CDTC'S MERIT EVALUATION PROCEDURE

SPECIAL INTRODUCTORY NOTE

What follows in this appendix is the latest documentation of CDTC's process for evaluating new project candidates. For the most part, in the 2013-18 TIP update, this process was suspended in order to accommodate the NYSDOT Forward Four initiative. (The process was used to evaluate projects submitted to the Main Office for Beyond Preservation funds.) The documentation of this procedure has been maintained in the 2013-18 TIP in order to provide a starting point for when it is used again.

BENEFIT/COST CALCULATIONS

Introduction

Benefit to cost ratios are calculated by CDTC staff whenever possible. They are shown in the box in the upper right-hand corner of the project fact sheet. Consistent units of thousands of current dollars per year are used throughout. Instances where a benefit/cost ratio calculation is inappropriate or unable to be calculated are handled by further elaboration of the "non-quantifiable" or "qualitative" project benefits. Bicycle and pedestrian projects are handled differently, as explained below.

Five measures of project benefit are calculated, including safety, travel time, energy/user, and "other" benefits. Life cycle cost savings are applied primarily to infrastructure improvements. Life cycle cost savings are calculated by using the CDTC STEP Model to estimate the system traffic disbenefits of letting a bridge or pavement section deteriorate to the point of abandonment.

Safety Benefits

Safety benefits are measured in the dollar value of the projected reduction in crashes per year calculated by using the steps described below. Established counter measures and crash reduction factors are used to estimate the safety benefit of each project.

<u>Project Limit Crash Data Summaries</u>

Using the NYSDOT Accident Location Information System (ALIS) and Safety Information Management System (SIMS), crash data are obtained for each of the candidate project segments for a five-year period for state roads and a three-year period for non-state roads (i.e. "pre-project crashes"). CDTC staff then tallies a project specific crash summary for each project candidate.

This crash summary breaks out crashes by intersection and link, and crash type and severity in terms of fatality, injury, property damage only, and whether a bicyclist or pedestrian was involved. The crash severity is then used to assign project specific average crash costs based on methodology described in form TE 164a (9/91) as contained in the NYSDOT document Highway Safety Improvement Program Procedures and Techniques.

Average crash costs by crash type and applicable facility type, also distinguished by link or intersection, are obtained from the most recent NYSDOT Table entitled NYSDOT-Safety Information Management System Average Accident Costs/Severity Distribution State Highways shown on the pages below (for display purposes the severity distribution is omitted).

Identification of Countermeasures and Application of Crash Reduction Factors (CRFs)

The information provided by the project sponsor regarding planned improvements to be undertaken for each proposed project is used to identify applicable countermeasures and corresponding crash reduction factors. Staff uses judgment in selecting crash reduction factors obtained from the most recent information available on crash reduction factors from a variety of sources including, FHWA, NYSDOT and other research. Countermeasures and CRFs include those that apply to both motorized and non-motorized crash types. One major data source for countermeasures and corresponding crash reduction factors is the Desktop Reference for Crash Reduction Factors Report No. FHWA-SA-08-011 U.S. Department of Transportation Federal Highway Administration September 2008 available at:
http://safety.fhwa.dot.gov/tools/crf/desk_ref_sept2008/desk_ref_sept2008.pdf.

Examples of crash reduction factors contained in the FHWA Desktop Reference are shown in Table H-1. (Note: CDTC continues to research crash reduction factors and will further update this data prior to its use in the 2009 project evaluation process.)

TABLE H-1
CRASH REDUCTION FACTORS EXAMPLES

Desktop Reference for Crash Reduction Factors — Intersection Crashes

Countermeasure(s)	Crash Type	Crash Severity	Area Type	Config	Control	Daily Traffic Volume (veh/day) Major	Daily Traffic Volume (veh/day) Minor	Ref	Obs	Effectiveness: Crash Reduction Factor / Function	Effectiveness: Std Error	Effectiveness: Range Low	Effectiveness: Range High	Study Type
Install advance warning signs (positive guidance)	All	All	All					1		35				
	All	All			Signal			28		22		3	40	
	All	All	Urban					15		30				Cross-section
	All	All	Rural					15		40				
	Right-angle	All			Signal			47	11	35		20	100	Simple Before-After
	Right-angle	All			Signal			28		35				
Provide overhead lane-use signs	Rear-end	All						51		10				
	Sidewipe	All						51		20				
PAVEMENT MARKINGS/MODIFICATIONS														
Add centerline and move STOP bar to extended curb lines	All	All			No signal			28		29				
	Right-angle	All			No signal			28		24				
Add centerline and move STOP bar to extended curb lines, double stop signs	All	All			No signal			28		9				
	Right-angle	All			No signal			28		0				
Add centerline and STOP bar, replace 24-inch with 30-inch stop signs	Right-angle	All			No signal			47		67	11	27	100	Simple Before-After
	Right-angle	All			No signal			28		67				
Improve pavement friction (groove)	All	All						28		25				
	Wet	All						28		59		42	75	
Improve/install pedestrian crossing	All	All						15		25				
	Ped	All						15		25				
Install pedestrian crossing	Ped	All						15		25				
	Ped	All						15		25				
	Ped	Fatal/Injury	Rural					38		60				EB Before-After
Install pedestrian crossing (raised)	All	All						5		30	67			Meta-analysis
	All	Fatal/Injury						5		36	54			Meta-analysis
	Ped	All						28		8				

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Countermeasures and applicable crash reduction factors from NYSDOT are available at: https://www.nysdot.gov/divisions/operating/osss/highway-repository/accident%20reduction%20factor.pdf

Additional crash reduction factors gleaned from other available research are illustrated in Table H-2A.

Crash reduction factors (CRFs) are separated into various groups: those that can be applied project-wide against link crashes, those that can be applied project-wide against intersection crashes, those to be applied at distinct locations within the project limits (i.e. specific intersections or curves for example) and those that can be applied against bicycle/motor vehicle or pedestrian/motor vehicle accidents only. Examples of project wide crash reduction factors include drainage improvements or shoulder widening. Intersection channelization or realignment of horizontal curves are factors related to intersections or distinct locations. Where multiple CRFs are applicable to a project, judgment is applied to determine whether it is most reasonable to average the CRFs or apply the one with the highest percent potential reduction in crashes, or apply that with greatest potential effectiveness.

Safety Benefit Calculation Steps:

Step 1: Multiply pre-project crashes by applicable crash reduction factors (CRF) to arrive at an estimate of post-project reduced number of crashes by link and intersection. If the crash history for a project area includes bike, pedestrian or severe crashes and the proposed project includes countermeasures to address these and there are applicable CRFs related to these countermeasures, pre-project and post-project reduced crashes are tallied for these categories as well.

