THE I-81 CHALLENGE

Draft Technical Memorandum #2:
Strategy Development and Evaluation

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Chapter 1 - Introduction

The I-81 Corridor Study was conducted to ensure that the planning effort for the I-81 corridor considers the infrastructure needs in the context of its community and its users. "The I-81 Challenge" involved four integrated efforts.

- The I-81 Corridor Study assesses and documents the highway's existing conditions and deficiencies, identifies multimodal transportation and community needs and priorities, analyzes potential strategies for the future of the corridor, evaluates such strategies, and recommends strategies for further study.

- The I-81 Challenge Public Participation Program develops, carries out, and documents the public outreach and involvement effort and gives the City of Syracuse, Onondaga, Oswego and Madison County residents a mechanism to learn about I-81 and voice their ideas about the I-81 corridor.

- The I-81 Travel Demand Modeling effort is a technical project using computer modeling to forecast and display how future options could affect the regional transportation network.

- The Syracuse Transit System Analysis, Phase I documents and evaluates the regional transit system operated by Central New York Regional Transportation Authority (CENTRO) and identifies various transit strategies to address, enhance and promote transit use throughout the region.

This memorandum is one of two documents that comprise the supportive technical documents to The I-81 Corridor Study[1]. The first document referred to as Technical Memorandum #1 (TM#1) Physical Conditions Analysis[2], published in January 2011 detailed the physical conditions of the corridor. The purpose of this second technical memorandum (TM#2) is to explore solutions to address the various needs within the corridor as well as, analyzes and evaluates potential transportation and infrastructure related strategies as compared to the corridor needs.
TM#2 is broken down into the following chapters:

Chapter 2 – Study Overview: includes a quick overview of the public participation program, recaps the corridor transportation needs and study goals and objectives.

Chapter 3 - Strategy Development: includes the evolution of the proposed transportation strategies for the I-81 Corridor. This chapter also includes the engineering considerations and magnitude of costs for each proposed strategy as well as detailed descriptions and justifications of those strategies that are recommenced for further analysis.

[1] The I-81 Corridor Study, July 2013
http://thei81challenge.org/cm/ResourceFiles/resources/I-81_Corridor_Study_Report_July_2013.pdf
[2] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

Chapter 4 – Strategy Evaluation: includes an assessment of the potential transportation, social, economic and environmental effects of the proposed strategies in comparison to the corridor needs.

CHAPTER 2 – STUDY OVERVIEW

2.1. PUBLIC INVOLVEMENT PROGRAM UPDATE

Public involvement during the planning phase of any project encourages meaningful discussions that can assist decision-makers in the process of exploring tools to create a sustainable, vibrant and healthy environment related to future transportation infrastructure. Over the past several years, NYSDOT, in partnership with SMTC, has led a public outreach program entitled "The I-81 Challenge" to advance the community discussion about the future of I-81 in Syracuse. NYSDOT and SMTC engaged a broad cross-section of community members and used a variety of methods in the program. An overview of the process along with documents detailing the extensive public involvement effort can be found on The I-81 Challenge website[3].

Educational and informational materials developed for this study can be found on the I-81 Challenge website[4], including:

- a study fact sheet (July 2009, with an update in February 2011);
- newsletters (Spring 2011 and Fall 2011);
- electronic communications, including a blog launched in March 2011;
- a Facebook page created in April 2011;
- "e-blasts" to a list of 1,200 stakeholder email addresses starting in December 2010;
- videos on the history of transportation in the Syracuse region;
- case studies of other cities with urban freeways; and a summary Case Study Report (2010)[5].

A Study Advisory Committee (SAC), consisting primarily of SMTC member agencies, was formed to provide input and guidance throughout The I-81 Challenge. Eleven SAC meetings were held to update members and obtain feedback on the study progress. As the study progressed, two additional committees were formed: a Community Liaison Committee (CLC) and a Municipal Liaison Committee (MLC). The CLC was comprised of individuals representing community organizations and the MLC was comprised of representatives of municipalities (town supervisors and village mayors) within the SMTC planning area. The CLC and MLC met prior to the 2011 and 2012 major public workshops for the project; the CLC also had an additional meeting in late 2011 as a follow-up to the first public workshops.

Public input, combined with technical studies, has generated a range of initial ideas, developed goals and objectives, developed evaluation criteria, and narrowed down the broad range of strategies. Based on input from stakeholders and further review and refinement, some strategies were determined not to be feasible. Other strategies were determined to be feasible and would progress to the environmental review phase for more detailed analysis;

[3] http://thei81challenge.org/Home/SubMenuContent/StudyReportsAndDocuments
[4] http://thei81challenge.org/Home/MenuContent/Resources
[5] http://thei81challenge.org/cm/ResourceFiles/resources/CaseStudiesReport_3-02-10.pdf

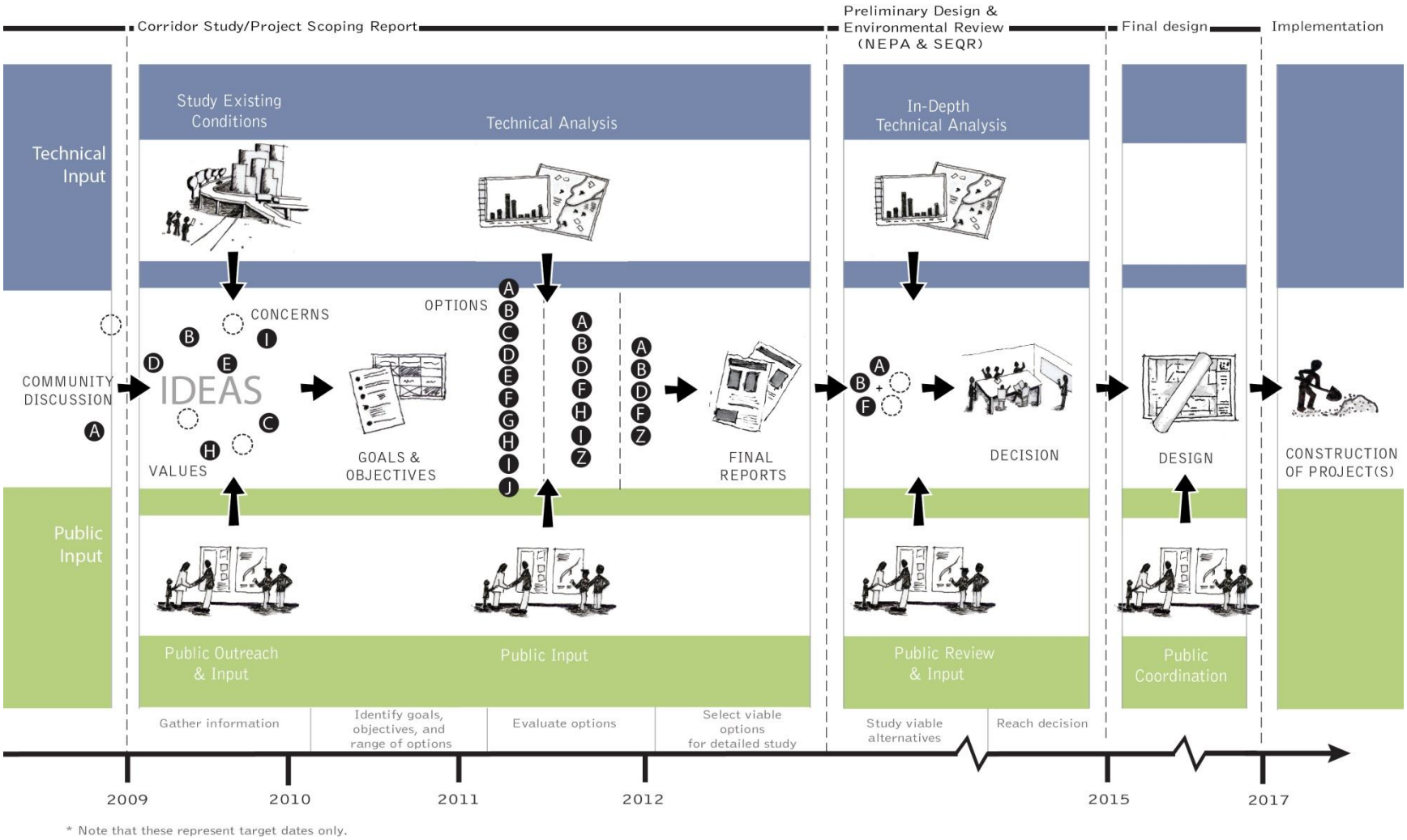
viable strategies would be advanced to the project development, design, and environmental review phase. The public involvement process will continue as strategies continue to be evaluated and refined.

The I-81 corridor study public participation program included various elements as shown in Table 1. The study process is shown in Figure 1.

