Williston-Essex Network Transportation Study

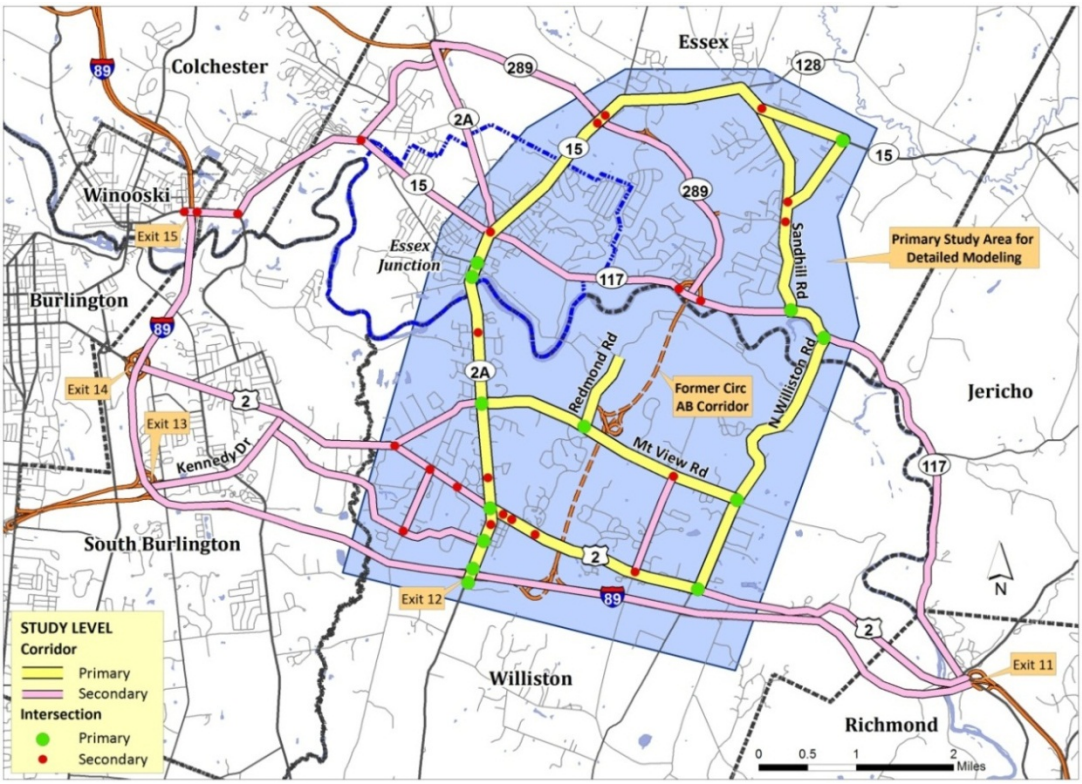
Summary Memorandum

1.0 Introduction and Project Purpose

Governor Shumlin's announcement that the Circumferential Highway (Circ) - as originally conceived - would not be built leaves major portions of Williston, Essex and Essex Junction without an integrated, coordinated plan for addressing issues of congestion, access, mode connectivity and safety. To comprehensively address these issues, the Chittenden County Regional Planning Commission (CCRPC) in close cooperation with the towns of Williston, Essex, the Village of Essex Junction, the Vermont Agency of Transportation (VTrans) and other stakeholders has initiated the Williston-Essex Network Transportation Study (WENTS).

The major goal of WENTS is to develop a set of multimodal strategies, policies, and land use strategies that enhance corridor mobility, improve access to major employment and retail centers, minimize congestion, improve safety, support economic development, and enhance environmental quality within the WENTS area—see Figure 1.

Figure 1: Study Area



The *Key Product* of this study is a set of short- and longer-term multimodal strategies (Implementation Plan) that will help achieve the study area's Goals and Objectives. A list of scoping studies approved by the Steering Committee will be initiated immediately by the CCRPC upon approval by the CIRC Alternatives Task Force at the January 31st meeting.

Recommended strategies will be based on:

- Agreed upon statement of goals and objectives;
- Comprehensive assessment of transportation/land use issues and needs;
- Consideration of all modes of travel, including automobile and commercial vehicle traffic, walking, cycling and transit.

2.0 STUDY PROCESS AND TIMELINE

A Steering Committee was formed that provided general oversight and policy direction throughout this study. The committee included representatives from the towns of Williston and Essex, the Village of Essex Junction, CCRPC, VTrans, CCTA, Local Motion, the Business Community and Environmental Groups.

The WENTS study is comprised of 5 phases, each of which involved opportunities for stakeholder and public input:

- Phase 1-Evaluation of Two Major Network Strategies
  - Major Network Strategy 1 -- I-89 connector to Mountain View Road (the former Circ A);
  - Major Network Strategy 2 -- Redmond Road connector which follows the Redmond Road alignment and connects to VT 289 through a new bridge across the Winooski River (similar to the Circ Alternative 15).
- Phase 2-Analysis of Existing and Future Conditions and Issues; Development of Performance Measures; and Development of Network-wide Vision and Goals;
- Phase 3-Development and Evaluation of Strategy Packages;
- Phase 4-Development of Implementation Plan; and
- Phase 5-Development of Draft and Final Network Plan.

As of this date, Phases 1-3 are complete. Phase 4, development of the Implementation Plan, is underway. The Implementation Plan will list and describe recommended multimodal transportation and land use strategies and other policy recommendations; identify potential environmental issues and right-of-way impacts; provide estimated implementation costs; and identify next steps and the parties responsible for initiating strategy implementation. Phase 5 is a synthesis of the study goals, process, results, and recommendations in a final report.

Table 1 is a list of the meetings that have occurred during the WENTS study process showing the participants, the meeting topic, and any decision that might have been made, if any. At least one additional Steering Committee meeting is anticipated before project completion. In addition a public meeting is scheduled for 5 February 2013.

Table 1: WENTS Meeting Schedule

When	Who	What	Decision
12-Mar	Steering Comm.	Project Introduction, Discussion of Scope	Establish Scope of Project
20-Apr	Steering Comm.	Evaluate Major Network Strategies (new bridge or new interchange)	
7 & 18 May	Selectboards	Introduce Project, Evaluate Major Network Strategies	
19-Jun	Public Meeting & Joint Selectboard	Introduce Project, Present and Discuss Major Network Strategies	Select New Bridge for Formal Evaluation
30-Jul	Steering Comm.	Existing Multimodal Conditions, Performance Measures, Goals & Objectives	Determine Performance Measures
25-Sep	Steering Comm.	Existing Traffic Conditions, Preliminary Strategy Packages	Finalize Goals & Objectives
25-Oct	Steering Comm.	Develop Core Improvements, Initial Evaluation of Strategy Packages	
13-Dec	Steering Comm.	Evaluate 2015 Impact of Strategy Packages, Develop Hybrid Strategy Packages	Select Strategy Packages for 2035 Evaluation
9-Jan	Joint Selectboards	Evaluate 2035 Impact of Hybrid Strategy Packages	
23-Jan	Steering Comm.	Review Performance of Hybrid Strategy Packages, Recommended Scoping Studies	Endorse Hybrid Strategy Package 2 and the Recommended Scoping Studies
31-Jan	Circ Alts Task Force		
5-Feb	Public Meeting 2		

3.0 AREA-WIDE GOALS AND OBJECTIVES

The WENTS Steering Committee agreed on the following area-wide Goals and Objectives for the WENTS area[1]. The proposed goals and objectives draw on prior studies, analyses of existing conditions and Steering Committee input. A primary focus of WENTS is to address vehicle congestion at regional mobility corridors within the study area while investing in other modes of transportation to increase their share.

For the purposes of this study, the following framework is used:

Goals: General statements of long-range desired outcomes for the study area.

Objectives: Specific statements that identify approaches to support the goals.

Statements of goals and objectives are meant to guide the selection and prioritization of improvement strategies for the Study.

Goals and Objectives

REGIONAL MOBILITY. Create a safe, clean and efficient transportation network that minimizes congestion, improves safety, expands travel options within selected corridors and enhances access to and from major employment and retail centers. VT 2A, VT 15, VT 117 and US 2 are significant regional mobility corridors that facilitate the movement of people and freight between the employment, civic and commercial centers of Chittenden County in and outside the study area.

Key objectives are:

[1] *The Conservation Law Foundation issued a statement indicating reservations to the Goals and Objectives statement that "The primary focus of WENTS is to address vehicle congestion at regional mobility corridors in the study area." The letter will be incorporated into the WENTS final report Appendices.*

- **Efficiency.** Reduce traffic congestion and improve travel times along regional mobility corridors within the study area.
- **Safety.** Improve safety for all modes; address High Crash Locations within the study area; and enhance emergency response capabilities.
- **Connectivity.** Expand travel options and improve intermodal connectivity along regional mobility corridors. Improve road, bicycle and pedestrian connections from the local transportation network to the mobility corridors.
- **Regional bicycle travel.** Plan and construct a regional system of connected bicycle facilities to provide safe and convenient regional bicycle travel.
- **Public transit.** Enhance public transit service to make it competitive with vehicle travel; Implement transit service in accordance with CCTA's Transit Development Plan.
- **Transportation Demand Management (TDM).** Support an effective TDM program to promote reductions in single-occupant vehicle travel.