Step 2: Subtract annualized post-project crashes from pre-project crashes to arrive at an estimate of crashes avoided due to the project.

Step 3: Multiply estimate of crashes avoided due to the project by project specific average crash cost (weighted by severity as described above) to arrive at dollar $ value of the project's estimated safety benefit. Crash costs are shown in Table H-2B.

TABLE H-2A
EXAMPLES OF ADDITIONAL CRASH REDUCTION FACTORS FROM VARIOUS SOURCES

Improvement	Average Reduction (% of Crashes) >5000 AADT/ln/<5000 AADT/ln	Remarks/Source
Consolidation of driveways	20/20	NYSDOT's 1995/1996 Five-Year Program included an estimate of a 26% reduction in accidents at locations where arterial management techniques are applied including consolidating driveways, inter-connecting parking lots, installation of frontage roads, etc. Azzeh et. al reported an estimated 20% reduction in accidents after consolidation of driveways.
Improvement	**Average Reduction (% of Crashes)** >5000 AADT/ln/<5000 AADT/ln	**Remarks/Source**
Installation of service roads	17/17	Wolf Road/Exit 3 Area Transportation System Study Planning Report, CDTC, March 1990
Installation of sidewalks	50/50	FHWA's Investigation of Exposure-based Pedestrian Accident Areas: Crosswalks, Sidewalks, Local Streets and Major Arterials. RD -88-038, Knoblauch, RI, Justin, BH, Smith, SA et al, 1988. Applied against pedestrian/mv accidents only
Painted and/or raised bicycle crossing at intersections - assumed to be installed with all bike lane projects	30/30	An estimated reduction of 30% in bicycle/motor vehicle accidents due to installation of raised and painted bike lane/path intersection crossing (Garder, Leden, and Pulkkinen, 1998) Applied against bicycle/mv accidents only
Traffic calming (bulb outs, etc)	40/40	Estimated 40% reduction in all intersection accidents from traffic calming aggregating for all improvement types including bulbouts, narrowings, crosswalks, etc. according to "Safety Benefits of Traffic Calming", Zein, Geddes, Hemsing, Johnson, 1997, Transportation Research Record 1578. Applied against intersection accidents only
Installation of pedestrian refuge island	57/57	Geddes et al found the following levels of crash reduction traffic circles and chicanes, 82% … multiple measures 65% … pedestrian refuges 57%. “Safety Benefits of Traffic Calming” Zein, Geddes, Hemsing, Johnson, 1997, Transportation Research Record 1578
Installation of Roundabout	39/39	According to Insurance Institute for Highway Safety as published in "Crash Reductions Following Installation of Roundabouts in the United States", by Persaud, Retting, et. al., March 2000. This figure was cited by the NYSDOT Roundabout group in a presentation made to the CDTC Policy Board in June 2004. This 39% is a conservative number with smaller, single lane roundabouts typically achieving higher rates of reduction than large, multilane roundabouts. Aggregated over all types, the Insurance Institute also states that 76% reductions were found for all injury accidents. Reductions in the numbers of fatal and incapacitating injury accidents were estimated to be about 90%. The most recent data available will be used for this CRF and are found in the FHWA report http://safety.fhwa.dot.gov/tools/crf/desk_ref_sept2008/desk_ref_sept2008.pdf
Travel Demand Management (TDM) Strategies	1:1 ratio	Available evidence suggests that a 10% reduction in mileage in an area provides a 10% (to 14%) reduction in crashes. (“Safe Travels: Evaluating Mobility Management Traffic Safety Impacts”, Victoria Transport Policy Institute, Littman and Fitzroy, 2009) http://www.vtpi.org/safetrav.pdf