Table 1 – Public Participation Program

Public Participation	Timeframe	Number of Participants	Primary Objective	Outcome
Questionnaires (2)	Summer 2009 through Spring 2010; and Spring 2011	Approximately 100 responses in 2009/2010; 990 responses in 2011	• Learn how people currently use I-81 and their concerns about the future of I-81	• Raised awareness of project; used information about concerns and current use to develop goals and objectives.
Focus groups (23)	Sept/Oct 2009 and Feb/June 2010	176 participants	• Initiate *The I-81 Challenge* • Understand the range of interests perspectives, uses, concerns and opportunities related toI-81 transportation needs and the future of I-81 corridor	• Identified community principles and community impact areas
Community meetings (more than 30)	Continuous (esp. Dec 2009 - Sept 2011)	Nearly 500 attendees	• Share information, gather community input about the process	• Raised awareness of project, educated the community about the process
Public workshops (3 days)	May 2011	700 in-person, 200 online	• Educate public on study process, corridor existing conditions, project evolution, history, existing conditions and community principles • Identify transportation needs and gather input of goals and objectives	• Input on deficiencies and needs of corridor • Refined goals and objectives • Initial step in strategy development process
Public meeting	May 2012	480 in-person, 250 online	• Evaluate and eliminate preliminary options, identify potential feasible strategies and examples	• Feedback on initial pre-screening • Identified draft strategies • Evaluation process and strategy evaluation matrix
Public meeting	May 2013	720 in-person, 330 online	• Present corridor study findings	• Bring feasible strategies into scoping, environmental review and preliminary engineering

Figure 1 – Public Involvement Program Process



2.2. CORRIDOR TRANSPORTATION NEEDS

As emphasized in the National Transportation Policy Project (NTPP), this is a period of extraordinary opportunity for revitalizing America's surface transportation system. The investments of the interstate highway era, begun more than 50 years ago, are nearing or beyond their intended lifespan. Existing systems are dated, in many cases strained to (or beyond) capacity, and increasingly fall short of delivering transportation services at the level of quality, performance, and efficiency the American public demands6. These demands and needs are evident in the 12-mile I-81 corridor. Specifically, the I-81 corridor study process has identified the need to:

- **Address capacity, reliability and safety problems associated with non-conforming highway features**

  Address the deficiencies in the transportation system geometry to improve traffic operations, flow and capacity, reducing congestion and accidents. The corridor study found that highway sections along the I-81 corridor that do not meet current design standards generally coincide with areas of increased congestion and high accident rates. Addressing design deficiencies in the corridor would improve capacity and reliability, and reduce accident patterns and rates.

  There are approximately 200 non-standard and non-conforming features[7] in the 12 mile I-81 Corridor study area. These features are detailed in TM #1 and shown in Table 2 and have been identified as contributing factors to the observed congestion, operations and safety concerns. The highest concentration of these features is in the viaduct priority area including the I-81/I-690 interchange and viaduct area where 102 design deficiencies are present.

[6] *National Transportation Policy Project. (2009). "Performance Driven: A New Vision for U.S. Transportation Policy." A project of the Bipartisan Policy Center. <http://www.bipartisanpolicy.org/sites/default/files/NTPP%20Report.pdf>.*

[7] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

Table 2 -
Summary Existing Non-Standard & Non-Conforming Features

	Non-Standard Features							Non-Conforming		
	Shoulder Width	Grade	Horizontal Curve	Sight Distance	Super - Elevation	Lane Width	Median Width	Ramp Spacing	Accel/Decel Length	Total
Area A - South End										
I-481 South Interchange	0	4	2	7	7	0	0	0	0	20
Exit 17	0	0	0	5	0	0	0	0	0	5
Cemetery to Viaduct	2	0	2	0	0	0	1	0	0	5
Area A - North End										
Rt. 370 Interchange	0	0	1	2	3	0	0	1	0	7
7th North and Thruway	0	0	2	5	7	0	0	2	2	18
Mattydale Exit	0	0	2	4	2	0	0	0	0	8
Airport Exit	0	0	0	2	0	0	0	1	1	4
Taft Road	0	0	0	2	1	0	0	0	1	4
Church St	0	0	2	2	2	0	0	0	0	6
I-481 North Intechange	0	1	10	6	0	0	0	0	3	20
Interchange/Viaduct										
Viaduct	2	0	0	8	0	0	2	0	1	13
I-81 / I-690 Interchange	5	5	6	16	2	2	2	10	4	52
North Approach	0	0	2	6	4	0	0	1	3	16
I-690 / West Street	0	0	4	6	2	0	2	2	0	16
I-690 East Side	0	0	0	2	0	0	0	0	3	5
TOTAL	9	10	33	73	30	2	7	17	18	**199**

- **Address deteriorating infrastructure**
  Address functionally obsolete and deficient structures within the I-81 study area. The major reason for the urgency of this planning effort is the condition of the viaduct and other bridges located on I-81 between the I-481 interchanges, as well as on I-690 in the vicinity of the I-81/I-690 interchange. Of the 76 bridges[8] in this area, 60 percent are considered functionally obsolete and have narrow lanes, and no or reduced shoulders. NYSDOT frequently inspects these bridges and makes routine repairs to protect the traveling public. However, it is critically important to begin a serious effort to address these aging pieces of infrastructure to assure the safety and efficiency of the future regional transportation network.

- **Maintain traffic flow**
  Maintain and improve traffic flow to and within the City of Syracuse, surrounding communities, and the interstate system. Retain traffic flow to northern and southern outer segments of the corridor to ensure continued accessibility and mobility for all

[8] [8] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

travelers to and from the area. Although I-81 is an important national trade route, recent data collected found that only about 12 percent (11% autos, 1% heavy vehicles) of all vehicles traveling along the I-81 corridor pass through the Syracuse region[9]. This information is useful for understanding how much traffic is using or could use alternative interstate routes to bypass the region and suggests that diverting regional interstate through traffic will have little impact on traffic volumes or operations on I-81.

- **Improve pedestrian and bicyclist access and safety**
  Improve accommodations for pedestrian and bicyclist use and system connectivity; reduce injuries and fatalities to pedestrians within the I-81 study area. Within the corridor study area there is an increased emphasis on the need to provide adequate access for pedestrians and bicyclists. Expanded transit system and improved or new pedestrian and bicyclist facilities will result in greater connectivity; improving mass transit options will assist in reducing congestion. In urbanized areas of I-81 corridor, there is a lack of pedestrian and bicycle facilities including sidewalks, lighting and bike lanes which decrease the safety for pedestrians and bicyclists[10]. Specifically, there is a need to improve the connection between downtown Syracuse and the University Hill area. More desirable and safer pedestrian and bicyclist travel can in turn has a positive economic impact on local shopping, restaurants, and other non-work activities and enhance community "sense of place".

- **Improve access to support community cohesion and economic competitiveness**
  Improve access to local businesses, medical facilities and connections to the local street network. From the surrounding areas and interstate travel, improve connectivity for the residential areas and minimize physical intrusions into commercial and residential areas within the I-81 study area. Stimulate economic development within the I-81 study area, including in the city and the suburban areas in the outer segments of the corridor. Maintain or improve economic development opportunities in collaboration with local businesses, including "Meds and Eds", and retail in Syracuse and surrounding communities. In the downtown Syracuse area, there is public perception that the viaduct presents a barrier to community cohesiveness.

- **Support, coordinate and be consistent with regional land use plans and sustainable community principles**
  Address the transportation needs in a way that supports economic competiveness, community cohesion, and environmental resource protection. These are three cornerstones of a sustainable community. Coordinate transportation needs with land use development plans within the I-81 study area, including the City of Syracuse and the towns north and south of the city. The Regional Economic Development Council (REDC)

[9] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

[10] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

recognizes that "strong regions are built around strong municipal cores that develop centers of innovation and commerce central element of our development strategy".

2.3. STUDY GOALS AND OBJECTIVES

As noted on the AASHTO Center for Environmental Excellence website[11], current and future transportation growth patterns and the way that we develop transportation systems are important factors in sustaining the world's limited economic, environmental, and social resources and capacity. Through the *I-81 Challenge* focus groups, community members and stakeholders developed an initial and important list of emerging community principles and community impact areas. The detailed summary of these activities is provided in Technical Memo #1[12] and in White papers and other public involvement documents on *The I-81 Challenge* website[13].

The initial emerging community principles and community impact areas evolved into the corridor goals and objectives as shown in Table 3. These goals and objectives served as criteria for strategy evaluation, as presented in the discussion below with an assessment matrix for each strategy. The goals are grouped to reflect the transportation assessment as well as the sustainability triple bottom line principles of economic competitiveness, social equity/quality of life, and environmental stewardship. Strategies were evaluated against these community-identified objectives.

In its 2011 Capital Program Update guidance, NYSDOT recognized that a sustainable approach to planning considers the relative and cumulative value of transportation assets as they benefit the public, economy and environment. In this way, the decision-making process looks broadly at the wider benefits of transportation improvements as they relate to sustainability[14]. Those benefits, which mirror the community-identified goals for the I-81 Challenge as described above, are defined as follows:

- *Economic competitiveness:* improve efficiencies in work/business travel and freight movement; improve tourism access and inter-modal connectivity; develop investments which complement or enhance the strategic investments proposed by Regional Economic Development Councils.
- *Social equity/community:* improve accessibility for transit, recreation, education, health care; support smart growth, complete streets and livability; increase safety; weigh climate-associated risk to transportation infrastructure.
- *Environmental stewardship:* increase energy efficiency and reduce greenhouse gas emissions; reduce resource consumption; limit impacts that encroach on the environmental footprint; improve air quality.

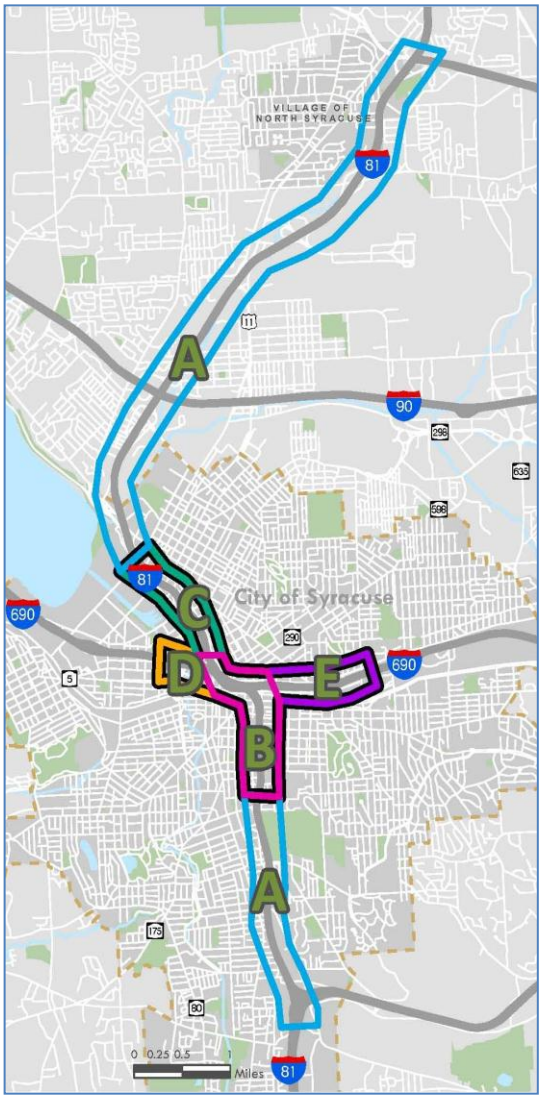
[11] http://environment.transportation.org/
[12] *Technical Memo #1: Physical Conditions Analysis; January 2011* http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf
[13] http://thei81challenge.org/Home/SubMenuContent/StudyReportsAndDocuments
[14] *2011 NYSDOT Capital Program Update Guidance*