LOCAL ACCESS. Create a comprehensive multimodal transportation system in Village areas and Growth Centers that emphasizes safe and convenient access to local businesses, services and neighborhoods. The study area contains Williston's Village and Growth Center, the Village of Essex Junction, and the Town/Historic Center of Essex Town for which these goals apply.

Key objectives include:

- **Connectivity.** Improve local transportation system connectivity to provide viable and safe mode alternatives for local trips.
- **Local walk-bike facilities.** Develop safe and convenient neighborhood-scale bicycle and pedestrian networks to serve existing and future growth.
- **Local roads.** Promote low-speed local traffic circulation and multimodal access to businesses, neighborhoods and services.
- **Neighborhoods.** Limit negative impacts to neighborhoods from regional vehicle traffic.
- **Transit.** Improve transit service to village areas and growth centers consistent with CCTA's Transit Development Plan; maximize neighborhood access to transit stops and Park-and-Ride areas.

ECONOMIC VITALITY. Support economic development in Chittenden County by enhancing travel reliability for freight, providing safe and efficient multimodal access to employment centers and retail facilities in the Study Area. The study area contains several large retail developments in Taft Corners and in Essex Town as well as the Champlain Valley Technology and Innovation Park (CVTIP) which includes the IBM campus among others.

Key objectives include:

- **Efficiency.** Improve travel reliability for freight within mobility corridors; decrease employee commuting time to and from employment centers in the study area.
- **Access.** Provide safe and efficient multimodal access to major businesses and industrial parks in the area.

- **Connectivity.** Provide safe and attractive non-motorized connections between commercial/employment centers and residential areas.
- **Transportation Demand Management (TDM).** Develop TDM programs in partnership with major employers in the study area to reduce single-occupant vehicle travel.

SUSTAINABILITY. Emphasize policies and investments that build a sustainable transportation system. These objectives apply to all proposed investments across the study area as a whole.

Key objectives include:

- **Transportation choices.** Invest in transportation choices to reduce single-occupant automobile travel.
- **Land use compatibility.** Promote transportation policies and facilities that support municipal and regional land use plans and are appropriate to the context of future development plans.
- **Development patterns.** Provide transportation facilities that support land use development patterns capable of efficiently using non-automobile transportation.
- **Environmental impact.** Minimize the environmental impact of transportation investments, including reducing greenhouse gas emissions and VMT.
- **Existing roadway system.** Maximize sustainability of the existing transportation network and invest in critical connections and linkages where necessary to improve mobility before investing in major new state or local roads.

4.0 EVALUATION OF STRATEGY PACKAGES

The challenge of the WENTS study is to develop a set of improvement concepts that collectively are designed to achieve the goals and objectives outlined above. Evaluations of current and future land use and transportation conditions in the study area were conducted using the Regional Model and the TransModeler microsimulation model built for the WENTS area. The Project Team and the Steering Committee acknowledged that no one specific improvement would be able to address vehicle mobility to the extent the Circ Highway was designed to do. Instead the Project Team developed the concept of "Strategy Packages", namely, an assembly of intersection and multimodal corridor improvements and additional transportation links that collectively address the most challenging mobility, connectivity, access and safety deficiencies projected for the study area.

Early in the study process the Steering Committee decided to specify a set of "Core Improvements" that garnered consensus regarding their multimodal benefits, and which are assumed in all future strategy packages. The core improvements are discussed in more detail in Section 5 of this memorandum.

During the fall of 2012 the Steering reviewed and discussed the following strategy packages for 2015 analysis year:

- Strategy Package 1: Redmond Road Connector with a new bridge over the Winooski River (former Major Network Strategy 2) and associated VT2A intersection improvements
- Strategy Package 2: Area-Wide Spot Intersection Improvements

- Strategy Package 3: Development of Planned and New Grid Streets
- Strategy Package 4: VT2A Mainline Capacity Improvements
- Strategy Package 5: North Williston Road Improvements

A qualitative evaluation of these 5 Strategy Packages was provided at the October 2012 Steering Committee meeting. Based on comments received from the Steering Committee the Project Team was directed to combine features of various Strategy Packages and develop a list of 3 "Hybrid" Strategy Packages which were to be formally modeled using TransModeler.

The 3 Hybrid Strategy Packages evaluated for 2015 conditions are:

- Hybrid Strategy Package 1: Redmond Road Connector (former Major Network Strategy 2)
- Hybrid Strategy Package 2a: Area-Wide Spot Intersection Improvements
- Hybrid Strategy Package 2b: HSP2a plus a set of new grid streets proximate to Exit 12
- Hybrid Strategy Package 3: VT2A mainline improvements

At their December 2012 meeting, the Steering Committee reviewed an interim set of 2015 modeling results for the above Hybrid Strategy Packages. The results focused on 3 sets of performance measures:

1. Network-wide performance
    a. Total Stop Delay at 13 Primary Intersections
    b. Total Vehicle Hours Traveled
    c. Total CO2-Equivalent Emissions
2. Bi-Directional Peak Hour Traffic Volumes, Selected Corridor Locations
3. Intersection Level of Service, Delay, Selected Intersections

Following review of the interim results and performance measures, the Steering Committee directed the Project Team to select the most effective strategies from each Hybrid Strategy Package and combine them into two final Hybrid Strategy Packages for further modeling (2035 future analysis year), environmental impact evaluation and refinement of cost estimates.

Descriptions and comprehensive results for the two final Hybrid Strategy Packages and Base Case Strategy Package (includes core improvements) are presented in Sections 5 through 7 in this memorandum. Section 8 presents the WENTS Steering Committee's preferred Strategy Package and recommended scoping studies for the CIRC Alts Task Force's consideration.

5.0 FINAL HYBRID STRATEGY PACKAGES

The ***Base Case Strategy Package*** assumes that Phase 1 and Phase 2 CIRC Alternatives implementation projects and additional Core Improvements agreed upon by the WENTS Steering Committee are constructed or implemented within the study area.

The key feature of the final ***Hybrid Strategy Package 1 (HSP1)*** is a new bridge across the Winooski River at the current southern terminus of VT289, accessing a reconstructed Redmond Road. HSP1 incorporates all of the Core Improvements (inclusive of the Phase 1 and 2 Circ Alts improvements),

plus additional spot improvements designed to manage the changed traffic flow resulting from the new bridge.

The key features of the final ***Hybrid Strategy Package 2 (HSP2)*** are reconstruction of I-89 Exit 12 and new grid streets proximate to the Exit that are designed to better manage vehicular traffic in this section of the study area. As with HSP1, other spot improvements are incorporated within HSP2 to address the most significant areas of projected congestion. Also, as with HSP1, the Core Improvements and Circ Task Force Phase 1 and 2 improvements are included in the HSP2 scenario.

5.1 Core Improvements

5.1.1 CIRC Alt Task Force Phase 1 and 2 Implementation Projects

All CIRC Alternatives Phase 1 and 2 Implementation Projects are included in the CCRPC's Regional Model used for the WENTS study. In addition, projects within the WETNS area and programs influencing the area are included in the TransModeler microsimulation traffic model used for detailed congestion and capacity analyses of intersections and corridors within the study area.

Phase I Implementation Projects are listed below:

1. Crescent Connector Road in Essex Junction
2. VT 2A/James Brown Drive Intersection and related VT2A Mainline Improvements in Williston
3. Regional Transportation Demand/System Management Projects and Programs
4. Interstate 89 Exit 16 Interchange Improvements in Colchester
5. VT 2A/VT 289 Interchange Improvement in Essex

The total estimated cost of the Phase 1 improvements is $11.5 million.

The CIRC Alternatives Task Force Phase 2 implementation projects are listed below:

1. US 2/Trader Lane Signal in Williston
2. VT15/Sand Hill Road Intersection improvements in Essex
3. VT15 - Post Office Square to Five Corners multimodal improvements in Essex Junction.
4. VT15 Multiuse Path in Essex Junction, Essex, Colchester and Winooski.
5. Regional Transportation Demand/System Management Projects and Programs
6. Severance Corners Improvements in Colchester

The total estimated cost of the Phase 2 improvements is $13.9 million.

5.1.2 Additional Core Improvements

The WENTS Core Improvements include bicycle, pedestrian and transit service improvements. In addition, they include spot intersection safety improvements at high crash locations including a dynamic warning flasher at VT2A northbound approach to Exit 12.

5.1.2.1 Bicycle Facility Improvements

Bicycle facility improvements are designed to address discontinuities in the existing bicycle network within the study area. Three approaches are recommended depending on the location and the deficiency:

1. Restriping of existing roadways to create shoulders where none currently exist.
2. Widening shoulders to achieve bicycle facility design standards.
3. Addressing gaps and/or making connections to existing Shared Used Path facilities.