TABLE H-2B
AVERAGE CRASH COSTS

			Crash Severity Distribution (%)				Average Crash Costs				
		Classification	Fatal	Injury	Fatal/Injury	PDO*	Fatal	Injury	Fatal/Injury	PDO*	Average
1	L	FULL ACCESS, RURAL, DIVIDED, 4 LANE	0.41	16.36	16.77	83.22	$3,387,000	$90,500	$171,600	$5,200	$33,100
2	A	FULL ACCESS, RURAL, DIVIDED, 4 LANE	0.41	16.46	16.87	83.12	$3,382,000	$90,500	$171,400	$5,200	$33,200
3	L	FULL ACCESS, RURAL, DIVIDED, 5 LANE	0.41	16.36	16.77	83.22	$3,387,000	$90,500	$171,600	$5,200	$33,100
4	A	FULL ACCESS, RURAL, DIVIDED, 5 LANE	0.41	16.46	16.87	83.12	$3,382,000	$90,500	$171,400	$5,200	$33,200
5	L	FULL ACCESS, RURAL, DIVIDED, 6 LANE	0.41	16.36	16.77	83.22	$3,387,000	$90,500	$171,600	$5,200	$33,100
6	A	FULL ACCESS, RURAL, DIVIDED, 6 LANE	0.41	16.46	16.87	83.12	$3,382,000	$90,500	$171,400	$5,200	$33,200
7	L	FULL ACCESS, RURAL, DIVIDED, ALL LANES	0.41	16.36	16.77	83.22	$3,387,000	$90,500	$171,600	$5,200	$33,100
8	A	FULL ACCESS, RURAL, DIVIDED, ALL LANES	0.41	16.46	16.87	83.12	$3,382,000	$90,500	$171,400	$5,200	$33,200
9	L	FULL ACCESS, RURAL, UNDIVIDED, 2 LANE	0.53	19.62	20.15	79.85	$3,906,200	$90,700	$190,600	$5,200	$42,600
10	A	FULL ACCESS, RURAL, UNDIVIDED, 2 LANE	0.58	21.82	22.40	77.6	$3,711,500	$95,000	$188,400	$5,200	$46,200
11	L	FULL ACCESS, RURAL, UNDIVIDED, ALL LANES	0.53	19.62	20.15	79.85	$3,906,200	$90,700	$190,600	$5,200	$42,600
12	A	FULL ACCESS, RURAL, UNDIVIDED, ALL LANES	0.58	21.82	22.40	77.6	$3,711,500	$95,000	$188,400	$5,200	$46,200
13	L	FULL ACCESS, URBAN, DIVIDED, 4 LANE	0.37	36.93	37.30	62.7	$3,607,100	$96,700	$131,800	$3,800	$51,500
14	A	FULL ACCESS, URBAN, DIVIDED, 4 LANE	0.37	37.49	37.86	62.14	$3,572,700	$96,600	$130,600	$3,800	$51,800
15	L	FULL ACCESS, URBAN, DIVIDED, 5 LANE	0.37	36.93	37.30	62.7	$3,607,100	$96,700	$131,800	$3,800	$51,500
16	A	FULL ACCESS, URBAN, DIVIDED, 5 LANE	0.37	37.49	37.86	62.14	$3,572,700	$96,600	$130,600	$3,800	$51,800
17	L	FULL ACCESS, URBAN, DIVIDED, 6 LANE	0.37	36.93	37.30	62.7	$3,607,100	$96,700	$131,800	$3,800	$51,500
18	A	FULL ACCESS, URBAN, DIVIDED, 6 LANE	0.37	37.49	37.86	62.14	$3,572,700	$96,600	$130,600	$3,800	$51,800
19	L	FULL ACCESS, URBAN, DIVIDED, 7 LANE	0.37	36.93	37.30	62.7	$3,607,100	$96,700	$131,800	$3,800	$51,500
20	A	FULL ACCESS, URBAN, DIVIDED, 7 LANE	0.37	37.49	37.86	62.14	$3,572,700	$96,600	$130,600	$3,800	$51,800
21	L	FULL ACCESS, URBAN, DIVIDED, ALL LANES	0.37	36.93	37.30	62.7	$3,607,100	$96,700	$131,800	$3,800	$51,500
22	A	FULL ACCESS, URBAN, DIVIDED, ALL LANES	0.37	37.49	37.86	62.14	$3,572,700	$96,600	$130,600	$3,800	$51,800
23	L	FULL ACCESS, URBAN, UNDIVIDED, ALL LANES	0.35	32.25	32.60	67.41	$3,260,800	$91,700	$125,400	$3,800	$43,400
24	A	FULL ACCESS, URBAN, UNDIVIDED, ALL LANES	0.41	33.09	33.50	66.5	$3,251,100	$92,600	$130,900	$3,800	$46,400
25	L	PARTIAL ACCESS, RURAL, DIVIDED, 4 LANES	0.19	18.60	18.79	81.2	$3,245,600	$82,300	$114,900	$5,200	$25,800
26	A	PARTIAL ACCESS, RURAL, DIVIDED, 4 LANES	0.18	19.40	19.58	80.42	$3,245,600	$85,900	$114,800	$5,200	$26,600
27	L	PARTIAL ACCESS, RURAL, DIVIDED, ALL LANES	0.19	18.6	18.79	81.2	$3,245,600	$82,300	$114,900	$5,200	$25,800
28	A	PARTIAL ACCESS, RURAL, DIVIDED, ALL LANES	0.18	19.4	19.58	80.42	$3,245,600	$85,900	$114,800	$5,200	$26,600
29	L	PARTIAL ACCESS, RURAL, UNDIVIDED, 2 LANES	1.12	17.79	18.91	81.09	$4,123,300	$94,100	$332,900	$5,200	$67,200
30	A	PARTIAL ACCESS, RURAL, UNDIVIDED, 2 LANES	1.09	21.17	22.26	77.74	$3,956,100	$101,500	$289,500	$5,200	$68,500
31	L	PARTIAL ACCESS, RURAL, UNDIVIDED, ALL LANES	1.12	17.79	18.91	81.09	$4,123,300	$94,100	$332,900	$5,200	$67,200
32	A	PARTIAL ACCESS, RURAL, UNDIVIDED, ALL LANES	1.09	21.17	22.26	77.74	$3,956,100	$101,500	$289,500	$5,200	$68,500
33	L	PARTIAL ACCESS, URBAN, DIVIDED, 4 LANES	0.34	31.6	31.94	68.06	$3,524,700	$91,600	$128,000	$3,800	$43,500
34	A	PARTIAL ACCESS, URBAN, DIVIDED, 4 LANES	0.32	32.54	32.86	67.14	$3,567,100	$92,000	$126,400	$3,800	$44,100
35	L	PARTIAL ACCESS, URBAN, DIVIDED, 6 LANES	0.34	31.6	31.94	68.06	$3,524,700	$91,600	$128,000	$3,800	$43,500
36	A	PARTIAL ACCESS, URBAN, DIVIDED, 6 LANES	0.32	32.54	32.86	67.14	$3,567,100	$92,000	$126,400	$3,800	$44,100
37	L	PARTIAL ACCESS, URBAN, DIVIDED, ALL LANES	0.34	31.6	31.94	68.06	$3,524,700	$91,600	$128,000	$3,800	$43,500
38	A	PARTIAL ACCESS, URBAN, DIVIDED, ALL LANES	0.32	32.54	32.86	67.14	$3,567,100	$92,000	$126,400	$3,800	$44,100
39	L	PARTIAL ACCESS, URBAN, UNDIVIDED, 2 LANES	0.32	32.37	32.69	67.31	$3,254,600	$91,800	$122,900	$3,800	$42,800
40	A	PARTIAL ACCESS, URBAN, UNDIVIDED, 2 LANES	0.2	33.4	33.6	66.4	$3,254,600	$91,100	$109,800	$3,800	$39,400
41	L	PARTIAL ACCESS, URBAN, UNDIVIDED, ALL LANES	0.32	32.37	32.69	67.31	$3,254,600	$91,800	$122,900	$3,800	$42,800
42	A	PARTIAL ACCESS, URBAN, UNDIVIDED, ALL LANES	0.2	33.4	33.6	66.4	$3,254,600	$91,100	$109,800	$3,800	$39,400
43	L	FREE ACCESS, RURAL, DIVIDED, 2 LANES	0.23	21.03	21.26	78.74	$3,256,000	$92,200	$126,500	$5,200	$31,000