Table 3 – Corridor Goals and Objectives

Category	Goals	Objectives
Transportation	**Enhance the Transportation Network**	▪ Eliminate structural deficiencies using treatment strategies which provide the lowest life cycle maintenance costs and restore bridge condition ratings, where applicable, to good condition for at least 30 years. ▪ Improve existing geometric design through the application of appropriate design standards and the reduction of non-standard elements and/or geometries. ▪ Identify alternative mode improvements in the vicinity of I-81.
	Enhance Region-wide Mobility	▪ Improve peak period mobility and reduce delay on the highway system (primary, secondary and city streets) by providing acceptable operating speeds, improving level of service. Preserve regional mobility by maintaining travel times. ▪ Improve access to key destinations (i.e.: the airport, hospitals, and downtown businesses). Improve connectivity of alternative modes of transportation (pedestrian, bicycle, transit).
	Improve Public Safety	▪ Reduce accident occurrences to at or below the statewide average for similar facilities. ▪ Improve the safety of alternative modes of transportation (pedestrian, bicycle, transit).
Economic Competitiveness	**Maintain or Improve Economic Opportunities**	▪ Maintain or improve economic opportunities by addressing multi modal access. ▪ Improve transportation system efficiency, reliability and reduce travel costs. ▪ Maintain or improve the overall economic environment and infrastructure.
	Exercise Fiscal Responsibility	▪ Minimize capital costs by ensuring that transportation system investments are cost-effective. ▪ Minimize long term operation and maintenance costs.
Social Equity/ Quality of Life	**Support Community Quality of Life**	▪ Encourage sustainable land use patterns within the city and county. ▪ Enhance local connectivity (such as linking University Hill with downtown). ▪ Encourage smart growth: sustainable regional land use patterns that minimize suburban sprawl which increases demand for infrastructure and services. ▪ Improve the visual built environment through context sensitive design that contributes to roadside/street ambiance, community character and public safety. ▪ Promote other planning and development visions and initiatives (county, city, and region).
	Share Burdens and Benefits	▪ Share the burden of impacts during construction and long term across stakeholders (e.g. suburbs, adjacent neighborhoods, low income communities, Onondaga Nation). ▪ Share the benefits across stakeholders (e.g. suburbs, adjacent neighborhoods, low income communities, Onondaga Nation).
Environmental Stewardship	**Preserve or Enhance Environmental Health**	▪ Support local, regional and state environmental initiatives. ▪ Maintain or improve air quality (overall emissions and odor). ▪ Minimize air quality and noise impacts on adjacent neighbors. ▪ Minimize impacts on designated community landmarks and historic resources. ▪ Minimize storm water impacts and improve water quality.

2.4. PRIORITY AREA IDENTIFICATION

Figure 2 – Corridor Limits



The study covers a 12-mile stretch of I-81 in Onondaga County from the southern entrance to the City of Syracuse at the I-81/I-481 southern interchange (southerly limit), passing through the heart of the city and proceeding north, past Onondaga Lake, I-90 (NYS Thruway) and the Syracuse Hancock International Airport before intersecting with I-481 on the north side of the county (northerly limit), Figure 2. For evaluation purposes, the corridor was divided into the outer segments and the downtown viaduct area. The outer segments include the northern segment of I-81 from the I-481 northern interchange to Hiawatha (approximately 6.5 miles) and the southern segment of I-81 from about Castle Street south to the I-481 southern interchange (approximately 2 miles). The downtown viaduct area includes I-81 from Hiawatha Boulevard south to Castle Street along with I-690 from West Street to Teall Avenue.

For most of the I-81 corridor area, accident rates are above the statewide average for similar interstate systems. This is especially true in the area around the I-81/I-690 interchange. Accident rates through the I-690 interchange are four to five times the statewide average; and, the accident rate on the viaduct portion of I-81 (northbound direction) is more than triple the statewide average. The non-standard design features in this area contribute to above average accident rates.

The overall expressway system is operating at acceptable levels of service with the exception of the I-81/I-690 Interchange and their approaches to the city. I-81 from approximately Hiawatha Boulevard south to Harrison Street and I-690 from the State Fairgrounds east to Midler Avenue are approaching capacity during the commuter peak periods. The interchange of I-81/I-690 and the I-81 interchange with Harrison Street/East Adams Street are operating at or near failing conditions.

The primary corridor geometrics represent areas where significant deficiencies are evident. Nonstandard design features are particularly prevalent in and around the I-81/I-690 Interchange that include mainline geometry, ramp design and spacing, interchange spacing and road width (shoulders and medians). This includes I-81 from Hiawatha Boulevard south to

Harrison Street and I-690 in the area between and including I-81 and the West Street interchange. The narrow shoulder width and high traffic volumes on I-81 pose significant operational challenges. It is difficult to conduct routine maintenance and, when accidents occur, the limited shoulder width creates backups and hazards for traffic. The tight curves and narrow shoulders on the viaduct and the adjoining I-81/I-690 interchange are very difficult for emergency responders.

There are 76 bridges built in the mid to late 1960's in the primary study corridor. Of the 76 bridges, seven are classified as "structurally deficient" and 47 are "functionally obsolete". Thirty-one of the 32 bridges in the viaduct and I-81/I-690 interchange area need to be replaced because of their overall age, condition and functionality.

Additionally, the I-81 interstate system in the viaduct priority area presents a significant barrier to pedestrian and bicyclist mobility and it is difficulty to traverse I-81 through the City of Syracuse; the elevated highway and the collector/distributer streets associated with Almond Street under the highway contribute to this issue. The barrier effect is not consistent with ongoing downtown Syracuse initiatives to strengthen neighborhoods, to improve connectivity between the university/hospital complex and downtown, and to promote multi-modal usage.

The outer segments (labeled A in Figure 2) have minor capacity issues, isolated accident areas, and pavement in good condition. Based on the system's physical condition, the community's input, the social, economic and environmental conditions of the study area, and the identified needs, the area in the vicinity of the viaduct and I-690/I-81 interchange (labeled B/C/D/E in Figure 2) is determined to be a priority area for improvement (herein referred to as the "viaduct priority area").

CHAPTER 3 – STRATEGY DEVELOPMENT

Public and stakeholder agencies identified a wealth of ideas for the future I-81 Corridor to be evaluated and ultimately evolve into potential strategies. These ideas were grouped into various categories and then screened for fatal flaws or determination of whether they met the identified corridor transportation needs and corridor goals and objectives. Each strategy was then screened for operational feasibility, geometric design constraints, potential substantial social, economic and environmental effects, and potential costs. This chapter summarizes this process and identifies strategies recommended for further development in subsequent project design phases.

3.1. STUDY EVOLUTION AND STRATEGY DEVELOPMENT

Through the Public Workshop in 2011 and various other meetings with stakeholder agencies a wealth of ideas were provided for the future I-81 Corridor. The hundreds of ideas were initially grouped into five categories that broadly captured the essence of the potential solutions. With guidance from the NYSDOT's Project Development Manual (PDM), these five broad categories are:

- Null or No Build – this category includes simply maintaining the current system as is. This would include cleaning, painting and standard maintenance efforts. Routine maintenance efforts include filling pavement cracks, patching holes in the bridge decks and maintaining the highway drainage system. This alternative is traditionally used as a bench mark for comparison of the social and environmental impacts of possible build strategies.
- Rehabilitation – this category includes performing rehabilitation functions necessary to address bridge, pavement and drainage needs for I-81 to extend the service life of existing infrastructure or improve its load carrying capacity. This includes repairs of all the deficient elements associated with a bridge (e.g., deck, railings, bearings, abutment, etc.) to improve their individual conditions and in turn improve the overall condition of the bridge; and structural enhancements of existing pavement such as restoration treatments and structural overlays. No major capacity, geometric or safety improvements would be included.
- Reconstruction – this category includes complete removal and replacement of the pavement and bridges, as appropriate, on the highway system to address bridge, capacity, safety and geometric needs of the current 1960's vintage facility. Reconstruction could include a higher elevation I-81 viaduct replacement structure and/or architectural and aesthetic treatments that could provide an iconic image with the viaduct for the community.
- Regional Highway System Modifications – this category, by far the broadest, included major changes to the regional highway system that may include bypass routes, relocation of the highway, bury or depress the highway, removal of the highway and urban boulevard ideas.
- Transit (bus and rail) – while evaluating options for the I-81 corridor, ways to integrate transit and other modes to enhance each of the strategies will be considered. The transit effort includes an array of transit enhancements to existing systems, bus rapid transit or light rail transit.

These categories were the initiation of strategy development. Each of these categories and ideas within were then screened for fatal flaws or a determination of whether they met the identified corridor transportation needs and corridor goals and objectives.