Specific improvements, and their estimated costs, are shown in Table 2.

Table 2: Recommended Bicycle Facility Improvements

Bicycle Facilities	quantity	unit	unit cost*	total cost
Address lack of shoulders and discontinuity by:				
1. restriping where achievable/beneficial (i.e. 3 ft local/collectors, 4 ft arterials, +1 ft at curb/GR)				
N Williston Rd btw Mt View and US2	5600	lf	$ 2	$ 11,200
2. widening shoulder where necessary:				
N Williston Rd. N of Mt View	9400	lf	$ 75	$ 705,000
Mountain View Road	13600	lf	$ 75	$ 1,020,000
adjacent to Allen Brook crossing on VT2A (bridge replacement)	3400	sf	$ 500	$ 1,700,000
approach work	2	ea	$ 400,000	$ 800,000
temporary span	1		$ 1,000,000	$ 1,000,000
along VT117	3400	lf	$ 75	$ 255,000
VT15 between Village (@ Brickyard Rd) and VT289	5000	lf	$ 75	$ 375,000
Address missing Shared Path facility connections, particularly on VT15 and VT2A:				
1. short section E of Old Stage on VT15, S side				*assume by developers*
2. VT15, N side, VT289 to Old Stage	1000	lf	$ 400	$ 400,000
3. VT15, N side, Old Stage to Essex Way	1300	lf	$ 400	$ 520,000
4. Meadow Run to Beaudry Lane (ea. Side VT2A/Allen Brook xing) (1)				*project in final design*
5. Mountain View Rd. (S Side) from Old Stage to VT2A at Industrial	11400	lf	$ 400	$ 4,560,000
6. VT2A - Industrial to Blair Park (complete West side)	3620	lf	$ 400	$ 1,448,000
			TOTAL (rounded)	$ 12,800,000

5.1.2.2 Pedestrian Facility Improvements

Pedestrian facility improvements are designed to address discontinuities and/or missing links in the existing pedestrian network within the study area. In addition, pedestrian hardware and timing improvements at study area intersections are recommended (e.g. pedestrian countdown timers and advanced pedestrian interval (API) timing).

Specific improvements, and their estimated costs, are shown in Table 3.

Table 3: Recommended Pedestrian Facility Improvements

Pedestrian Facilities					
countdown timers	12	int.	$ 10,000	$	120,000
implement API timings	1	l.s.	$ 10,000	$	10,000
missing links (see specifics in bike ped deficiency list):					
1. N Williston/US2 in Williston village at Korner Kwik Stop (W side NWRd, N/S of US2)	440	lf	$ 175	$	77,000
2. US2 Williston Village on SW corner of Oak Hill	360	lf	$ 175	$	63,000
3. VT2A Exit 12 sidewalk (no bridge work)	1800	lf	$ 175	$	315,000
4. VT2A Marshall to US2 (W side)				*assume by developers*	
5: VT2A Flag Works to Knight Lane (E side)				*funded identified separately*	
6. VT2A Obrien Ct to Beaudry (E side)	800	lf	$ 175	$	140,000
7. VT2A from River Cove to East View (East side)				*assume part of JB Drive project*	
8. VT2A from Mt View to River Cove (E side)	2700	lf	$ 175	$	472,500
9. short section @ 289 NB off ramp on VT15	50	lf	$ 175	$	8,750
10. VT15, N side - Education to Athens Dr	2900	lf	$ 175	$	507,500
11. VT15 Athens Dr to VT289	3300	lf	$ 175	$	577,500
13. VT15 S side, Shaws plaza to VT128	1600	lf	$ 175	$	280,000
				$	2,300,000

5.1.2.3 Transit Improvements

Recommended transit improvements include a number of spot investments such as new bus shelters and new sidewalks to connect to bus shelters. Specific service improvements include adding a new weekday mid-day trip on the CCTA Williston Route and adding a weekday peak hour commuter route on VT15 between Jeffersonville and Burlington.

5.1.2.4 Advanced Traffic Signal Control

Adaptive signal control technology increases efficiency and maximizes capacity at signalized intersections and arterial corridors by adjusting signal timings to accommodate changing traffic patterns throughout the day. VTrans has installed the first adaptive signal control project in the state on VT2A at the VT289 interchange. This first installation is designed to understand the capabilities of the technology and build technical capacity at the Agency.

Adaptive Traffic Signal Controls are included in the CIRC Alternatives Transportation System Management initiatives (see 1 and 2 listed below). For the WENTS study area the 3 sections where adaptive signal control can be targeted, in order of priority, are:

1. VT2A from Exit 12 to Zephyr Drive (7 signals)
2. VT15, inclusive of the VT289 interchange to Essex Way (5 signals)
3. VT2A from South Street/River Street to Five Corners (4 signals including the Crescent Connector)

5.2 Hybrid Strategy Package 1

The key component of Hybrid Strategy Package 1 is a new bridge across the Winooski River extending the current southern terminus of VT289 to Redmond Road in Williston (see Figure 2). In Phase 1 of the WENTS study, both the Williston and Essex Selectboards voted to continue consideration of this Major Network Strategy through the remainder of the project.

Other improvements to the network are necessary to accommodate the changes in travel flow that will result from the new bridge. Specific improvements will be necessary at the Redmond Road/Mountain View Road intersection and at the VT2A/Mountain View/Industrial Ave. intersection.

HSP1 improvements are augmented by two spot improvements along VT2A near Exit 12. One of these is a capacity improvement at VT2A/Marshall Ave. The second is a reconstruction of the Exit 12 interchange to accommodate additional lanes and bicycle/pedestrian facilities under the bridge. Table 4 shows the specific elements of HSP1 and their estimated costs.