			Crash Severity Distribution (%)				Average Crash Costs				
		Classification	Fatal	Injury	Fatal/Injury	PDO*	Fatal	Injury	Fatal/Injury	PDO*	Average
44	A	FREE ACCESS, RURAL, DIVIDED, 2 LANES	0.46	23.32	23.78	76.22	$3,281,000	$94,700	$155,800	$5,200	$41,000
45	L	FREE ACCESS, RURAL, DIVIDED, 4 LANES	0.23	21.03	21.26	78.74	$3,256,000	$92,200	$126,500	$5,200	$31,000
46	A	FREE ACCESS, RURAL, DIVIDED, 4 LANES	0.46	23.32	23.78	76.22	$3,281,000	$94,700	$155,800	$5,200	$41,000
47	L	FREE ACCESS, RURAL, DIVIDED, ALL LANES	0.23	21.03	21.26	78.74	$3,256,000	$92,200	$126,500	$5,200	$31,000
48	A	FREE ACCESS, RURAL, DIVIDED, ALL LANES	0.46	23.32	23.78	76.22	$3,281,000	$94,700	$155,800	$5,200	$41,000
49	L	FREE ACCESS, RURAL, UNDIVIDED, 2 LANES	0.62	21.63	22.25	77.75	$3,890,600	$91,300	$197,600	$5,200	$48,000
50	A	FREE ACCESS, RURAL, UNDIVIDED, 2 LANES	0.64	23.14	23.78	76.22	$3,775,800	$93,600	$192,400	$5,200	$49,700
51	L	FREE ACCESS, RURAL, UNDIVIDED, 3 LANES	0.62	21.63	22.25	77.75	$3,890,600	$91,300	$197,600	$5,200	$48,000
52	A	FREE ACCESS, RURAL, UNDIVIDED, 3 LANES	0.64	23.14	23.78	76.22	$3,775,800	$93,600	$192,400	$5,200	$49,700
53	L	FREE ACCESS, RURAL, UNDIVIDED, 4 LANES	0.62	21.63	22.25	77.75	$3,890,600	$91,300	$197,600	$5,200	$48,000
54	A	FREE ACCESS, RURAL, UNDIVIDED, 4 LANES	0.64	23.14	23.78	76.22	$3,775,800	$93,600	$192,400	$5,200	$49,700
55	L	FREE ACCESS, RURAL, UNDIVIDED, ALL LANES	0.62	21.63	22.25	77.75	$3,890,600	$91,300	$197,600	$5,200	$48,000
56	A	FREE ACCESS, RURAL, UNDIVIDED, ALL LANES	0.64	23.14	23.78	76.22	$3,775,800	$93,600	$192,400	$5,200	$49,700
57	L	FREE ACCESS, URBAN, DIVIDED, 2 LANES	0.25	36.03	36.28	63.72	$3,410,400	$95,300	$118,400	$3,800	$45,400
58	A	FREE ACCESS, URBAN, DIVIDED, 2 LANES	0.28	37.23	37.51	62.50	$3,445,900	$95,300	$120,000	$3,800	$47,400
59	L	FREE ACCESS, URBAN, DIVIDED, 4 LANES	0.25	36.03	36.28	63.72	$3,410,400	$95,300	$118,400	$3,800	$45,400
60	A	FREE ACCESS, URBAN, DIVIDED, 4 LANES	0.28	37.23	37.51	62.50	$3,445,900	$95,300	$120,000	$3,800	$47,400
61	L	FREE ACCESS, URBAN, DIVIDED, 6 LANES	0.25	36.03	36.28	63.72	$3,410,400	$95,300	$118,400	$3,800	$45,400
62	A	FREE ACCESS, URBAN, DIVIDED, 6 LANES	0.28	37.23	37.51	62.50	$3,445,900	$95,300	$120,000	$3,800	$47,400
63	L	FREE ACCESS, URBAN, DIVIDED, 7 LANES	0.25	36.03	36.28	63.72	$3,410,400	$95,300	$118,400	$3,800	$45,400
64	A	FREE ACCESS, URBAN, DIVIDED, 7 LANES	0.28	37.23	37.51	62.50	$3,445,900	$95,300	$120,000	$3,800	$47,400
65	L	FREE ACCESS, URBAN, DIVIDED, ALL LANES	0.25	36.03	36.28	63.72	$3,410,400	$95,300	$118,400	$3,800	$45,400
66	A	FREE ACCESS, URBAN, DIVIDED, ALL LANES	0.28	37.23	37.51	62.50	$3,445,900	$95,300	$120,000	$3,800	$47,400
67	L	FREE ACCESS, URBAN, UNDIVIDED, 2 LANES	0.42	30.64	31.06	68.94	$3,532,400	$91,600	$138,200	$3,800	$45,600
68	A	FREE ACCESS, URBAN, UNDIVIDED, 2 LANES	0.37	32.40	32.77	67.23	$3,487,200	$92,300	$130,700	$3,800	$45,400
69	L	FREE ACCESS, URBAN, UNDIVIDED, 3 LANES	0.42	30.64	31.06	68.94	$3,532,400	$91,600	$138,200	$3,800	$45,600
70	A	FREE ACCESS, URBAN, UNDIVIDED, 3 LANES	0.37	32.40	32.77	67.23	$3,487,200	$92,300	$130,700	$3,800	$45,400
71	L	FREE ACCESS, URBAN, UNDIVIDED, 4 LANES	0.42	30.64	31.06	68.94	$3,532,400	$91,600	$138,200	$3,800	$45,600
72	A	FREE ACCESS, URBAN, UNDIVIDED, 4 LANES	0.37	32.40	32.77	67.23	$3,487,200	$92,300	$130,700	$3,800	$45,400
73	L	FREE ACCESS, URBAN, UNDIVIDED, ALL LANES	0.42	30.64	31.06	68.94	$3,532,400	$91,600	$138,200	$3,800	$45,600
74	A	FREE ACCESS, URBAN, UNDIVIDED, ALL LANES	0.37	32.40	32.77	67.23	$3,487,200	$92,300	$130,700	$3,800	$45,400
75	I	3 LEG, RURAL, SIGNAL, ALL LANES	0.70	26.27	26.97	73.03	$3,434,000	$96,400	$183,200	$5,200	$53,200
76	I	3 LEG, RURAL, SIGN, ALL LANES	0.70	26.27	26.97	73.03	$3,434,000	$96,400	$183,200	$5,200	$53,200
77	I	3 LEG, RURAL, NONE, ALL LANES	0.70	26.27	26.97	73.03	$3,434,000	$96,400	$183,200	$5,200	$53,200
78	I	3 LEG, URBAN, SIGNAL, 1-4 LANES	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
79	I	3 LEG, URBAN, W/ LEFT TURN, SIGNAL,5& > LANE	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
80	I	3 LEG, URBAN, NO LEFT TURN, SIGNAL,5& > LANE	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
81	I	3 LEG URBAN, SIGN, 1-3 LANES	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
82	I	3 LEG URBAN, SIGN, 4 LANES	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
83	I	3 LEG URBAN, SIGN, 5 OR MORE LANES	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
84	I	3 LEG URBAN, NONE, ALL LANES	0.33	35.81	36.14	63.85	$3,412,000	$93,800	$124,500	$3,800	$47,400
85	I	4& > LEGS, RURAL, SIGNAL, ALL LANES	0.82	32.53	33.35	66.66	$3,295,200	$107,100	$185,000	$5,200	$65,200
86	I	4& > LEGS, RURAL, SIGN, ALL LANES	0.82	32.53	33.35	66.66	$3,295,200	$107,100	$185,000	$5,200	$65,200
87	I	4& > LEGS, RURAL, NONE, ALL LANES	0.82	32.53	33.35	66.66	$3,295,200	$107,100	$185,000	$5,200	$65,200
88	I	4& > LEGS, URBAN, SIGNAL, 1-4 LANES	0.31	37.23	37.54	62.46	$3,530,300	$95,400	$123,700	$3,800	$48,800
89	I	4& > LEGS, URBAN, LEFT TURN, SIGNAL,5& >LANE	0.31	37.23	37.54	62.46	$3,530,300	$95,400	$123,700	$3,800	$48,800