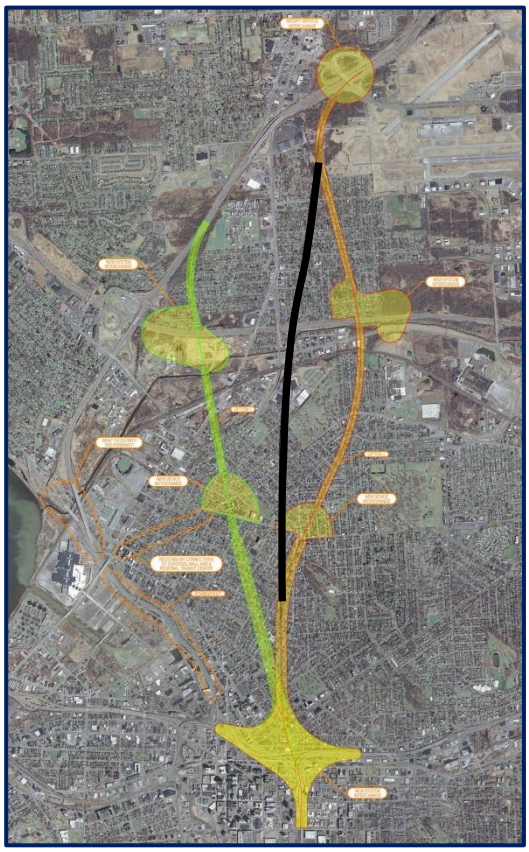
3.2 PRE-SCREENED STRATEGIES CONSIDERED AND ELIMINATED

Within the Regional Highway System Modifications category that included bypass routes and complete relocation concepts for I-81, an initial pre-screening effort was undertaken to eliminate those visions/ideas that are fatally flawed or do not meet the transportation needs and corridor goals and objectives. There were several visions that were identified, evaluated, and then dismissed from further consideration based on the substantial impacts, high costs and determination that they do not address the needs of the corridor. Within this grouping of regional highway system modifications, the Boulevard, Tunnel and Depressed Highway concepts were carried forward for further evaluation as unique feasible strategies. The remaining strategies in this category have been considered and dismissed from further consideration. A brief recap of those strategies that were evaluated and eliminated from further consideration follows.

3.2.1. I-81 Relocation Strategies

Several ideas to relocate I-81 were identified by the public at the May 2011 Public Workshop. These ideas were consolidated into an I-81 Relocation Strategy that covered the relocations in three geographic locations: Central Alignment north of I-690; Rt. 11/ Salina Street; and the OnTrack Alignment. The effects of these alignments vary greatly. The following provides an overview of those effects.

Figure 3 - I-81 Relocation – Central Alignment Ideas



I-81 Relocation - Central Alignment

The original idea the came out of the public workshop included relocating I-81 essentially in a straight line from the I-481 southern interchange through the city and north to the I-481 northern interchange. This I-81 re-alignment would bisect the center of the Syracuse University, various medical facilities, the airport, and numerous established city neighborhoods and was consequently, determined to be unacceptable due to those impacts.

The relocation idea was “rationalized” to consider other alternative central re-alignments including one for the northern section between the I-690 interchange and then connected to I-81 north of the City line.

Two additional relocation alignments were also developed to examine their feasibility; these alignments are shown on Figure 3. The first option relocates I-81 easterly from the I-690 interchange and reconnects with I-81 just north of the I-90 interchange. The second option reconnects at the I-81 Syracuse Hancock Airport Exit. Both of these relocation alignments have substantial impacts on property and community resources. Property impacts include a 250 foot – 450 foot swath of land that would need to be acquired through city neighborhoods plus land for new interchanges and new connections to the DestinyUSA, Regional Transit Center, and Onondaga Lake Parkway. Community resource impacts include the substantial impact on multiple neighborhoods and schools, Sisters of St. Francis Campus, and the Cooper Crouse Hinds complex.

In addition, relocation of I-81 would provide little to no transportation system benefits in terms of safety, access, congestion, and travel times and would not address the infrastructure needs in the viaduct area. Relocating I-81 would require extensive fiscal investment to replicate a portion of I-81 that is recommended for rehabilitation; would have substantial effects on surrounding neighborhoods and communities; would require the re-establishment of connections to the Parkway, DestinyUSA and Transit Center; and does not meet the transportation needs or corridor goals and objectives. Therefore, relocating I-81 in this area was dismissed from further consideration.

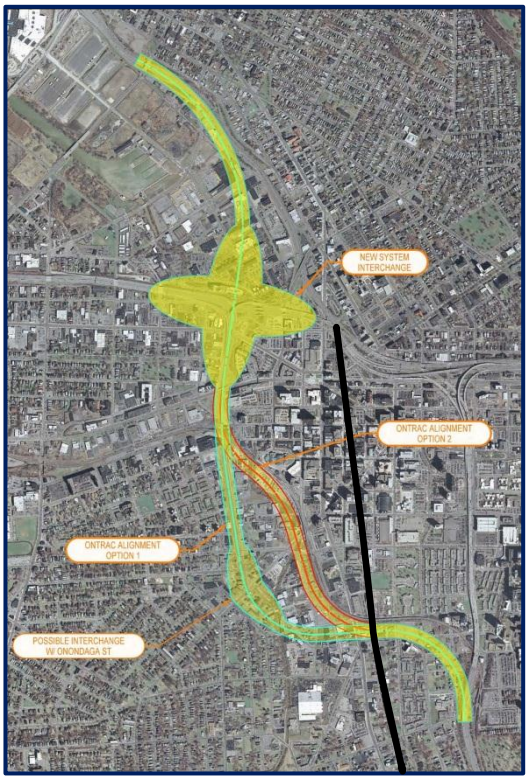
I-81 Relocation - Rt. 11 Salina Street

This public workshop idea would relocate I-81 along Salina Street, passing through the center of downtown Syracuse (black line on the graphic to the right). This concept would have massive impacts to the downtown area and surrounding neighborhoods with little to no transportation system benefits. Therefore, relocating I-81 on this alignment was eliminated from further consideration.

I-81 Relocation - OnTrack Alignment/West Street Extension

This public workshop idea would relocate I-81 from approximately the Castle Street area along the OnTrack rail line, connecting with West Street, I-690 and reconnecting with I-81 near Court Street. In general, this alignment removes the elevated highway barrier between Downtown and University Hill by relocating I-81 to the western perimeter of Downtown Syracuse. It would, however, require the relocation on the OnTrack rail line.

Figure 4 - I-81 Relocation – OnTrack Alignment Ideas



The OnTrack rail line is owned and operated by the New York Susquehanna & Western Railroad. This is a single track rail line, rehabilitated in the 1990's from Syracuse to Binghamton and is known as the Syracuse Mainline south of the city. This rail line connects with the CSX main line near the southwest corner of Onondaga Lake; it then proceeds south towards Binghamton and to the Norfolk & Southern lines that tie to the Delaware and Hudson line to Albany and beyond. Relocation of this rail line is not considered feasible due to cost, right-of-way, operational and ownership issues; hence the option along the rail line was dropped from further consideration.

The second alignment (West Street extension) was developed to take advantage of this corridor, but avoiding the railroad line and Franklin Square. This alignment has the potential to improve region-wide mobility and allows for the existing I-81 viaduct to be removed and replaced with a surface boulevard providing improved access to key destinations in the Downtown/University Hill areas. However, this relocation alignment would simply transfer the substantial impacts from Downtown to the western perimeter neighborhoods. These impacts would potentially include increased noise and reduced air quality and, substantial impacts on property and community resources. Property impacts would include a 250 foot swath of land that would need to be acquired through the City plus property for the new interchanges. This would result in substantial impacts to residential as well as non-residential properties along the West Street arterial. Community resource impacts would include impacts to businesses and cultural centers: Huntington Family Center, Hopps Memorial Christian Methodist Episcopal Church, Atlas Health Care, and other office/industrial buildings, as well as substantial impacts to Franklin Square.

While relocating I-81 to the western downtown perimeter might improve connectivity between Downtown and University Hill, it would provide little benefit to the existing portions of the transportation system with relatively high costs (social and fiscal). Relocating I-81 near the OnTrack line would require a minimal fiscal investment in the range of $155-$165 million to simply construct the relocated section near the OnTrack line; this would be in addition to the cost to address other transportation needs. These costs do not include property impact costs, engineering and other soft costs (right of way, environmental, construction inspection, and relocation costs). In addition, costs to eliminate/repurpose the current I-81 through the viaduct area and portions of I-690 and I-81 through the viaduct area would still be incurred. The relocation would have substantial effects on surrounding neighborhoods including elimination and disruption of portions of Near Westside neighborhood and the new Franklin Square residential/mixed use area and provides little transportation benefit. Hence, relocating I-81 on the western downtown perimeter was eliminated from further consideration.

West Street, however, should be considered for potential extension further to the south, if necessary, to improve connectivity to east-west streets (Harrison/Adams) serving Downtown. This alignment was further considered as part of the Boulevard Strategy to provide additional traffic capacity and potentially improve the overall street grid network.

3.2.2. Western Bypass

This public workshop idea would extend I-481 forming a western bypass originating at the I-81/I-481 south interchange and proceeding in a northwest direction with varying terminus locations including I-690 via NY Route 695; I-90 via an Onondaga Lake crossing then through Liverpool; and two options connecting to Rt. 481 in the Town of Clay. Ideas also included an Onondaga Lake crossing to connect I-690 and I-90. These various alignments are displayed in the accompanying figure and labeled as options 1-6. The severity of the effects varies widely for each of the alignments.

The western bypass would be generally located within built urban environments and would have substantial impacts on property, community resources, economic and environmental resources. The potential benefit may be the reduced traffic on I-690 and most importantly on the I-81 viaduct. Preliminary estimates indicated however that possibly as much as 15% (13% autos, 2% heavy vehicles) of the viaduct traffic could be reduced by providing a portion of the western bypass; such as the shortest option extending I-481 to NYS Route 695.

The property impacts would include the acquisition of a 250 foot to 400 foot swath of land through established city and town neighborhoods (along with some open lands) plus land for the new interchanges. The western bypass would impact various residential neighborhoods, schools, parks, recreational facilities, medical, office, retail and industrial facilities. The bypass options would have varying environmental impacts to the Onondaga lakefront, Tailing Pond wetland area/Old Erie Canal, and the Clay marsh lands. The various options were reviewed for feasibility and potential substantial environmental effects and conceptual order of magnitude construction costs were developed. Potentially substantial social, economic and environmental effects were reviewed to identify numerous major impacts, particularly for the longer alignments. Order of magnitude construction costs range from $350 million(for the shortest option) to over $1.2 billion for construction of the expressway only; no right of way, property impacts, engineering and other costs are included in this rough linear/mile estimate and would add substantially to the overall costs. In addition, costs associated with fixing the current I-81 corridor would still be incurred.