Figure 2: Map of HSP1 Improvements

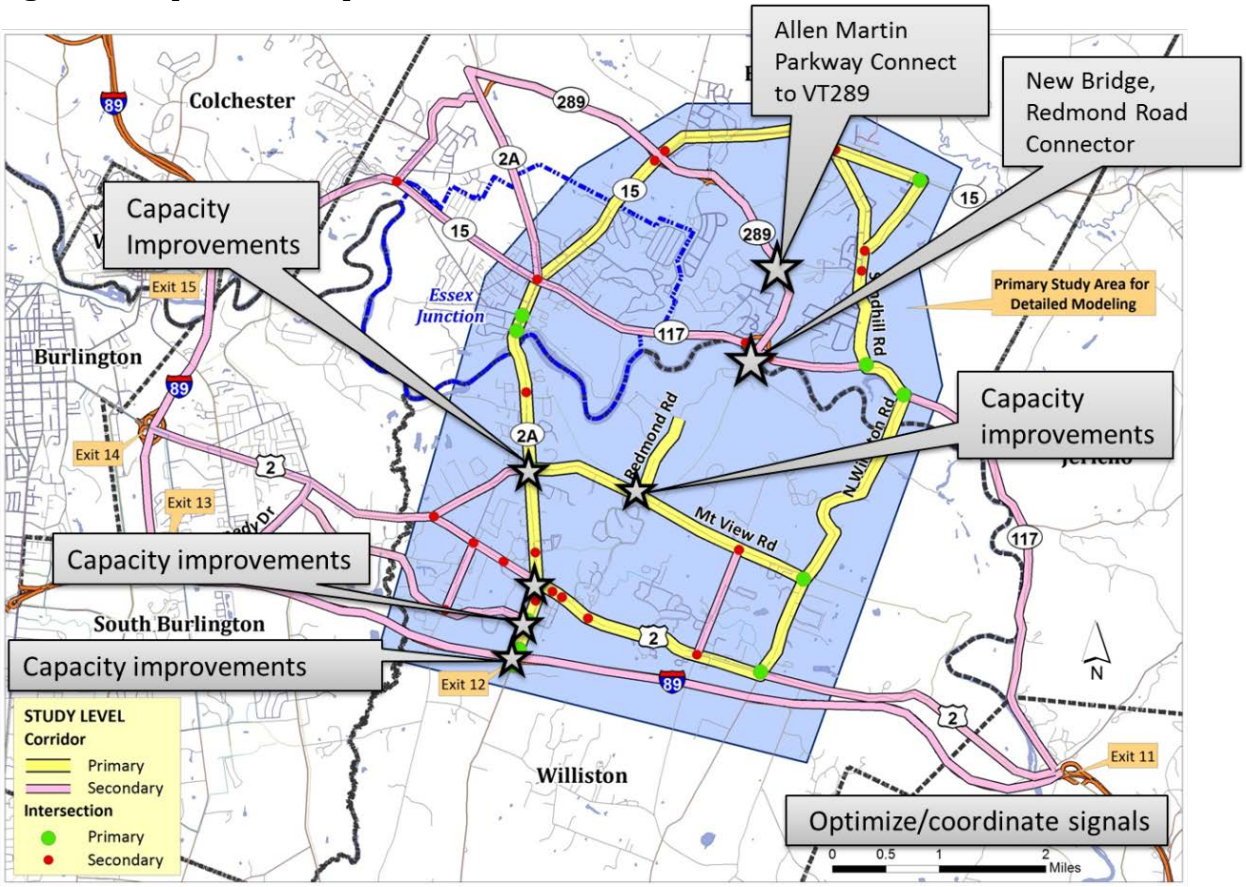


Table 4: Elements of Hybrid Strategy Package 1, with Estimated Costs

Item	Location/Description	likely cost	low	high
1	Bridge and rebuild Redmond Road	$ 25.0	$ 23.5	$ 29.5
2	Build Allen Martin Parkway to connect to VT289	$ 2.0	$ 1.5	$ 3.0
3	Improve Redmond/Mt View intersection (SB right turn lane, signal)	$ 0.3	$ 0.2	$ 0.4
4	Capacity Improvements at Industrial / Mt. View / VT2A: WB left, extend NB left and right	$ 0.6	$ 0.5	$ 1.0
5	reconfiguration of VT2A/Marshall Ave. (2nd WB thru)	$ 1.2	$ 1.0	$ 2.0
6	New interchange configuration at Exit 12	$ 25.0	$ 20.0	$ 30.0
	TOTAL (millions)	**$ 54.1**	$ 46.7	$ 65.9

The total cost of HSP1 improvements is estimated to be $ 47 to 66 million.

5.3 Hybrid Strategy Package 2

The key components of Hybrid Strategy Package 2 are reconstruction of I-89 Exit 12 and new grid streets proximate to the Exit designed to provide additional vehicle mobility in this section of the network. Table 5 shows specific grid street improvements, and their estimated costs, included in HSP2.

Table 5: Network Grid Connections Included in HSP2

Item	Location/Description	likely cost	low	high
1	Connect Harvest Lane near Home Depot to VT 2A near the state police barracks	$ 2.0	$1.0	$2.5
2	Connect Harvest (~UPS) to Trader Lane	$ 0.7	$0.5	$1.5
3	Connect VT2A at the state police barracks to the roundabout in MTP	$ 2.0	$1.5	$2.5
		$ 4.7	$ 3.0	$ 6.5

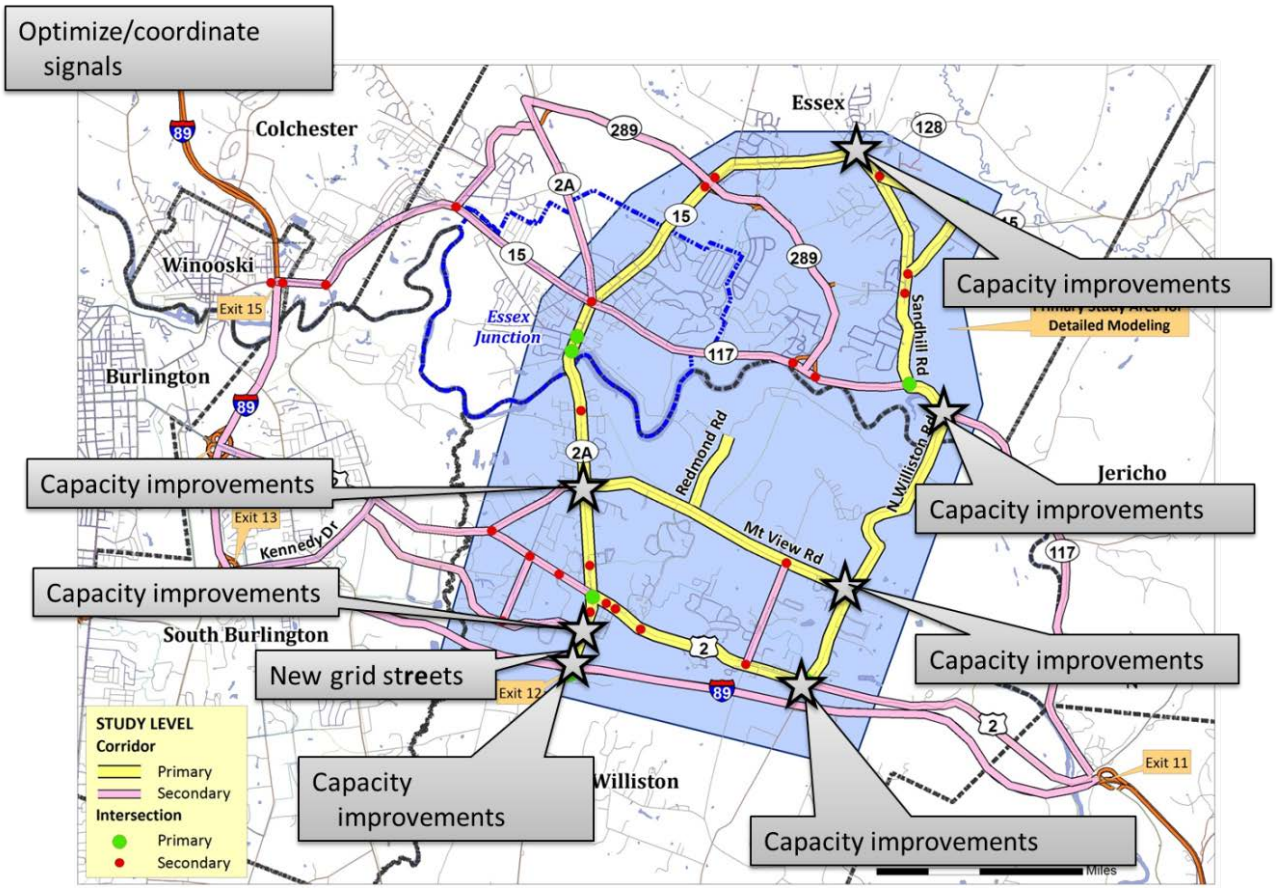
Under direction of the Steering Committee HSP2 combined new grid street concepts with several spot intersection improvements—a total of 7 intersection improvements are included in HSP2, which are shown in Table 6.

Table 6: Intersection Improvements Included in HSP2

Item	Location/Description	likely cost	low	high
1	Towers Rd / VT 128/ VT 15 – WB left turn lane	$0.1	$0.1	$0.3
2	N. Williston Road/US 2/Oak Hill Road - roundabout	$1.0	$0.8	$1.5
3	N. Williston Road/VT117 - signal and lane additions	$0.3	$0.3	$0.8
4	N. Williston Road/Mt View Road - roundabout	$0.6	$0.4	$1.0
5	Industrial / VT2A: WB left, 2 EB lefts, 2nd NB thru	$1.0	$0.8	$1.5
6	VT2A/Marshall Ave. (2nd WB thru, 2nd NB thru)	$6.0	$5.0	$7.0
7	New interchange configuration at Exit 12	$25.0	$20.0	$30.0
		$34.0	$27.4	$42.1

The total cost of HSP2 improvements is estimated to be $30 – 49 million. Figure 3 shows the study area with the general locations of HSP2 recommended improvements.

Figure 3: Map of Hybrid Strategy Package 2 Improvements



6.0 SUMMARY OF PERFORMANCE

Performance measures were established in consultation with the Steering Committee as part of the project's Phase 2 work. Performance measures include network-wide performance measures, corridor travel times, and intersection operations performance measures.

Multimodal performance measures were also established. However, all future scenarios include the same bicycle, pedestrian, and transit improvements. As such, there is no differentiation among the scenarios. The performance measures presented below focus on vehicle mobility measures.

All performance measures are based on PM peak hour traffic conditions.

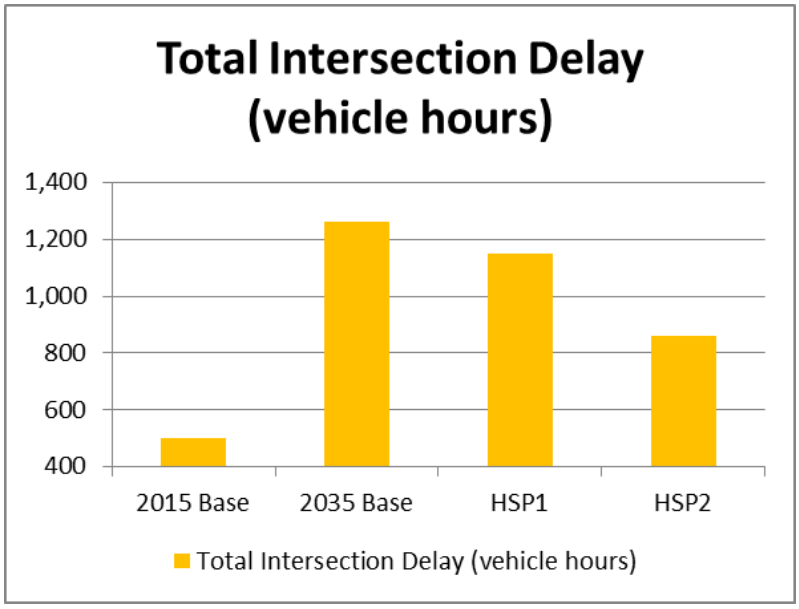
6.1 Network-Wide Performance

Network-wide measures include:

1. Total Intersection Delay for all Primary and Secondary Study area intersections (Figure 4).
2. Total Vehicle Hours Traveled—total vehicle time for all vehicles in the traffic simulation network (Figure 5).
3. Total CO2-equivalent emissions (Figure 6).