			Crash Severity Distribution (%)				Average Crash Costs				
		Classification	Fatal	Injury	Fatal/Injury	PDO*	Fatal	Injury	Fatal/Injury	PDO*	Average
90	I	4& > LEGS, URBAN, NO LEFT , SIGNAL, 5& >LANE	0.31	37.23	37.54	62.46	$3,530,300	$95,400	$123,700	$3,800	$48,800
91	I	4& > LEGS, URBAN, SIGN, 1-3 LANES	0.31	37.23	37.54	62.46	$3,530,300	$95,400	$123,700	$3,800	$48,800
92	I	4& > LEGS, URBAN, SIGN, 4 OR MORE LANES	0.31	37.23	37.54	62.46	$3,530,300	$95,400	$123,700	$3,800	$48,800
93	I	4& > LEGS, URBAN, NONE, ALL LANES	0.31	37.23	37.54	62.46	$3,530,300	$95,400	$123,700	$3,800	$48,800
94	I	ON RAMP, RURAL, ALL CNTLS, MERGE W/1 LANE	0.00	18.90	18.90	81.10	$3,316,200	$93,600	$93,600	$5,200	$21,900
95	I	ON RAMP, RURAL, ALL CNTLS, MERGE W/2& > LANE	0.00	18.90	18.90	81.10	$3,316,200	$93,600	$93,600	$5,200	$21,900
96	I	ON RAMP, URBAN, ALL CNTLS, MERGE W/1 LANE	0.29	41.40	41.69	58.30	$3,290,600	$94,500	$117,000	$3,800	$51,000
97	I	ON RAMP, URBAN, ALL CNTLS, MERGE W/2 LANES	0.29	41.40	41.69	58.30	$3,290,600	$94,500	$117,000	$3,800	$51,000
98	I	ON RAMP, URBAN, ALL CNTLS, MERGE W/3& > LANE	0.29	41.40	41.69	58.30	$3,290,600	$94,500	$117,000	$3,800	$51,000
99	I	OFF RAMP, RURAL, ALL CNTLS, MERGE W/1 LANE	0.00	18.90	18.90	81.10	$3,316,200	$93,600	$93,600	$5,200	$21,900
100	I	OFF RAMP, RURAL, ALL CNTLS, MERGE W/2&> LANE	0.00	18.90	18.90	81.10	$3,316,200	$93,600	$93,600	$5,200	$21,900
101	I	OFF RAMP, URBAN, ALL CNTLS, MERGE W/1 LANE	0.29	41.40	41.69	58.30	$3,290,600	$94,500	$117,000	$3,800	$51,000
102	I	OFF RAMP, URBAN, ALL CNTLS, MERGE W/2 LANES	0.29	41.40	41.69	58.30	$3,290,600	$94,500	$117,000	$3,800	$51,000
103	I	OFF RAMP, URBAN, ALL CNTLS, MERGE W/3&> LANE	0.29	41.40	41.69	58.30	$3,290,600	$94,500	$117,000	$3,800	$51,000

* Includes Both Reportable and Non-Reportable Crashes
** A= All Accidents, L= Non-Intersection Accidents, I= Intersection Accidents

SOURCE: NYSDOT Safety Information Management System, Average Accident Costs State Highways, 2008, NYSDOT Safety Bureau 8/09

Travel Time Savings

Monetary benefits of *mobility* improvements are measured by calculating user operating cost savings and the monetary value of travel time savings that would result from project implementation. For most projects, these benefits are calculated using the CDTC STEP Model. Year 2010 traffic is assigned to the network with and without the proposed project. User operating costs and travel time costs are calculated as the difference between the costs resulting from these two assignments. The cost impacts resulted from the increased capacity and improved operation that the project is expected to provide, including the impact of traffic diversions that the STEP Model assignment predicts. Safety impacts are calculated if specific improvements included in the project are expected to reduce accidents as described in the previous section.

Travel time savings for mobility projects are measured in the dollar value of the projected time saved by implementation of the project per year. Travel Time Savings are the product of the change in total delay per year (based on delay per vehicle per day, the daily traffic volume and the number of days in a year when the condition exists), and a monetary equivalence factor. The average value of travel time of $8.18 per vehicle hour is used.

This value is derived from the NYSDOT Highway User Cost Accounting Microcomputer Package, August, 1991. Costs are increased to reflect inflation and increased minimum wage, consistent with an updated version of the Highway User Cost Micro-Computer Package to be published in the near future by NYSDOT. After adjusting for vehicle occupancy and other factors, each non-truck vehicle hour is currently valued at $7.20. The average vehicle hour of truck travel time is currently calculated to be $21.14 per hour. The average value of travel time for all vehicles used by CDTC is a weighted average calculated by assuming 7% truck traffic. The result is $8.18 per vehicle hour of travel.

Energy and User Cost Savings

Energy and user cost savings for pavement improvements are measured in the dollar value of the projected energy and user cost saved per year. Energy cost is the product of the daily change in operating fuel consumption (based on the FHWA-supported microcomputer procedures in most cases), the daily volume, the number of weekdays in a year, and a monetary equivalence factor from a standardized table. The maintenance costs before and after are taken from Table H-3 on page 10. The savings are calculated from those numbers.

Energy and user cost savings for *mobility* projects are calculated based on the operating costs shown in Table H-4 on page 10. These costs are also derived from the NYSDOT Highway User Cost Accounting Microcomputer Package, updated for inflation.

TABLE H-3
AVERAGE USER MAINTENANCE COST BY HIGHWAY CONDITION

NYSDOT Pavement Score	Average Cost Per Vehicle Mile[1]
10	$0.1287
9	$0.1287
8	$0.1312
7	$0.1347
6	$0.1400
5	$0.1470
4	$0.1570
3	$0.1666
2	$0.1786
1	NA

SOURCE: Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Condition Factors, FHWA, 1982.