In summary, the western bypass would require extensive fiscal investment (range $350M - $1.2B) plus the cost to fix the I-81 corridor needs; would have substantial negative effects on surrounding western communities; and does not meet the transportation needs and corridor goals and objectives. Therefore the western bypass was dismissed from further consideration as a stand-alone strategy. The extension of I-481 to NYS Route 695 (Option 4) was further considered as capacity mitigation for the Boulevard Strategy as this was considered the most logical and one of the least expensive bypass options with fewer social, economic and environmental impacts.

3.3. NO BUILD AND STRATEGIES CONSIDERED

As required by state and federal environmental regulations, the No Build strategy serves as a baseline to which all feasible build alternatives are compared. Considering the deteriorated condition of the highway and bridges in the I-81 corridor, the No Build strategy is not considered a feasible alternative; rather it is carried into the National Environmental Policy Act (NEPA) process as a benchmark.

The resulting five strategies were recommended for further study and evaluation:

- Rehabilitation Strategy
- Reconstruction Strategy
- Boulevard Strategy
- Tunnel Strategy
- Depressed Highway Strategy

Inherent in each of the strategies is the integration of transit, pedestrian and bicycle system improvements and potential aesthetic concepts. Transit analysis is a parallel effort to this corridor study and a summary is provided later in this chapter; integration of specific transit elements would be identified in subsequent phases of project development along with pedestrian, bicycle and aesthetic concepts. In addition to multimodal means, transportation systems management and travel demand management strategies will be considered in future phases of project development to reduce travel demand in the corridor and to allow the system to operate more efficiently.

3.3.1. No Build Strategy

The No Build strategy includes simply maintaining the current 12 mile system as is. This would include cleaning, painting and standard maintenance efforts. Routine maintenance efforts include filling pavement cracks, patching holes in the bridge decks and maintaining the highway drainage system. This strategy is traditionally used as a bench-mark for comparison of possible build strategies. This strategy is required to be considered under both federal and state environmental regulations. It is clear, however, that this strategy does not address the I-81 long-term needs, in particular the most pressing need to address the bridge conditions. The following outlines several areas of concern with this strategy:

- ***Highway Design Features***: There are multiple design deficiencies throughout the 12 mile I-81 corridor. These arise from the original 1965 design and 45mph design speed posting through the City which are deficient in comparison to today's standards. Deficiencies such as ramp spacing, lack of shoulders, excessive superelevation (the difference between the heights of sides of a road on a bend) and others, have rippling effects on system operations, capacity and safety. For example, notable deficiencies are concentrated in the I-81/I-690 Interchange and the adjacent service interchanges on I-81 and on I-690.

- ***Highway and Bridge Infrastructure Conditions***: Given the age of the roadway infrastructure, the majority of the highway would need either major rehabilitation or

reconstruction by the design year 2040. Bridge conditions would continue to deteriorate until bridges would need to be posted for reduced loads with ongoing and increasing maintenance efforts required. Most bridge conditions would be experiencing increasing deterioration by 2040, with localized deck failures becoming more frequent. Maintenance issues related to stormwater, snow and ice are making general maintenance more difficult each year requiring more costly maintenance and emergency repair contracts. Standard maintenance efforts do not address the needs of these bridges (see photos below).

- ***Traffic Volumes and Congestion***: Along I-81, most of the present traffic capacity issues extend from north of Hiawatha Boulevard to East Adams Street encompassing the I-690 interchange and the Downtown/University Hill access. On I-690, capacity issues extend from Rte. 695 on the west to Midler Avenue. Congestion would expand beyond these limits if not addressed. Traffic conditions are presented in more detail in TM#1.[15]

I-81 Bridge Condition - Failure

- ***Accident History***: As discussed in TM#1[16], high rates of accidents occur in the 12 mile I-81 corridor as compared to statewide averages. Accident rates are well above the statewide average including the I-81/I-690 Interchange where it is three to five times the statewide average for comparable interchanges. Priority Investigation Locations (PILs), are listed in TM#1 which represents areas of high historical accident problems cover the corridor have been documented from the viaduct area north to I-481 north interchange. Safety concerns would continue and may expand beyond these limits if not addressed.

[15] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf
[16] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

3.3.2. Rehabilitation Strategy

The Rehabilitation Strategy would include the development of a long term priority-based program to rehabilitate the basic infrastructure: roadway pavement, bridges and roadway features (i.e. guide rail, signage and drainage) for the entire 12 mile segment of I-81 from the I-481 south interchange to the I-481 north interchange, including the viaduct area. Bridge rehabilitation repairs all the deficient elements associated with the bridge (e.g., deck, railings, bearings, abutment, etc.) to improve their individual conditions to an acceptable level and extend the service life of the bridge as a whole to the design year of 2040. Where it is determined that rehabilitation of a bridge is not cost effective (as compared to replacement costs), the bridge would be replaced. This would be the case for 38 out of 39 of the bridges in the viaduct priority area, all of which were built prior to 1970. Pavement rehabilitation includes structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capability. Rehabilitation techniques include recycling, restoration treatments and structural overlays.

The rehabilitation strategy was evaluated for the outer segments (8.5 miles) of I-81 as well as for the viaduct priority area (3.5 miles). The outer segments include I-81 from the I-481 northern interchange to Hiawatha and the segment of I-81 from about Castle Street south to the I-481 southern interchange. The viaduct priority area includes I-81 from Hiawatha Boulevard south to Castle Street along with I-690 from West Street to Teall Avenue.

Outer Segments (8.5 miles) Rehabilitation Treatments and Improvements:

To keep the Interstate in a state of good repair, periodic pavement treatments will be performed as well as appropriate bridge rehabilitation repairs. The outer segment improvements, shown in Figure 5, include improvements at the I-81/I-481 southern interchange, rehabilitation of 13 bridges, replacement of 13 bridges, and general safety improvements throughout the corridor.

- I-81/I-481 southern interchange improvements include overhead lighting, audible delineators (depressions placed on the road surface to serve as driving aids) and high friction pavement.
- Provide shoulder edge rumble strips, skid resistant pavement on grade or curved segments, where needed.
- Preliminary Bridge analysis recommends that of the 26 bridges in these areas, 13 be rehabilitated and 13 be replaced due to their age, condition, functional obsolence, and that they are well past their service life.

Major Geometric Constraints – Outer Segments: The outer segments have minor capacity issues, isolated accident areas, and the pavement is in good condition. Only 3% of the geometric deficiencies would be addressed with limited safety enhancements.

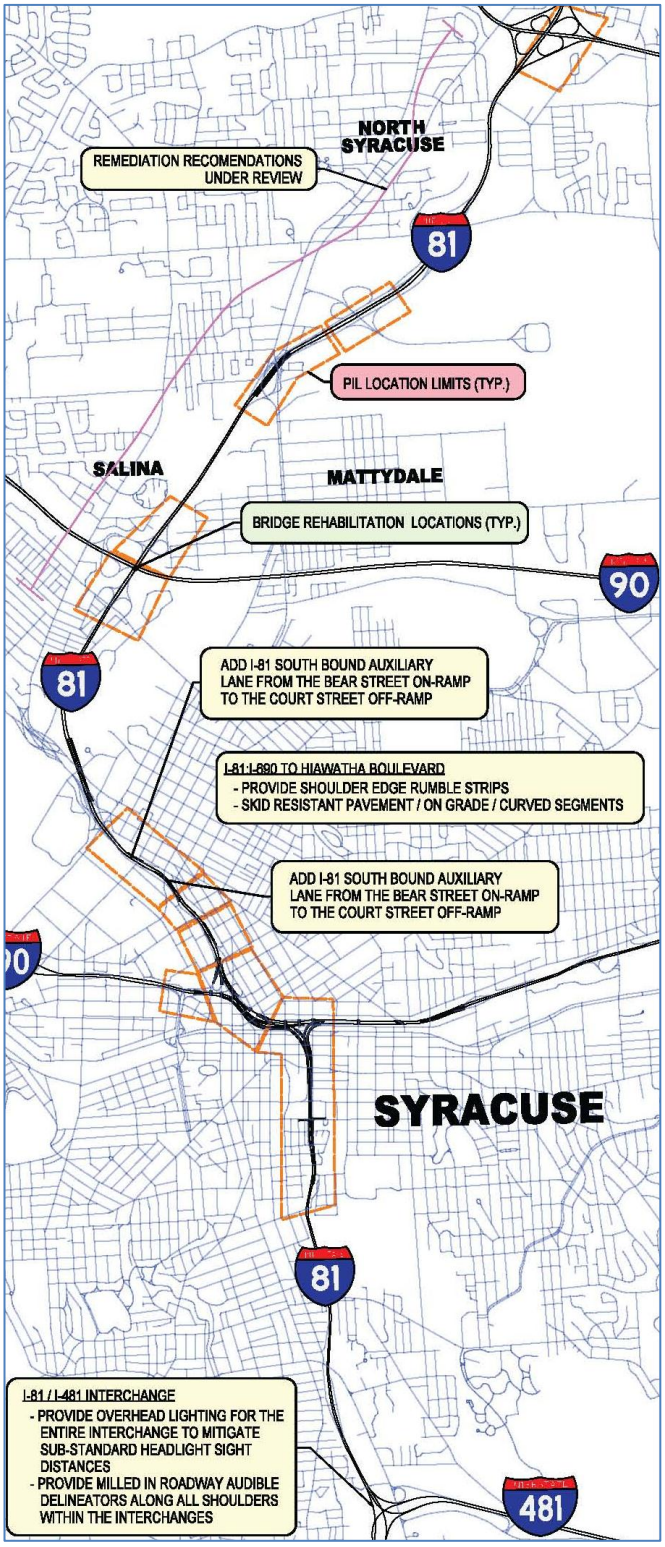
Interstate Local Access – Outer Segments: Generally maintains existing access points and travel patterns.