Performance of the 3 future 2035 scenarios is compared against the 2015 Base Case to provide a yardstick of changes to traffic and congestion over the 20 year period.

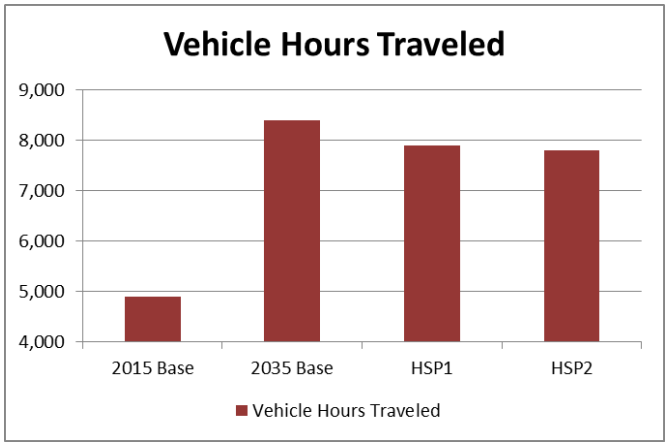
Figure 4: Total Intersection Delay



The results for Total Intersection Delay show a substantial increase in overall intersection-based congestion when comparing 2035 performance against the 2015 Base Case. Compared to the 2015 Base Case, intersection delay increases by 152% for the 2035 Base Case, 130% for 2035 HSP1, and 72% for 2035 HSP2.

When compared against the 2035 Base Case, HSP1 results in a 9% reduction in intersection delay and HSP2 results in a 32% reduction in intersection delay.

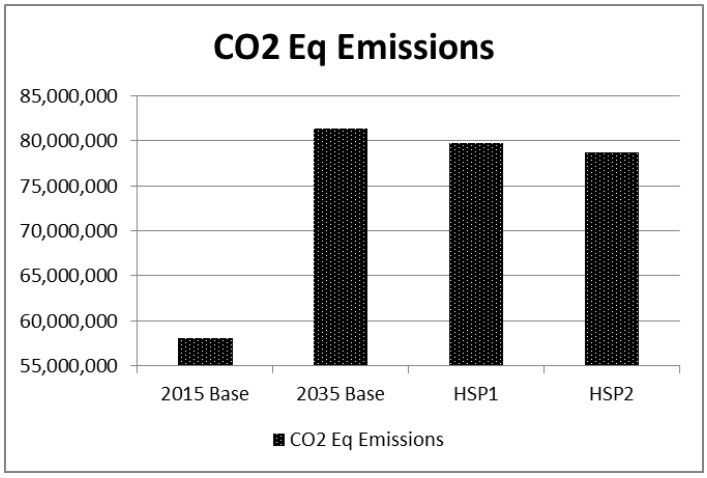
Figure 5: Vehicle Hours Traveled



Total vehicle hours traveled is a broader indicator of congestion that includes time spent in vehicles at intersections, in queues, and along roadway segments. As with Intersection Delay, the results for Vehicle Hours Traveled (VHT) show a substantial increase in overall congestion when comparing 2035 performance against the 2015 Base Case. Compared to the 2015 Base Case, VHT increases by 72% for the 2035 Base Case, 61% for 2035 HSP1, and 59% for 2035 HSP2.

When compared against the 2035 Base Case, HSP1 results in a 6% reduction in VHT and HSP2 results in a 7% reduction in VHT. When compared to the results for Total Intersection Delay, the VHT results indicate that the great majority of congestion in 2035 will be intersection-based congestion.

Figure 6: Total CO2-Equivalent Emissions



Total CO2-equivalent vehicular emissions in 2035 are estimated to be 36-40% greater than in 2015. Both HSP1 and HSP2 show marginal improvement over the Base Case (2-3% reduction).

6.2 Corridor Travel Times

Bi-directional vehicle travel times (minutes), for specific corridors, were measured from model runs for the 2015 and 2035 Base Case, 2035 HSP1, and HSP2. Results are shown in Table 7.

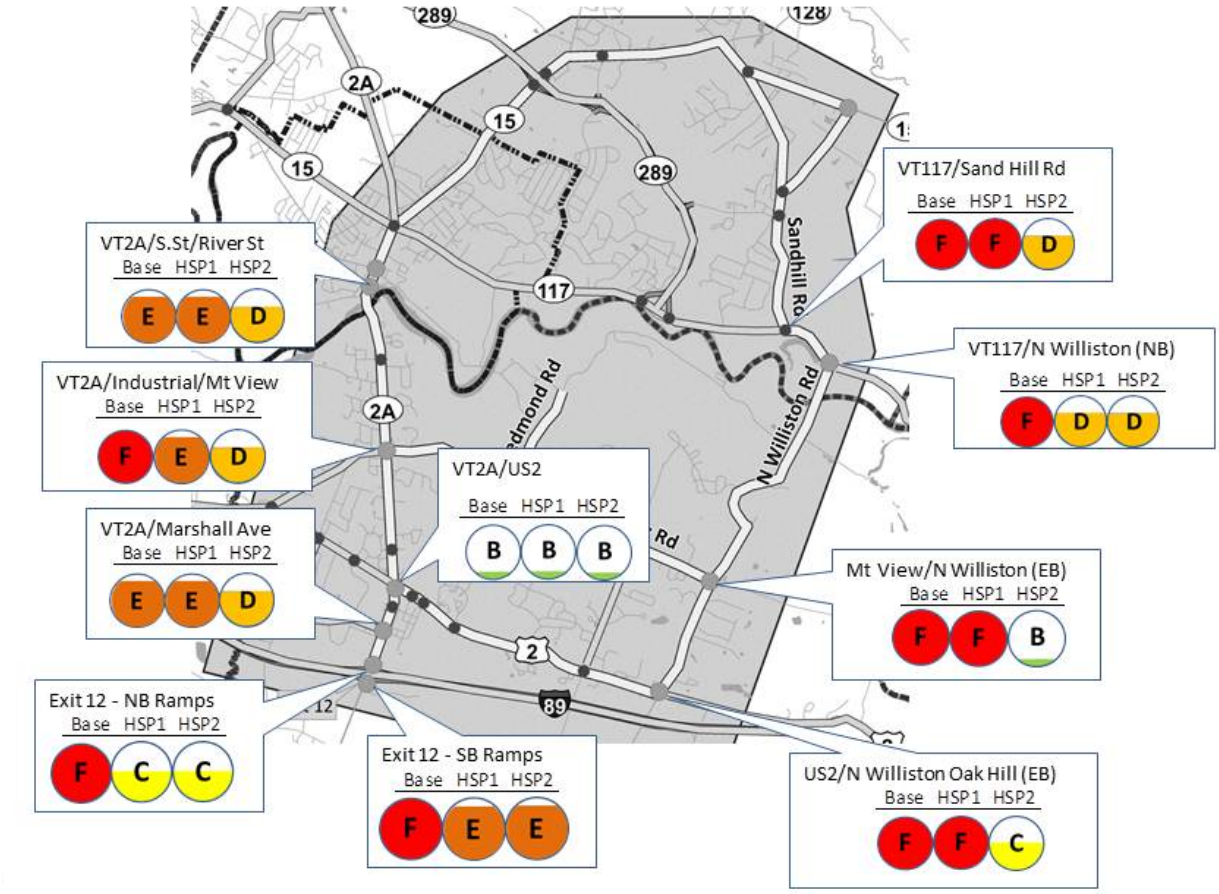
Table 7: Corridor Travel Times

Corridor			2035 Travel Time (mins.)		
AllenMartin, VT15 - SandHill		2015 Base	Base	HSP1	HSP2
	SB	1.2	1.2	1.3	1.2
	NB	1.5	1.6	1.6	1.6
MountainView, VT2A - NWilliston		2015 Base	Base	HSP1	HSP2
	EB	4.8	6.1	8.2	4.5
	WB	6.3	11.5	11.9	9.6
NWilliston, US2 - VT117		2015 Base	Base	HSP1	HSP2
	NB	7.1	9.3	4.7	5.7
	SB	5.1	5.7	5.5	4.9
Sandhill, VT117 - VT15		2015 Base	Base	HSP1	HSP2
	NB	3.1	3.3	4.9	3.2
	SB	3.3	9.0	4.4	3.6
US2, VT2A - NWilliston		2015 Base	Base	HSP1	HSP2
	EB	5.5	9.5	6.3	5.0
	WB	5.1	13.2	12.2	7.7
VT15, SandHill-FiveCorners		2015 Base	Base	HSP1	HSP2
	WB	6.0	6.1	5.9	6.4
	EB	6.3	6.8	6.8	6.8
VT2A, Exit12 - Five Corners		2015 Base	Base	HSP1	HSP2
	NB	12.7	15.7	11.0	13.6
	SB	9.4	17.7	12.7	13.9

6.3 Primary Intersection Performance

Figure 7 shows the overall Level-of-Service (LOS) for all primary intersections in the WENTS study area for the Base/Core Strategy Package, HSP1 and HSP2. The LOS results reflect 2035 PM Peak Hour Conditions. Many of the primary intersections are signalized. As such, some potential improvement in service is possible through additional signal optimization. Some optimization was performed but additional improvements may be possible but would likely be only marginal.