TABLE H-4
AVERAGE HIGHWAY VEHICLE OPERATING COSTS
(Dollars per Vehicle Mile Traveled) by Operating Speed and Posted Speed Limit

	Posted Speed (mph)					
Operating Speed (mph)	**30**	**35**	**40**	**45**	**50**	**55-65**
5	0.849	0.868	0.886	0.904	0.923	0.940
10	0.744	0.769	0.795	0.821	0.833	0.844
15	0.666	0.693	0.720	0.736	0.758	0.775
20	0.626	0.648	0.670	0.690	0.715	0.726
25	0.600	0.618	0.635	0.654	0.674	0.689
30	0.586	0.600	0.615	0.629	0.646	0.663
35	NA	0.586	0.599	0.611	0.626	0.639
40	NA	NA	0.594	0.605	0.616	0.628
45	NA	NA	NA	0.603	0.611	0.620
50	NA	NA	NA	NA	0.608	0.616
55	NA	NA	NA	NA	NA	0.614

Operating costs are derived from the NYSDOT Highway User Cost Accounting Microcomputer Package, August 1991. Operating costs are increased by 25%, in order to agree with 2008 operating costs from the Bureau of Transportation Statistics (BTS). Vehicle ownership costs per mile were added. Including vehicle ownership costs in vehicle cost per mile represents a new emphasis for CDTC benefit calculation. It is consistent with AAA estimates and the IRS allowances for driving costs. Truck ownership costs were added based on the assumption that the percentage of VMT consisting of trucks is 7%. If operating speed is less than posted speed, congestion is assumed. Travel time costs will be valued at $10.75, which is based on the NYSDOT HUCA updated for inflation to 2008.

[1] 0% grade, 30 mph, 40% small cars/pickups, 40% med. cars, 10% large cars, 7% 2 axle trucks, 3% 3 axle trucks.

Life Cycle Cost Savings

Life cycle cost savings are measured in the dollar value of the projected time saved per year by deferring abandonment of the facility. Life cycle cost savings are a product of the percent-extended life of the facility, and the mobility benefits that result from keeping the facility usable.

"Life cycle cost savings" could also be described as "extended facility value". Intuitively, repairing or replacing a facility or service integral to the regional system is important because of the value of that facility or service to the transportation system. Bridges are not replaced because they are in poor condition; they are replaced because it is important to keep those links open. Buses are not replaced because they are twelve years old; they are replaced because it is important to continue to operate a vital transit service. As a result, the life cycle costs savings of an infrastructure project are defined as:

$$\text{Life Cycle Cost Savings} = (\text{Total Facility Value}) \times (\text{Pct. Extended Life})$$

where:

$$\text{Total Facility Value} = \text{Travel Time Savings} + \text{Energy and User Cost Savings}$$

and

$$\%\ \text{Extended Life} = \text{Years of Facility Life Added by Project} \div \text{Normal Facility Life}$$

Travel time savings and regional user cost savings attributable to the facility are calculated using the CDTC STEP Model. The model is run once with the facility or service in place, then a second time with the facility or service removed. The difference in regional system measures between the two runs is assumed to represent the total value of the facility or service.

For bridges, the facility is removed for modeling purposes by eliminating the bridge link entirely from the highway network. For highways, the facility is considered removed by reducing the travel speed to five miles per hour. Transit service is eliminated by adding passenger travel as vehicular travel on the highways that transit effectively serves.

Percent extended facility life is determined using the data in Table H-5, Table H-6, Table H-7, and Table H-8.

TABLE H-5
RELATIONSHIP BETWEEN THE EXTENDED LIFE OF A HIGHWAY AND ITS SURFACE RATING

	% Extended Life		
Surface Score	**Rigid Pavements**	**Overlay Pavements**	**Flexible Pavements**
10	0%	0%	0%
9	5.9%	4.3%	3.8%
8	14.7%	8.7%	11.5%
7	26.5%	21.7%	23.1%
6	47.1%	43.5%	46.2%
5	79.4%	78.3%	69.2%
4	100.0%	100.0%	88.5%
3	100.0%	100.0%	100.0%
2	100.0%	100.0%	100.0%
1	100.0%	100.0%	100.0%

Source: Derived by CDTC from an internal NYSDOT memorandum regarding new pavement deterioration rates dated August 8, 1986.

TABLE H-6
RELATIONSHIP BETWEEN THE EXTENDED LIFE OF A BRIDGE AND ITS RATING

Bridge Rating	% Extended Life
7	0%
6	22.2%
5	44.4%
4	66.6%
3	88.9%
2.5	100.0%
2.0	100.0%
1.0	100.0%

Source: CDTC

TABLE H-7
RELATIONSHIP BETWEEN THE AGE AND EXTENDED LIFE OF A FACILITY OTHER THAN BRIDGES AND HIGHWAYS

Age / Expected Life	% Extended Life
0	0%
.2	5%
.4	10%
.6	20%
.8	30%
.9	40%
1.0	50%
1.1	60%
1.2	70%
1.4	80%
1.6	90%
1.8	95%
2.0	100%

Source: CDTC

TABLE H-8
6% CAPITAL RECOVERY FACTORS FOR ANNUALIZED COSTS

Design Life in Years	Capital Recovery Factor
1	1.060000
2	0.545437
3	0.374110
4	0.288591
5	0.237396
6	0.203363
7	0.179135
8	0.161036
9	0.147022
10	0.135868
11	0.126793
12	0.119277
13	0.112960
14	0.107585
15	0.102963
16	0.098952
17	0.095445
18	0.092357
19	0.089621
20	0.087185
21	0.085005
22	0.083046
23	0.081278
24	0.079679
25	0.078227
26	0.076904
27	0.075697
28	0.074593
29	0.073580
30	0.072649
31	0.071792
32	0.071002
33	0.070273
34	0.069598
35	0.068974
36	0.068395
37	0.067857
38	0.067358
39	0.066894
40	0.066462
45	0.064700
50	0.063444
55	0.062537
60	0.061876
65	0.061391
70	0.061033
75	0.060769
80	0.060573
90	0.060318
100	0.060177

TABLE H-9
DESIGN LIFE OF VARIOUS FACILITIES

Facility	**Design Life**
Right-of-way, obstacle removal	100 years
Local pavement reconstruction [2]	30 to 50 years
Bridge Replacements	50 years
Other Major Structures	30 years
New Construction	30 years
Major Reconstruction	30 years
Sidewalks	30 years
Class 1 bike paths	30 years
Major Geometrics: change of intersection configuration, curve flattening, etc.	20 years
Concrete barrier (median or half section)	20 years
Rubblization	20 years
Grade crossing protection upgrades	20 years
Minor Geometrics: left-turn lanes, channelization	15 years
Lighting	15 years
Major sign structures	15 years
Metal median barrier	15 years
Bus	12 years
Signals and flashing beacons	10 years
Resurfacing (2 1/2")	10 years
Minor signing	10 years
Metal guide rail	10 years
Armor coat (1")	7 years
Concrete pavement grooving (less than 10,000 AADT per lane)	7 years
Concrete pavement grooving (greater than 10,000 AADT per lane)	5 years
Delineators and guide markers	5 years
Asphalt pavement grooving (less than 10,000 AADT per lane)	5 years
Oil and stone	4 years
Asphalt pavement grooving (greater than 10,000 AADT per lane)	4 years
Shoulder stabilization	4 years
Pavement markings: thermoplastic	3 to 7 years
Pavement markings: paint	1/2 year

Source: NYSDOT, From TE 204 Safety Project Benefit and Cost Summary, supplemented for additional project types

[2] Design life of pavements with AADT less than 30,000 are between 30 years and 50 years and vary with AADT.