Potential Social, Economic and Environmental Effects – Outer Segments: The rehabilitation of the segment would have little to no effect on social, economic and environmental factors in and around the corridor.

Order of Magnitude Strategy Cost – Outer Segments: An approximate order of magnitude construction cost in 2020 dollars is projected to be in the range of $300 - $350 Million for the outer segments (8.5 miles) of the corridor. This preliminary estimate includes maintenance and protection of traffic, contingency and an inflation adjustment. The construction estimate does not include costs for engineering or construction inspection; these costs could range up to an additional $50-60 million. Considering this strategy includes rehabilitation or replacement of the bridges with minor other improvements that do not vary from the current alignment, expenditures for right of way acquisition and environmental impact mitigation are not anticipated at this time.

Feasibility: The rehabilitation strategy is a feasible strategy for the outer segments of I-81. These areas have minor capacity issues, isolated accident areas, the pavement is in good condition and of the 26 bridges in the areas, 13 would be rehabilitated and 13 would be replaced. The application of the Rehabilitation Strategy to these areas would also have minimal social, economic, and environmental impacts. The rehabilitation strategy was retained as most feasible, cost effective, and responsive to the project goals and needs for the northern and southern outer segments of the I-81 corridor; consequently, no further strategies were developed for these areas.

Figure 5 – Rehabilitation – Outer Segments



Viaduct Priority Area (3.5 miles) Rehabilitation Improvements:
The viaduct and interchange improvements would include the northern improvements, West Street interchange improvements and a new I-690 exit east of I-81; as such, these improvements are grouped into the "viaduct priority area".

I-81 Northern Improvements (Hiawatha Blvd to Butternut Street) would include:

- Extend the Bear Street on-ramp as an auxiliary lane to Spencer Street (Exit 21) off-ramp.
- Northbound acceleration lane at State Street on-ramp and Pearl Street on-ramp would be extended.
- Extend the I-81 northbound acceleration lane from Sunset St on-ramp.
- Genant Street southbound on-ramp would be closed.
- Genant Street would be extended to Butternut Street, eliminating the Franklin Street exit.
- Franklin St/Clinton Street/Salina Street exit per Genant Street improvements would be modified to extend Genant Street to Butternut and eliminates the Franklin Street off-ramp.
- Shoulder edge rumble strips, skid resistant pavement on grade or curved segments would be provided.

Improvements at I-81/I-690 interchange would be needed, including:

- Extend acceleration lane for I-81 northbound ramp to I-690 westbound (left hand entrance improvement).
- Extend deceleration/storage lane on I-690 eastbound to I-81 southbound ramp to add an additional lane.
- Widen bridges to provide shoulders.

I-81 viaduct improvements would include:

- Widen the southbound off-ramp to Harrison/Adams Street to provide two travel lanes and widen bridges to provide shoulders.
- Integrate local system improvements along Almond Street and E. Adams Street to address persistent delays and backups (which effect I-81 and I-690 operations).

Preliminary bridge analysis indicates 38 of the 50 bridges in the viaduct priority area are recommended for full replacement (versus rehabilitation) due to their overall age, condition and functionality.

Major Geometric Constraints- Viaduct Priority Area: Many geometric design constraints exist with the numerous non-standard and non-conforming features present in the viaduct priority area. All of these constraints cannot be addressed (e.g., mainline radius values) such that under a rehabilitation scenario, improvements considered have been focused on the most critical problem areas where modifications are feasible. Based on the review, only 10 (10%) of

the 102 geometric deficiencies can be corrected through rehabilitation treatments. Review of bridge conditions, in particular with the increased frequency of major deck problems, resulted in the recommendation to replace all bridges built prior to 1970 as most or all are functionally obsolete and would be approximately 100 years old by the 2050 (ETC+30) bridge design year. The rehabilitation strategy offers some limited opportunities to address some additional geometric deficiencies, however the intricacies and constraints in the existing design may allow for improvement of only additional 5 to 10 deficiencies. This means that limited geometric improvements can be achieved and it is important to note that safety improvements correlate with improvements of geometric and capacity deficiencies.

2020 - Estimated Time of Completion (ETC)

2040 - Design Year (ETC+20)

2050 – Bridge Design Year (ETC+30)

Interstate Local Access-Viaduct Priority Area: Generally maintains existing access points and travel patterns.

- The ramp modifications at Genant and Franklin Street, however, would alter travel patterns for adjacent neighborhoods and Downtown areas.
- Morning commute access would be improved to Almond Street, Downtown and University Hill.
- Access to the regional highway system is reduced by elimination of two (2) access ramps (Genant Street and Franklin Street).
- Operations and safety along I-81 at various ramps would be improved including:
  - Closure of the Genant Street on-ramp to I-81 southbound to reduce weaving and improve safety. Extend Genant Street to Butternut Street.
  - Reduce the number of decision points (locations where drivers will be deciding their route) by eliminating the I-81 southbound Franklin Street exit to Downtown.
  - Improves the Pearl Street and State Street on-ramps to I-81 northbound by extending the acceleration lanes for improved merging distances.

Potential Notable Social, Economic and Environmental Effects – Viaduct Priority Area:

- Access to the regional highway system would be slightly reduced with the elimination of two (Genant Street and Franklin Street) access ramps. This access loss may affect adjacent businesses.
- Potential community concern regarding the aesthetics and perceived barrier effect of the viaduct would remain.
- There is the potential for isolated impacts associated with bridge/shoulder widening where new piers may be required and may impact adjacent facilities and properties.
- This strategy is not cost effective. Due to the substantial deterioration of the bridge conditions, almost all the bridges would need to be replaced at a substantial cost; even so, capacity/congestion needs would not be addressed under a rehabilitation strategy.

Order of Magnitude Strategy Cost: An approximate order of magnitude cost in 2020 dollars is estimated to be in the range of $500 - $600 Million for the viaduct priority area (3.5 miles) of the corridor. This preliminary estimate includes maintenance and protection of traffic,

contingency and an inflation adjustment. This estimate does not included costs for right of way acquisition, engineering, environmental issues and mitigation or construction inspection; these costs would add an additional $200-$300 million to the total viaduct priority area costs.

Feasibility: For the viaduct priority area, the rehabilitation strategy is not feasible, and therefore recommended to be dismissed from further consideration. Under this strategy, 31 of the 32 bridges in the viaduct and interchange area are recommended for replacement (versus rehabilitation) because of their overall age, condition and functionality, but this strategy would not address the major capacity, safety and geometric needs retained by the outdated 1960's era design. In addition, the rehabilitation strategy would have ongoing life cycle maintenance costs.

Figure 6 shows an overview of the Rehabilitation Strategy for the viaduct priority area.