Figure 7: 2035, PM Peak Overall Intersection LOS



The following tables provide detailed LOS and vehicle delay (in seconds) results for the study area's primary intersections. The results for the 2035 scenarios (Base, HSP1, and HSP2) are shown along with the 2010 Base year results, which are closest to today's operational conditions.

Please note that intersection control could change from one scenario to the next. This is noted in the column heading under the scenario name. Some geometric changes assumed for HSP1 and/or HSP2 require additional traffic movements to be tracked in some specific cases.

INTERSECTION		2010 BASE		2035 Base		2035 HSP 1		2035 HSP2	
VT2A/Exit 12 SB		Signal		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	32	C	86	F	68	E	59	E
NB	TR	23	C	73	E	45	D	55	E
	T	30	C	125	F	67	E	81	F
SB	L	34	C	58	E	44	D	47	D
	T	18	B	32	C	24	C	23	C
EB	LT	47	D	93	F	91	F	65	E
	L	46	D	140	F	114	F	78	E
	R	25	C	84	F	78	E	56	E
VT2A/Exit 12 NB		Signal		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	15	B	85	F	30	C	34	C
NB	L	9	A	63	E	159	F	41	D
	TR	8	A	26	C	8	A	11	B
SB	T	18	B	131	F	26	C	37	D
	R	15	B	71	E	37	D	54	D
WB	L	53	D	179	F	59	E	64	E
	R	34	C	156	F	33	C	58	E
VT2A/Marshall Ave./Maple Tree Place		Signal		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	54	D	73	E	74	E	41	D
NB	L	76	E	72	E	136	F	75	E
	T	31	C	41	D	66	E	37	D
	R	18	B	19	B	29	C	14	B
SB	TR	56	E	89	F	66	E	41	D
	L	65	E	70	E	83	F	60	E
	T	42	D	84	F	60	E	36	D
EB	L	152	F	55	D	80	E	77	E
	T	67	E	46	D	53	D	41	D
	R	19	B	41	D	26	C	15	B
WB	TR	101	F	69	E	56	E	26	C
	T	not applicable		not applicable		61	E	28	C
	L	87	F	221	F	184	F	28	C

VT2A/US2		Signal		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	13	B	14	B	12	B	13	B
NB	L	15	B	23	C	16	B	19	B
	T	11	B	10	B	9	A	11	B
	R	4	A	6	A	7	A	8	A
SB	L	14	B	18	B	19	B	31	C
	T	9	A	9	A	7	A	12	B
	R	3	A	4	A	5	A	5	A
EB	L	18	B	23	C	14	B	13	B
	T	12	B	13	B	11	B	9	A
	R	7	A	8	A	9	A	6	A
WB	L	31	C	30	C	37	D	20	C
	T	15	B	18	B	20	B	13	B
	R	9	A	18	B	19	B	13	B

VT2A/Industrial Ave./Mountain View Dr.		Signal		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	39	D	105	F	68	E	42	D
NB	L	91	F	102	F	75	E	62	E
	T	15	B	13	B	14	B	18	B
	R	4	A	5	A	4	A	8	A
SB	L	100	F	219	F	188	F	166	F
	T	45	D	167	F	161	F	52	D
	R	30	C	156	F	135	F	44	D
EB	TR	42	D	104	F	85	F	50	D
	L	74	E	135	F	66	E	61	E
WB	LTR / L	15	B	27	C	15	B	11	B
	TR	not applicable		not applicable		18	B	19	B

Mountain View Dr./Redmond Road		Stop on Redmond		Stop on Redmond		Signal		Stop on Redmond	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	not applicable		not applicable		90	F	not applicable	
SB	L	14	B	25	C	50	D	35	D
	R	11	B	14	B	41	D	19	B
EB	L	11	B	8	A	198	F	20	B
	T	not applicable		not applicable		138	F	not applicable	
WB	T/TR	5	A	5	A	31	C	11	B
	R	not applicable		not applicable		25	C	not applicable	

VT2A/South St./River St.		Signal		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	70	E	76	E	97	F	70	E
NB	L	69	E	63	E	58	E	62	E
	T	21	C	34	C	25	C	29	C
SB	TR	56	E	106	F	57	E	167	F
EB	LR	313	F	879	F	609	F	31	C
WB	TR	28	C	34	C	30	C	34	C
	L	58	E	29	C	77	E	228	F

US2/Oak Hill Rd./N. Williston Rd.		All Way Stop		All Way Stop		All Way Stop		Roundabout	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	148	F	152	F	69	E	18	B
NB	LTR	13	B	17	B	16	B	10	B
SB	LTR	27	C	75	E	67	E	14	B
EB	LTR	309	F	348	F	122	F	26	C
WB	LTR	18	B	18	B	16	B	6	A

N. Williston Rd./Mountain View Rd.		Stop on Mountainview		Stop on Mountainview		Stop on Mountainview		Roundabout	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	not applicable		not applicable		not applicable		18	B
NB	LTR	6	A	12	B	10	B	10	B
SB	LTR	38	D	23	C	17	B	26	C
EB	LTR	66	E	129	F	89	F	17	B
WB	LTR	34	C	27	C	22	C	10	B

N. Williston Rd./VT117		Stop on N. Williston		Stop on N. Williston		Stop on N. Williston		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	not applicable		not applicable		not applicable		25	C
NB	L	200	F	349	F	51	D	38	D
	R	160	F	266	F	25	C	34	C
EB	LTR	5	A	12	B	9	A	26	C
WB	L/TR			246	F	69	E	12	B
WB	L	19	B			not applicable		30	C

Allen Martin Dr./VT15		Stop on A. Martin		Stop on A. Martin		Stop on A. Martin		Stop on A. Martin	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	not applicable		not applicable		not applicable		not applicable	
NB	L	12	B	18	B	20	C	18	B
	R	2	A	4	A	3	A	3	A
WB	LT	2	A	3	A	4	A	3	A

VT117/Sand Hill Rd.		Stop on Sand Hill		Signal		Signal		Signal	
Direction	Movement	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	overall	not applicable		100	F	81	F	49	D
SB	L	54	D	355	F	103	F	78	E
	R	25	C	262	F	54	D	51	D
EB	L	51	D	44	D	117	F	58	E
	T			21	C	92	F	21	C
WB	TR	6	A	29	C	25	C	357	F

7.0 ENVIRONMENTAL/RIGHT-OF-WAY CONSTRAINTS

Standard Geographic Information System (GIS) techniques were used to evaluate the environmental and right-of-way impact of HSP1 and HSP2 relative to the Base Case.

Environmental and transportation impacts and cost estimates for HSP1 and HSP2 are visualized via the graphics shown in Figure 8 - Figure 11. The same visualization techniques are used as were utilized during Phase 1 of the WENTS project evaluating the Major Network Strategies.

