (2011)		http://ostpxweb.dot.gov/policy
Annual Fatality Cost with no WAMR			
$674,622			
Annual Fatality Cost with WAMR			
$72,540			
Net Benefit			
$602,082	Annual SOV minus Transit Fatalities		

Sustainability		
Estimated Usership		
3000	daily riders	Based on 2 prior local studies. See Assumptions tab.
Norwalker's average commute (one way)		
23.87	(minutes)	Census: Aggregate travel time to work, workers 16 y.o. and over
Derived miles		
15	miles (one-way)	Estimate
SOV Average fuel economy		
34	mpg	http://www.bts.gov/publications/national_transportation_statistics/html/table_04_23.html
Estimated daily fuel consumption		
45,000	daily passenger miles	
11,700,000	annual passenger miles	
1,324	gallons	
260	work days / year	
344,118	annual gallons	
6,675,882	pounds of CO_2	http://www.epa.gov/oms/climate/420f05001.htm#calculating
3,028	metric tons of CO_2	
$28	SCC per metric ton	Annual SCC Value. Included annual discounted values into a calculated average for
$86,154		Years 2013-2033
Transit fuel economy		
8	mpg	Based on vehicle type suggested in local feasibility study
6	vehicles	Based on recommendations in the local feasibility study
85	miles per vehicle per day	Based on route suggested in the local feasibility study
186,150	total aggregate miles per year	
23,269	total gallons of fuel	
516,566	pounds of CO_2	http://www.epa.gov/oms/climate/420f05001.htm#calculating
234	metric tons of CO_2	
$28	SCC per metric ton	Annual SCC Value. Included annual discounted values into a calculated average for
$6,658		Years 2013-2033
Net Benefit		
$79,496	Annual SOV Social Cost of Carbon minus Annual Transit Cost of Carbon	

Year	Proj Year	Benefits			Sum	Capital Cost	Operating Costs	Net Benefits No Sust*	Discount Rate	Benefit	Total Net Benefits
		Livability	Economic	Safety					3%	Sustainability*	
2012	1					-$4,400,000		($4,400,000)	($4,271,845)		($4,271,845)
2013	2					-$15,600,000		($15,600,000)	($14,704,496)		($14,704,496)
2014	3	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$16,782,918	$79,496	$16,862,414
2015	4	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$16,294,095	$79,496	$16,373,591
2016	5	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$15,819,510	$79,496	$15,899,006
2017	6	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$15,358,748	$79,496	$15,438,244
2018	7	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$14,911,405	$79,496	$14,990,901
2019	8	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$14,477,093	$79,496	$14,556,589
2020	9	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$14,055,430	$79,496	$14,134,926
2021	10	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$13,646,048	$79,496	$13,725,544
2022	11	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$13,248,591	$79,496	$13,328,087
2023	12	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$12,862,709	$79,496	$12,942,205
2024	13	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$12,488,067	$79,496	$12,567,563
2025	14	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$12,124,337	$79,496	$12,203,833
2026	15	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$11,771,201	$79,496	$11,850,697
2027	16	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$11,428,351	$79,496	$11,507,847
2028	17	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$11,095,486	$79,496	$11,174,982
2029	18	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$10,772,317	$79,496	$10,851,813
2030	19	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$10,458,560	$79,496	$10,538,056
2031	20	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$10,153,942	$79,496	$10,233,437
2032	21	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$9,858,196	$79,496	$9,937,692
2033	22	$7,160,066	$12,082,000	$602,082	$19,844,148		-$1,505,000	$18,339,148	$9,571,064	$79,496	$9,650,560
NET PRESENT VALUE											**$239,791,645**

* The Sustainability benefit's discount is already built into its number in accordance with Interagency guidance.

Other Benefits Not to Overlook

WAMR offers certain benefits that either cannot be quantified, or whose quantification is beyond the ability/time constraints of the team assembling this application. They are listed here nevertheless for the reviewers' reference and consideration.

1 Demonstration model
A common impediment to transportation innovations among small cities is the lack of a precedent to which a department or city council can point and say "they've done it in the town of 'x'." Examples are often available among larger cities, or cities in far-away places, but, in the northeast, communities seek examples among comparable communities. At a population of 85,000 people, this traditional northeastern commuter suburb could easily serve as a demonstration model for hundreds of communities around the region, contemplating similar investments in transit-oriented development.

2 No injuries, no victims
The WAMR BCA model does not include benefits associated with the increased safety of transit, other than with fatalities of the potential usership. The NOFA invites applicants to refer to online guidance for the economic value of preventing fatalities and injuries; the WAMR BCA only does so the former, as time ran out on finding driving versus transit ridership injury rates. Moreover, inasmuch as most accidents involve another vehicle and its passengers, no benefit is being quantified or claimed in connection with the target ridership's counterparts in potential accidents. This is another way in which our BCA may be considered to be conservative, or to have undershot its potential benefits.

3 Induced development
DOT guidance in the TIGER NOFA cautions applicants on the complexities of claiming the benefits of property development in BCAs. It also, however, notes that land use changes in connection with mixed-use development stemming from transportation improvements can encourage better proximity between peoples' homes, workplaces schools, and shopping, translating to real value in long-term savings on travel-time. For purposes of this BCA no development-related benefits have been claimed. We note here, however, that WAMR is anticipated to facilitate induce, or improve upwards of 5 million SF of mixed-use development within 1/4-mile distance of its route within 5-10 years of coming on line, and that we fully expect large percentages of the residents, workers, and patrons of that development to realize substantial benefits from WAMR.

4 LMI Benefits
The WAMR area falls entirely within Norwalk's low- and moderate-income census tracts. The city's low- and moderate-income population will be primary beneficiaries of the project, available in their neighborhood for trips to where they want to go, or, at the very least, to transit hubs that access the whole city and beyond. Because their ridership and economic gain is not distinct from the rest of the beneficiaries, their numbers are simply rolled into the foregoing BCA components; but it should be said here that WAMR will be a major benefit to their transportation circumstances in light of its service area and intended fareless pricing.

5 State of Good Repair

A piece of data that was sought but not found in time for inclusion within this application was the number of Norwalk transit users -- either of the bus system or the regional rail station -- that would be induced to also avail themselves of the other system upon the establishment of better connectivity between the two. Almost a million annual riders flow through each of these transit hubs, yet surprisingly few use both. If the two million-rider hubs were connected with frequent and convenient service, existing transit riders would seem an obvious audience for that service. Once established, the three individual components -- bus system, rail system, and circulator -- become component pieces of a whole with all the associated efficiencies: improvements to any component piece, now, will improve the options for users not only of that piece, but for users of any piece.