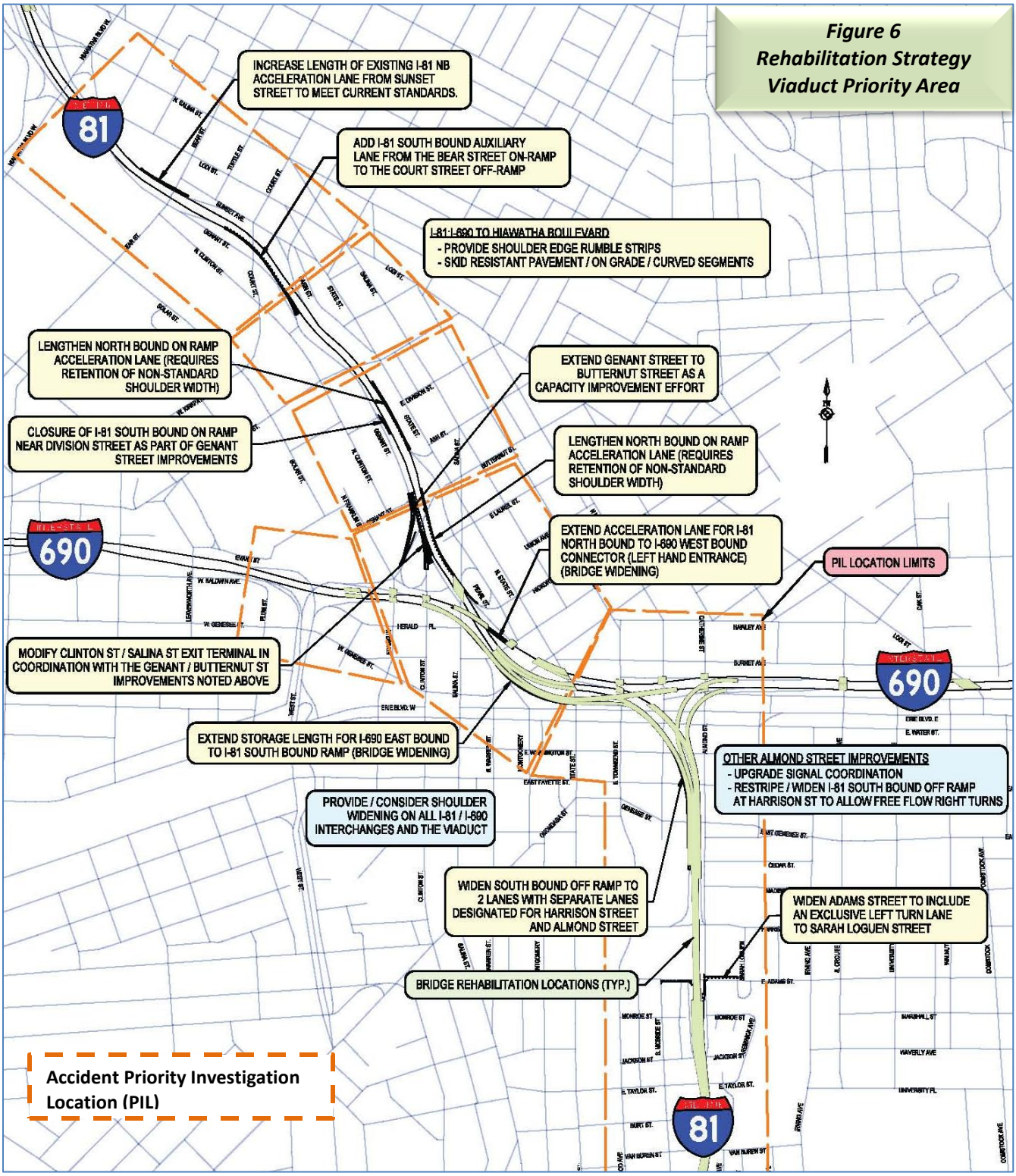


Figure 6
Rehabilitation Strategy
Viaduct Priority Area
INCREASE LENGTH OF EXISTING I-81 NB ACCELERATION LANE FROM SUNSET STREET TO MEET CURRENT STANDARDS.
ADD I-81 SOUTH BOUND AUXILIARY LANE FROM THE BEAR STREET ON-RAMP TO THE COURT STREET OFF-RAMP
I-81: I-690 TO HIAWATHA BOULEVARD
- PROVIDE SHOULDER EDGE RUMBLE STRIPS
- SKID RESISTANT PAVEMENT / ON GRADE / CURVED SEGMENTS
LENGTHEN NORTH BOUND ON RAMP ACCELERATION LANE (REQUIRES RETENTION OF NON-STANDARD SHOULDER WIDTH)
EXTEND GENANT STREET TO BUTTERNUT STREET AS A CAPACITY IMPROVEMENT EFFORT
CLOSURE OF I-81 SOUTH BOUND ON RAMP NEAR DIVISION STREET AS PART OF GENANT STREET IMPROVEMENTS
LENGTHEN NORTH BOUND ON RAMP ACCELERATION LANE (REQUIRES RETENTION OF NON-STANDARD SHOULDER WIDTH)
EXTEND ACCELERATION LANE FOR I-81 NORTH BOUND TO I-690 WEST BOUND CONNECTOR (LEFT HAND ENTRANCE) (BRIDGE WIDENING)
PIL LOCATION LIMITS
MODIFY CLINTON ST / SALINA ST EXIT TERMINAL IN COORDINATION WITH THE GENANT / BUTTERNUT ST IMPROVEMENTS NOTED ABOVE
EXTEND STORAGE LENGTH FOR I-690 EAST BOUND TO I-81 SOUTH BOUND RAMP (BRIDGE WIDENING)
OTHER ALMOND STREET IMPROVEMENTS
- UPGRADE SIGNAL COORDINATION
- RESTRIPE / WIDEN I-81 SOUTH BOUND OFF RAMP AT HARRISON ST TO ALLOW FREE FLOW RIGHT TURNS
PROVIDE / CONSIDER SHOULDER WIDENING ON ALL I-81 / I-690 INTERCHANGES AND THE VIADUCT
WIDEN SOUTH BOUND OFF RAMP TO 2 LANES WITH SEPARATE LANES DESIGNATED FOR HARRISON STREET AND ALMOND STREET
WIDEN ADAMS STREET TO INCLUDE AN EXCLUSIVE LEFT TURN LANE TO SARAH LOGUEN STREET
BRIDGE REHABILITATION LOCATIONS (TYP.)
Accident Priority Investigation Location (PIL)
81
690
81

3.4. PRIORITY AREA STRATEGIES

Figure7 - Priority Area Strategies

The rehabilitation strategy is retained for the northern and southern outer segments of the I-81 corridor; consequently, no further strategies were developed for these areas. The rehabilitation of outer segments is not integral to project(s) in the viaduct priority area nor does the need for this component occur in the relative time frame of the more immediate needs in the viaduct priority area. As such, rehabilitation of the outer segments is not included as a component of the priority area strategy assessments.

The rehabilitation strategy was determined to not be feasible and not cost effective and was therefore eliminated from further study for the viaduct priority area. Consequently, "build" strategies were further developed and evaluated in the I-81 viaduct priority area, as shown in Figure 7.

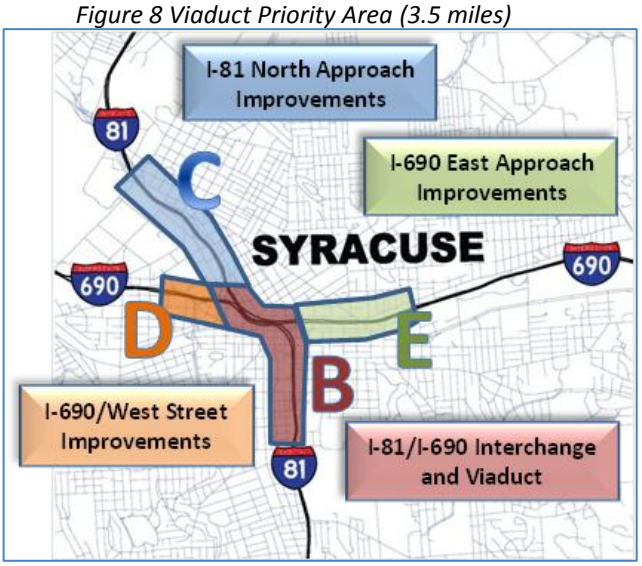
Viaduct and interchange improvements for the build strategies will include the northern improvements, West Street interchange improvements and a new I-690 exit east of I-81; as such, these improvements are collectively grouped into the "viaduct priority area" and these elements are included in the strategies assessments and cost estimates. These build strategies include reconstruction of the viaduct, viaduct removal with at-grade/boulevard, viaduct removal with tunnel, and viaduct removal with depressed highway. Street grid improvements and transportation system enhancements will vary with each build strategy and will be further developed in subsequent phases of project development.

SMTC's Regional Travel Demand Model for planning-level analysis was used to determine impacts to regional mobility as one component of the feasibility assessment for each priority area strategy. Forecasts of changes to the region traffic were comparable (within approximately 2 minutes) for each. More detailed analysis to develop location-specific mitigation measures will be necessary during the next phase of this process.

3.4.1 Common Elements

As noted previously, the viaduct priority area improvements include the northern improvements, West Street interchange improvements and a new I-690 exit east of I-81; these elements are included in the subsequent strategy assessments and cost estimates, Figure 8.

Figure 8 Viaduct Priority Area (3.5 miles)



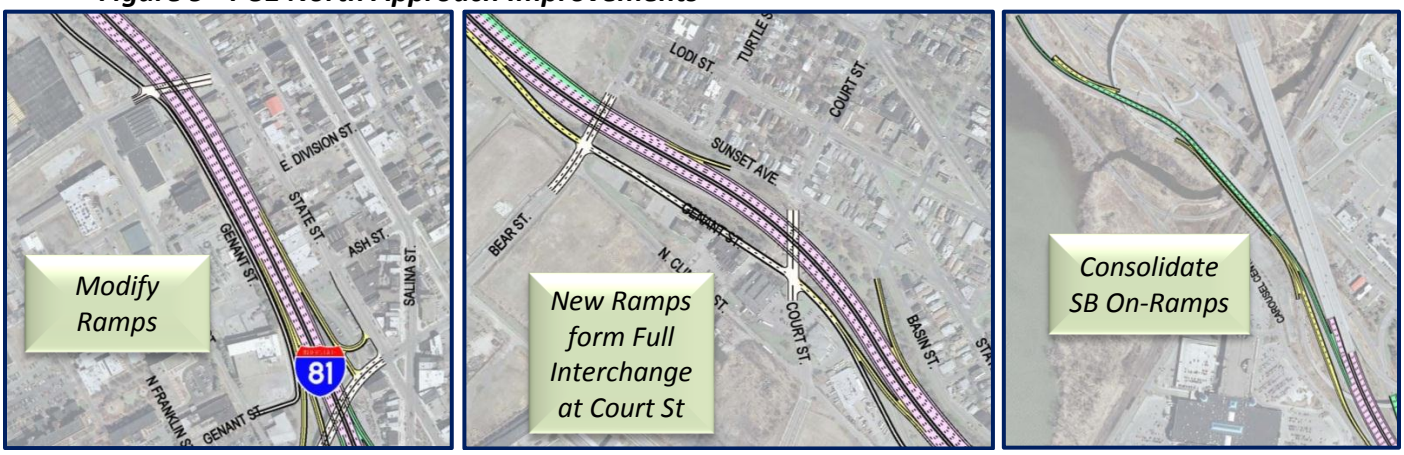
There are several common elements to all the build strategies that affect the transportation operations. These improvements would reduce congestion, improve safety, address geometric deficiencies (ramp spacing, superelevation, etc.) and improve access:

- ***I-81/I-690 Interchange and Viaduct improvements (Area B)***: interchange layouts vary based on the respective strategy.
-
- ***I-81 North Approach Improvements (Area C)***: consolidates Pearl Street/State Street ramps, consolidates Rt. 370 (Onondaga Lake Parkway) and Old Liverpool Road ramps, eliminates Genant Street on-ramp, eliminates Salina Street off-ramp, and provides a full interchange at Court Street; shown in Figure 9.

- ***I-690/West Street Improvements (Area D)***: there are two options to either retain existing interchange, or modify interchange to a single point urban interchange (SPUI). These improvements combined with the new interchange layouts may require the elimination of the Herald Place off-ramp and the Butternut Street ramp to West Street.

- ***I-690 East Approach Improvements (Area E)***: there are three options to provide a new interchange at Crouse Avenue, Comstock Avenue, or Walnut Avenue. The Crouse interchange layout only applies to one of the Boulevard Strategy options.