Figure 8: Summary Results of HSP1 & HSP2: Environmental – Transportation – Costs

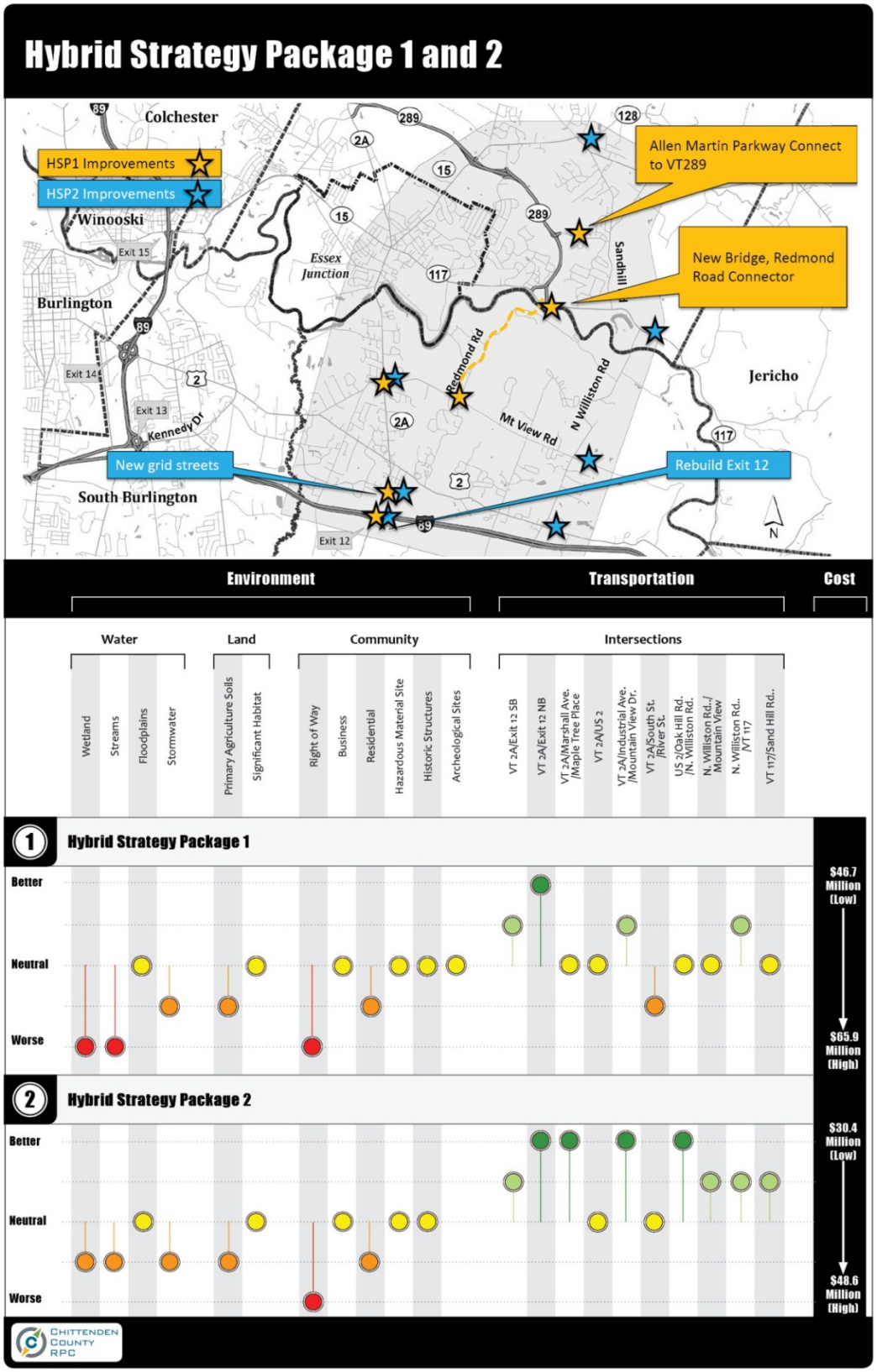


Figure 9: Results for HSP1 Improvements: Environmental – Transportation – Costs

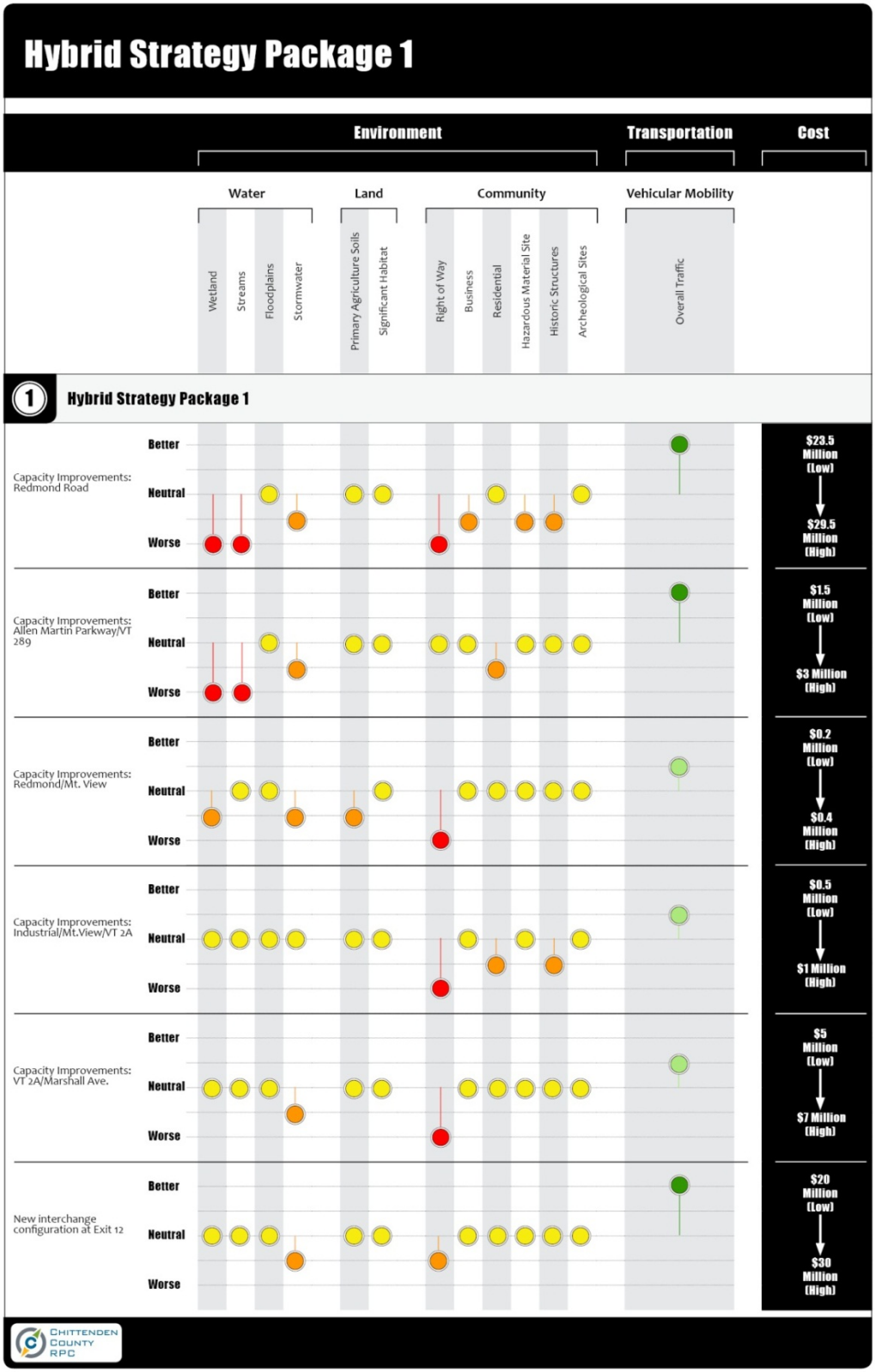


Figure 10: Results for HSP2 Spot Improvements: Environmental – Transportation – Costs