Other Benefits

"Other" benefits of candidate projects capture the monetary transportation system impacts not included elsewhere in the calculations, but contained in the *New Visions* Core Performance Measures.

Supplemental monetary impacts beyond those identified elsewhere in the benefit to cost calculation are documented in the "Estimated Marginal Monetary Costs of Travel in the Capital District", April 1995. These supplemental monetary benefits (or disbenefits) of candidate projects included changes to the following system-level measures of transportation system cost which are not captured elsewhere in the list of project benefits:

- Private vehicle ownership
- Parking provision and use -- work trip
- Parking provision and use -- other commercial
- Parking provision and use -- residential
- Transportation related fire/police/justice expense
- Regional air pollution
- Global air pollution (climate change)
- Vibration damage
- Water quality damage
- Waste disposal
- Energy use impacts on costs of national security and impact on international trade

The *New Visions* plan relies heavily on these extensions to the traditional system costs and benefits. It should be recognized, however, that these are factors that are influenced primarily by *system-level* rather than *project-level* changes. That is, system-level success over the 20 years in increasing the amount of mixed use development, sidewalk connections and quality of transit service may influence total vehicle ownership in the region (and thus reduce the cost of providing residential garages), for example. However, it would be difficult to assign part of that cumulative benefit to a single TIP candidate project that, for example, building bus shelters.

As a result, monetary measures for "other benefits" are identified only for projects significant enough to affect system-level measures. Such projects are generally ones that affect the number of vehicle trips or the aggregate level of vehicle miles of travel in the Capital District.

Non-monetary benefits include increased access to transit service, greater flexibility or reliability and other measures from the *New Visions* Core Performance Measures list. To the extent that a TIP candidate project could be expected to change the values for these regional measures, the change is identified on the fact sheet.

Total Benefit/Cost Ratio

A total benefit/cost ratio is the sum of these five categories of quantifiable project benefits divided by the annualized cost of the project. Annualized costs are a product of the total project cost and the 6% Capital Recovery Factors (Table H-8 on page 14).

BICYCLE/PEDESTRIAN PROJECT MERIT EVALUATION METHODOLOGY

Introduction

Projects are evaluated against their functional peers for the purpose of assigning classifications corresponding to low, medium or high potential benefit. For example, projects having particular potential to encourage bicycle trips (e.g., longer-distance trails) are evaluated against other bicycle projects, while sidewalks are evaluated against other pedestrian projects. This segregation is intended to ensure fair comparisons. This approach avoided a result of most of the overall top-rated projects being bicycle accommodations, which tended to have larger potential markets (as defined by number of nearby short trips) and potentials for conversion from driving.

Consistent with the 1997-02 and 2001-06 TIP update, CDTC staff again used potential market for bicycle/pedestrian travel, cost-effectiveness and potential safety benefits (e.g., accident reduction or avoidance) in the evaluation of bicycle and pedestrian projects. These measures are briefly defined below.

Potential Market for Bike and Pedestrian Travel

This measure is based on ***the better of*** a candidate's two classifications on (1) number of short trips originating or ending near the improvement and (2) modeled short trip response on the bicycle/pedestrian version of CDTC's Systematic Traffic Evaluation and Planning (STEP) model.

A potential bicycle trip table was created by selecting all PM peak hour trips from the CDTC STEP Model that are less than 10 miles. A potential pedestrian trip table was created by selecting all PM peak hour trips from the CDTC STEP Model that are less than 2 miles. (Allowances were made for TAZ size by increasing the 2 mile threshold by one half the distance between each TAZ pair.) "Short trips originating or ending near the improvement" are defined as potential bicycle or pedestrian trips to or from the Traffic Analysis Zones (TAZ's) in which the project is located or, if the project is on the border of more than one TAZ (as most candidates are), short trips to or from ALL adjacent TAZ's. The aim of this measure is to get an indication of how many trips might be realistic candidates for conversion to cycling or walking. "Modeled short trip response" is arguably a more stringent standard, for it requires that a project show an ability to capture bicycle and pedestrian trips from other possible bicycle/pedestrian travel routes.

Project candidates are modeled on the network using the same conventions applied in preparation of the Bicycle/Pedestrian Task Force's technical analyses. Routes are either opened up for the first time or made slightly faster by an improvement, starting from a preference-based network. This network shut down illegal facilities (e.g., the Northway has no bicycle or pedestrian access), discouraged the use of very undesirable facilities (e.g., Central Avenue in Colonie, or Wolf Road) via a 1 MPH speed, and made the lowest-order roads (e.g., local streets and bike/hike paths) the most attractive (at 10 MPH bicycle, 3 MPH walk). Improvements to sidewalks, pedestrian crossings and amenities where sidewalks already exit were modeled at 3 MPH and evaluated using 75% of the assigned short trips. Roads in between are coded based on functional class, existing accommodation, traffic volume and any other known influences on bikeability or walkability.

Given the narrower range of possible speeds on the pedestrian network, some additional points on preference-based coding protocol for pedestrians may be helpful.

1. To ensure an appropriate starting point, the null pedestrian network is first coded to reflect the best available information on the presence or absence of sidewalks, improved shortcut paths and other bonafide pedestrian accommodations across the Capital District. As is the case in preparation of the null bicycle network, special attention is paid to ensuring that the network contained no elements of any improvements to be developed under any of the candidate projects.

2. *Absolute shutdown* of a facility to pedestrians is accomplished by coding the subject link with a speed of 1 MPH (to prevent running into program errors triggered by 0 MPH link speeds in some model processes) and overtyping the link length with a length of 9.99 miles. In all cases where this is done, the result is absolutely no use of a facility.

3. Basically *unimproved, but walkable* facilities are coded with speeds of 1 MPH.

4. *Links with sidewalks*, *pathways* and *trails* are coded with speeds of 3 MPH (the maximum speed on the pedestrian network).

5. If an improvement would provide the level of comfort and physical separation from traffic typical of a sidewalk, a link's speed is increased from 1 MPH to 3 MPH for the length of the improvement.