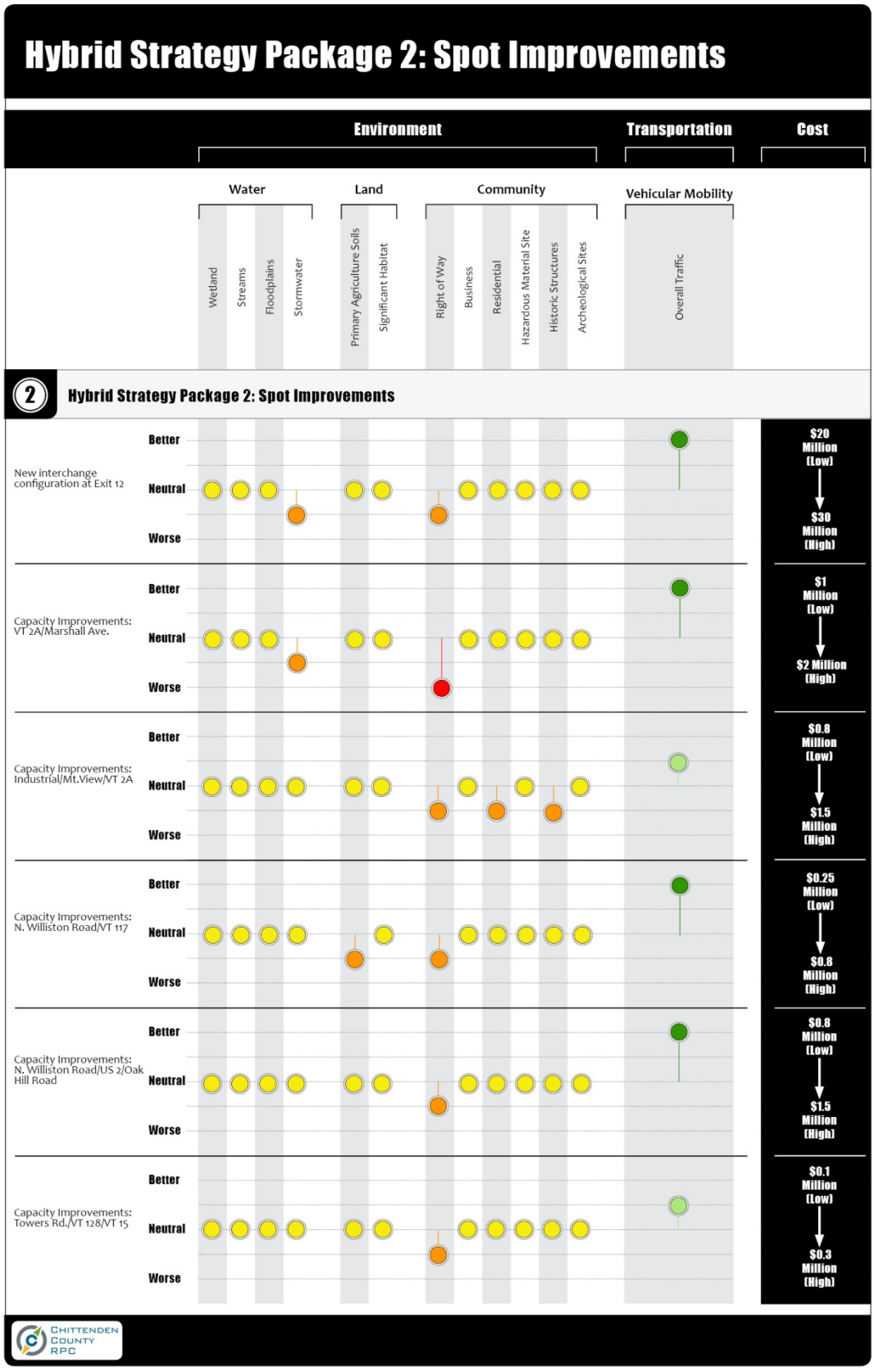
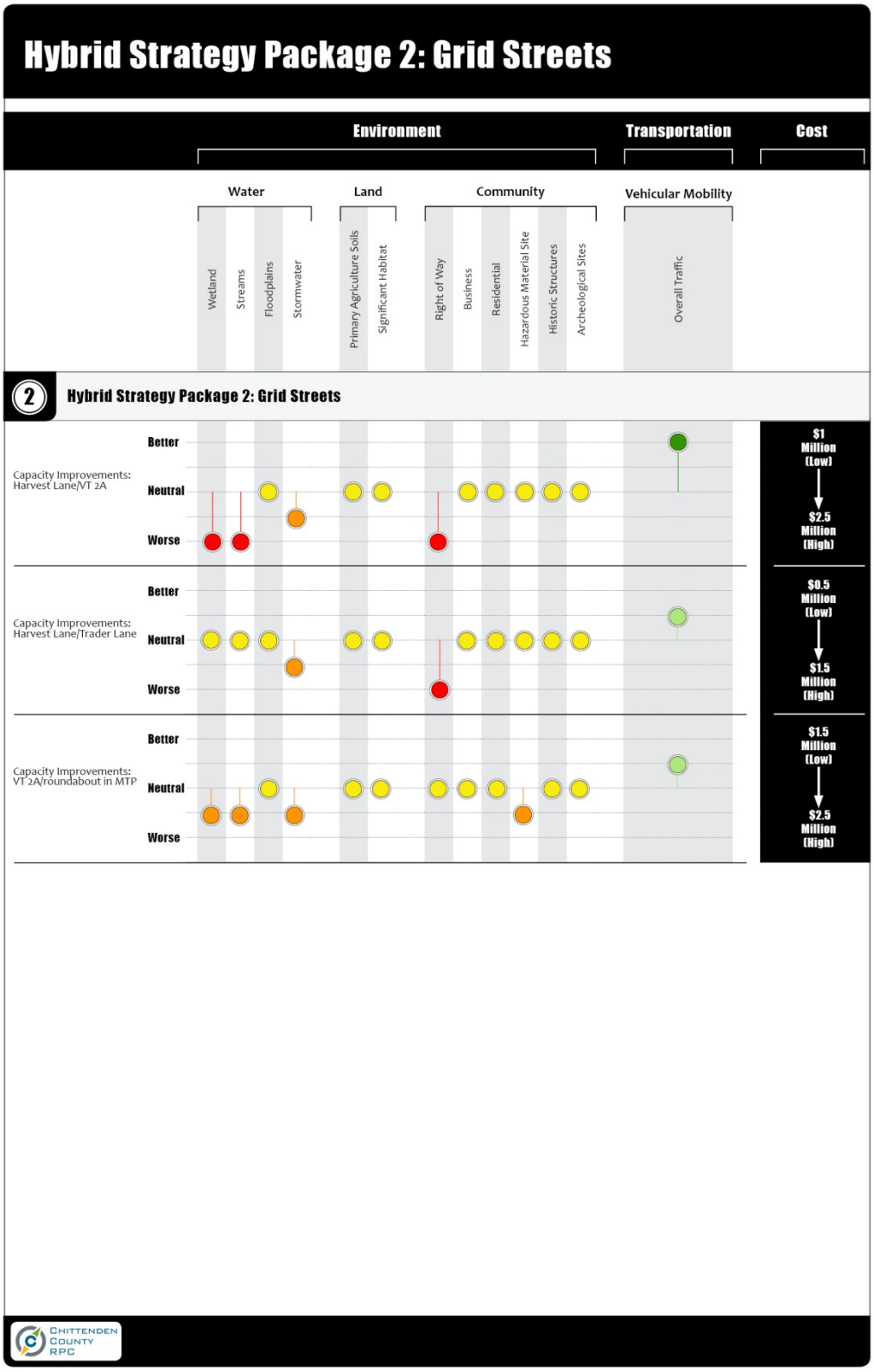


Figure 11: Results for HSP2 Grid Streets: Environmental – Transportation – Costs



8.0 WENTS STEERING COMMITTEE RECOMMENDATIONS

The WENTS Steering Committee met on January 23, 2013 to discuss results for HSP1 and HSP2. Based on the Performance Measures summarized in this report, and on the estimated costs and relative environmental impact, the Steering Committee endorsed ***Hybrid Strategy Package 2 (HSP2)*** as the preferred strategy package for the WENTS study area.

The Steering Committee also approved the following Scoping Studies, based on the HSP2 and Core Strategy Package, to recommend to the CIRC Alternatives Task Force for consideration as CIRC Alts Phase III Planning Studies.

- **I-89 Exit 12 Reconfiguration and Grid Streets. The study area for this scoping study begins several hundred feet south of the Exit 12 interchange and extends to the VT2A/Marshall Ave intersection.** This scoping study will evaluate potential reconfigurations of Exit 12 to provide additional traffic mitigation in the immediate area; address safety issues; and improve bicycle/pedestrian mobility north and south of I-89. The scoping study will also address the opportunity for new local roads connecting VT 2A to Harvest Lane (west of 2A) and to Maple Tree Place (east of 2A) as well as a new VT 2A intersection at the vicinity of the State Police Barracks.
- **VT2A/Mountain View/Industrial Avenue, inclusive of VT2A from this intersection to the James Brown Drive project improvement.** In addition to addressing significant congestion issues at this intersection/corridor, this study should consider bicycle/pedestrian mobility in the area proximate to the intersection and connections to existing facilities along VT2A and along Mountain View Drive.
- **VT117/North Williston Road intersection**, inclusive of the North Williston Road approach to the Winooski River Bridge to consider intermittent flooding of the road. Project should consider mitigation of peak period congestion, existing safety deficiencies, and bicycle/pedestrian safety and mobility.
- **Multimodal improvements: US2 from Taft Corner to Williston Village.** This section of US 2 has several deficiencies that should be addressed in one inclusive multimodal study. Issues to be addressed include:
    a. Bicycle/pedestrian connections along and/or parallel to US2 connecting existing multiuse paths.
    b. Removal and rehabilitation of the eastbound US2 climbing lane.
    c. Provision of transit access (i.e. bus shelters and pedestrian access to bus shelters) at appropriate places along this segment.
    d. Other improvements to the US2 mainline to more safely accommodate bicycle/pedestrian traffic.
- Bicycle and pedestrian scoping study for **Mountain View Road from Old Stage Road to VT2A.**
- Bicycle and pedestrian scoping study for **VT2A from Industrial Avenue to Blair Park, inclusive of the Allen Brook crossing**.
- Bicycle and pedestrian scoping study for **VT15, from Old Stage Road to Essex Way**.

The WENTS Steering Committee is also endorsing a critical non-infrastructure recommendation to pursue a new **Statewide Congestion Policy** targeted for High Growth Areas in the county, as defined in the Regional (*Ecos*) Plan. The new Congestion Policy will redefine congestion measures and thresholds and will allow for a wider range of traffic mitigation measures (TDM, Transit, etc) from

developments in these areas. This new policy will reinforce local and regional land use polices and will support existing and planned land use densities and patterns in the designated areas.

The Steering Committee based the new Congestion Policy recommendation on performance results in the WENTS area indicating a dramatic increase in traffic congestion which is a direct result of the amount of growth planned for the WENTS area.