Cost-Effectiveness

Cost-effectiveness is calculated as the modeled level of response to an improvement (in person-miles of travel, as calculated using the "short trip response" basis above) per $1,000 of annualized project cost. By definition, this measure is partially driven by the findings for the more stringent of the two market measures mentioned above. A grade was given to each project based on the overall cost of the project. Lowest cost projects received a grade of "A", medium cost projects a grade of "B" and high cost projects a grade of "C". This cost grade was compared to the grade given for assigned trips. Final cost effectiveness scores were based on the following tables:

Cost Score	Assigned Trips Score	Final Cost Effectiveness Score
A	A	A
A	B	A
A	C	B
B	A	A
B	B	B
B	C	C
C	A	B
C	B	C
C	C	C

Potential Safety Benefit

The Bicycle and Pedestrian Issues Task Force suggested this measure as a way of illustrating the safety enhancement which comes in providing cyclists and pedestrians with some separate space of their own on the highway network. Potential safety benefit is defined as the potential for an action to prevent future car-bicycle or car-pedestrian accidents. Candidate projects are determined to have low, medium or high potentials for accident prevention based on motor vehicle traffic volumes, available pavement or other bicycle/pedestrian accommodations, levels of cyclist/pedestrian use of facilities, and (where available) known car-bicycle or car-pedestrian accident histories.

NON-QUANTIFIED PROJECT BENEFITS

Calculated benefit/cost ratios capture transportation benefits well. However, transportation benefits alone are not sufficient to highlight project contributions to meeting the goals and implementing the strategies in *New Visions*. Therefore, considerable space on the project fact sheets is devoted to narrative descriptions of project benefits. The source of most of this information is the project justifications provided by the project sponsor.

Congestion Relief

Congestion relief can be measured as the daily excess person-hours of delay saved due to the implementation of projects. It is shown where it could be calculated, divided by both the annualized cost and the total cost to provide a measure of comparability between projects. The calculation of this measure is fully elaborated in CDTC's Congestion Management System report.

Narrative discussion is included under the first heading in the second box on the project fact sheet if numbers could not be calculated or to elaborate upon the congestion relief aspects of the project.

Air Quality Benefit

The hydrocarbon emissions reductions for each project considered for CMAQ funding is calculated using NYSDOT methodology as well as reductions in nitrogen oxides. Because the primary air pollution concern in the Capital District is with ozone precursors, this is the focus of the analysis. The cost effectiveness of the hydrocarbon emissions benefit is also calculated. If applicable, a similar analysis is performed for non-CMAQ mobility projects and the results recorded under this heading. Candidate projects that are eligible for the CMAQ program ONLY are noted here. A narrative discussion is provided if numbers could not be calculated or to elaborate upon the project's expected air quality benefits.

Regional System Linkage

Regional system linkage addresses the project's geographic and intermodal aspects. The emphasis of the discussion is on whether or not the project addressed a critical link in the transportation system (e.g., a major river crossing) or would provide a new linkage not previously provided (e.g. an intermodal transfer or new suburban transit service). The purpose of including this criterion is to focus on the transportation system impacts of the project. Boundary issues are also appropriately mentioned here.

Land Use Compatibility (Planned or Existing)

Linking transportation investments to land use is an important aspect of *New Visions*. The fact sheet provided the opportunity to cite local and regional plans that recommend or support the project, the existing adjacent land uses, or potential future developments. Specific consistency with *New Visions* arterial management principles and strategies are elaborated here.

Contribution to Community or Economic Development

Using transportation investments as a tool to make our communities better places to live and to improve regional economic health is another important aspect of *New Visions*. The fact sheets provided an opportunity to highlight the community-building or economic development benefits of a project. Potential <u>negative</u> impacts on the community or economy associated with the project are noted here as well. This part of the fact sheet provided space to note the dependence of economic development plans on the implementation of the project, including quantification of measures such as job creation/retention, increases in taxes collected, expansion in secondary services, and the enticement for additional enterprise. The degree of public support for a project could also be noted.

Environmental Issues

Known environmental issues, such as intrusion on sensitive lands (wetlands, woodlands, parklands, aquifers, and historical property) are chronicled on the project fact sheet. Other potential issues highlighted here included such things as the removal of billboards, inclusion of scenic easements, and archaeological considerations, where applicable. Whether or not the project is located in a known minority or low income area is also noted here per federal requirements related to environmental justice.

Business or Housing Dislocations

The need for right-of-way acquisition that would dislocate existing businesses or housing is noted on the project fact sheet. Historic preservation concerns are also noted here.

Facilitation of Bicycling

To supplement priority network information, the degree to which the project addressed bicycling needs is noted. The provision of bicycle features within the project (e.g. bike path, improved bus facilities, bike lockers at a park and ride lot) could be noted, if known.

Facilitation of Walking

To supplement priority network information, the degree to which the project addressed the needs of walkers is noted. The provision of pedestrian features within the project (e.g. sidewalks, pedestrian actuation of signals, crosswalks) is specifically noted, if known.

Facilitation of Goods Movement

To supplement priority network information, the degree to which the project addressed goods movement needs is noted. The provision of freight-friendly features within the project (e.g. improved geometry, rail safety, rest stops, and bridge height or weight restrictions) is noted here.

Facilitation of Transit Use

To supplement priority network information, the degree to which the project addressed transit needs is noted in the fourth heading in the fourth box on the project fact sheet. The existence (or lack) of fixed route transit within the project limits is noted here. The provision of transit features within the project (e.g. improved bus stops, shelters, and pedestrian access to a major bus route) is noted, if known. Projects that could decrease the current level of transit access, such as intersection improvements that eliminate a bus stop, are noted, as well as projects that decrease future access opportunities. The relationship of the project to the implementation of the ADA is highlighted, if applicable.

Facilitation of Intermodal Transfers

Intermodal transfer opportunities make the transportation system work better as a whole, particularly the transfer across modes. Intersection projects that take into account bus routing and pedestrian/bicycle actuation, for example, are highlighted under this criterion. To supplement priority network information, the degree to which the project facilitated intermodal transfers is noted.

Screening Issues

The project fact sheet provided a space to mention any outstanding screening issues. Things like outstanding data needs, concerns with ability to implement within five years, project justifications, or eligibility concerns are noted here. Any issues with the cost estimate or its components are noted here.

Match and Maintenance

The second heading in the bottom box on the project fact sheet provided a space to note what agency will provide the non-federal share of project costs and who maintain the project once built. This is also the proper place to note any ownership issues, overmatch, or ongoing operating budget concerns.

Other Considerations

A category for other project considerations is included in the last box in order to be able to mention any significant factors not covered above.