Figure 9 - I-81 North Approach Improvements



- *Genant St/State St/Pearl St Ramp Modifications (left) Full Interchange at Court St (center)*
- *Rt.370/Onondaga Lake Parkway Ramp Modifications (right)*

Another common element is that each strategy evaluated eliminates, at a minimum, seven (7) local ramps that would alter travel patterns. These modifications are a direct result of addressing either geometric, safety or capacity deficiencies to design the expressway to today's standards (60mph design speed). Concept refinements and future engineering would need to occur to minimize adverse travel effects of elimination of these ramps.

- I-81 southbound Salina Street off-ramp would be eliminated, but Downtown access would be maintained via Franklin Street/Clinton Street.
- Genant Street on-ramp to I-81 southbound would be closed which would alter Northside and Lakefront neighborhood access.
- Consolidates the I-81 Pearl Street and State Street on-ramps which would alter egress from downtown and the Northside neighborhood.
- West Street exit ramp to Herald Place would be closed which would affect egress from Downtown and Westside neighborhoods.
- Butternut Street connection to West Street would be eliminated which would affect access to Westside and Downtown neighborhoods.
- I-690 Townsend Avenue and McBride Street ramps serving traffic from the east side of the city and county would be eliminated.

Common Major Geometric Design Constraints: *(The importance of this section is to identify constraints that may limit geometric design such as ramp spacing forcing ramp closures versus constraints that influence design but still able to meet current standards.)* All of the strategies have the following major geometric design constraints:

- The I-81 North Approach (Hiawatha Boulevard to I-690) is substantial constrained by an "S" curve alignment, heavy superelevation, steep ramp grades, ramps and ramp spacing and physical (buildings) constraints. The ramp spacing requirements have limited the proposed layout of this segment; more specifically ramp closures such as Pearl Street, Genant and Salina Street.

- I-690/West Street Interchange: The close proximity to the I-81/I-690 interchange and the new system connections (missing links) have limited the proposed design layout and the Butternut Street connecting ramp to West Street had to be closed.
- I-81/I-690 Interchange: Through the general interchange area ramp spacing, in particular the entrance-exit spacing (weaving), limits the locations of the system connections (interstate to interstate) along with the local access connections. For example, three of the four approaches to the interchange have local ramps too close to the system interchange forcing the closure of Townsend and McBride ramps. Subsequent engineering phases may need to consider design speed and design exceptions to allow critical access ramps to remain.

Common Potential Notable Social, Economic and Environmental Effects:

- I-81 North Approach Improvements:
  - There would be impacts to various properties and buildings as a result of the proposed layout and ramp improvements. In particular, the new I-81 layout in the segment between Butternut Street to Spencer Street does not fit within the available right of way.
  - The ramp/access modifications would alter local travel patterns from Hiawatha Blvd to I-690 affecting direct access to the Lakefront, Northside and Downtown neighborhoods.
- I-690 East Approach Improvements: the new interchange layouts would have varying impacts on adjacent properties; however, the new interchange layouts would provide additional access to Northside and University Hill/Eastside neighborhoods.

Figure 10 shows the Common Elements of the build strategies.

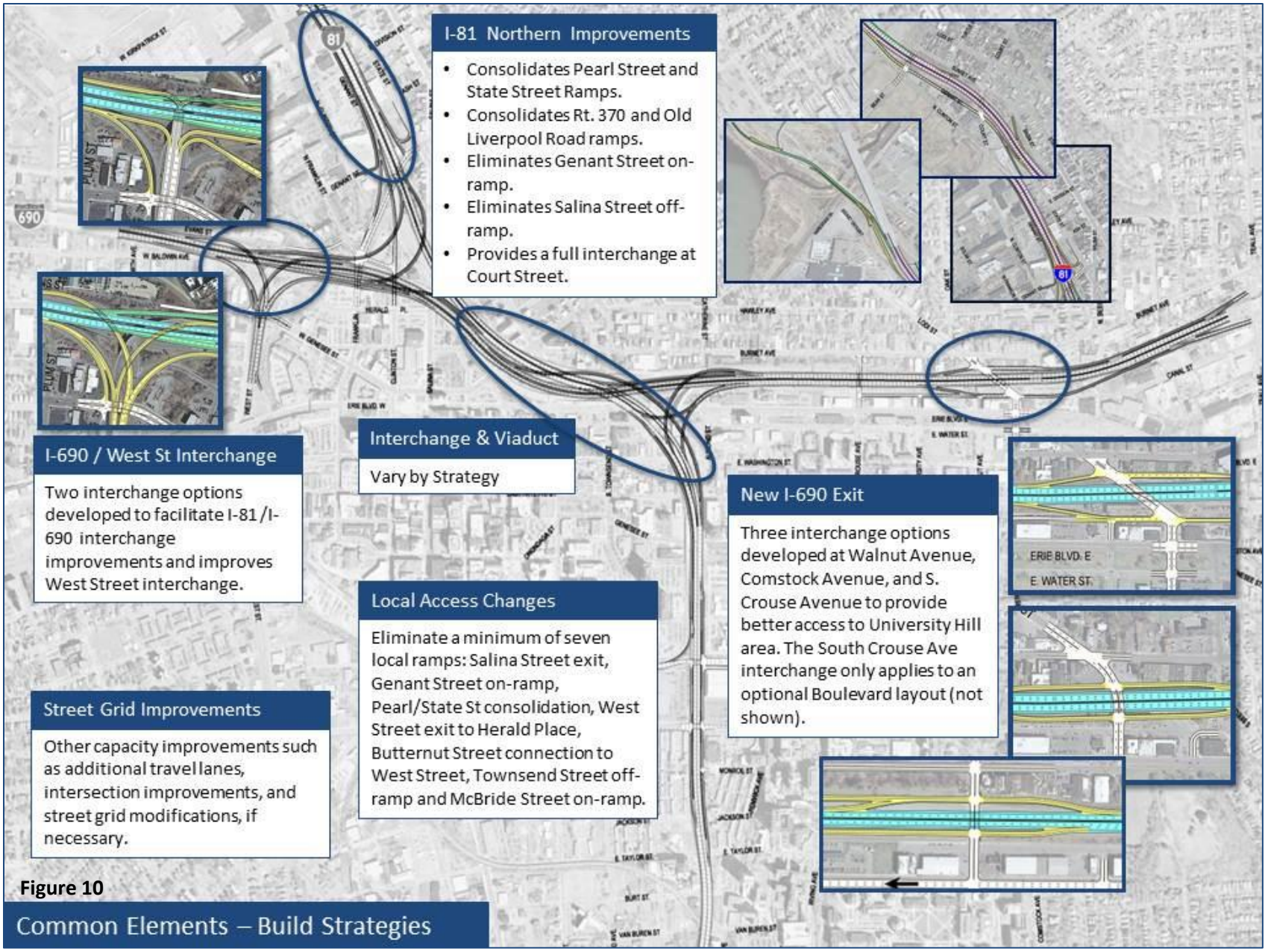


Figure 10

Common Elements – Build Strategies

3.4.2. Reconstruction Strategy

This strategy would reconstruct the I-81 through the viaduct priority area to meet current design standards (60 MPH design speed). This strategy also includes the Common Elements previously described. The reconstruction layouts for the interchange are fundamentally based on the placement of I-81 and I-690 within the existing interchange footprint. Three interchange layouts were reviewed and would be further evaluated during subsequent project phases.

- Option 1: Traditional interchange layout with I-81 on the north and I-690 on the south.
- Option 2: Stacked layout north to south with I-81 northbound, I-690 westbound, I-81 southbound and I-690 eastbound.
- Option 3: Split layout with I-690 in the middle, I-81 northbound to the north and I-81 southbound to the south.

Reconstruction Strategy includes the Common Elements as well as:

- I-81/I-690 fully directional interchange that includes missing ramp links (Bear St/ Hiawatha Blvd); includes layouts in the existing east-west footprint; eliminates design deficiencies by improving geometry to current standards; including left hand entrance ramps; and eliminates the Townsend Street and McBride Street ramps.
- Exit 18 (Harrison/Adams St): provides a two lane I-81 southbound off-ramp to Harrison Street to address safety and mobility needs by improving weaving conditions and capacity.
- May consider additional capacity and access improvements, such as: Castle Street interchange; Exit 17 modifications; and street grid modifications, if necessary.

Major Geometric Design Constraint specific to this strategy:

- In order to minimize community impacts, interchange layouts would be heavily influenced by the existing transportation corridor right of way. The new I-81/I-690 layouts do meet current design standards and generally fit within the existing footprint.

Potential Notable Social, Economic and Environmental Effects:

- I-81/I-690 Interchange: The new I-81 layout and ramps would impact properties and buildings in the James Street/State Street and McBride/Erie Blvd areas.
- I-81 Viaduct: May slightly affect adjacent properties due to the inclusion of standard shoulder and median widths.
- The reconstruction of I-81 would have temporary construction impacts on adjacent properties, communities and regional travel patterns.
- Highway improvements for the reconstruction strategy would support suburbanization, have limited additions to local access connections, retains the viaduct and perceived visual disconnect, and have moderate property impacts with overall limited support for sustainability.
- This strategy has low consistency with City and County long-term vision and preferred future land use patterns.

- Reconstruction of the viaduct priority area offers an opportunity to integrate multi-modal enhancements with positive economic and social impacts.

Order of Magnitude Strategy Cost: A rough order of magnitude construction costs in 2020 dollars was estimated to be in the range of $800 - $900 million. This preliminary estimate includes maintenance and protection of traffic, contingency and an inflation adjustment. This estimate does not include costs for right of way acquisition, engineering, environmental impact mitigation or construction inspection; these cost would add an additional $250 - $400 million.

Feasibility: This strategy is feasible and recommended for further study. This strategy falls in the middle range construction costs for the strategies explored, but requires normal life cycle maintenance costs to upkeep the infrastructure. This strategy corrects the majority of geometric deficiencies, rebuilds all the bridges in the viaduct priority area, and addresses capacity and safety needs as described in Section 3.5.

Figure 11 highlights the Reconstruction Strategy key elements.

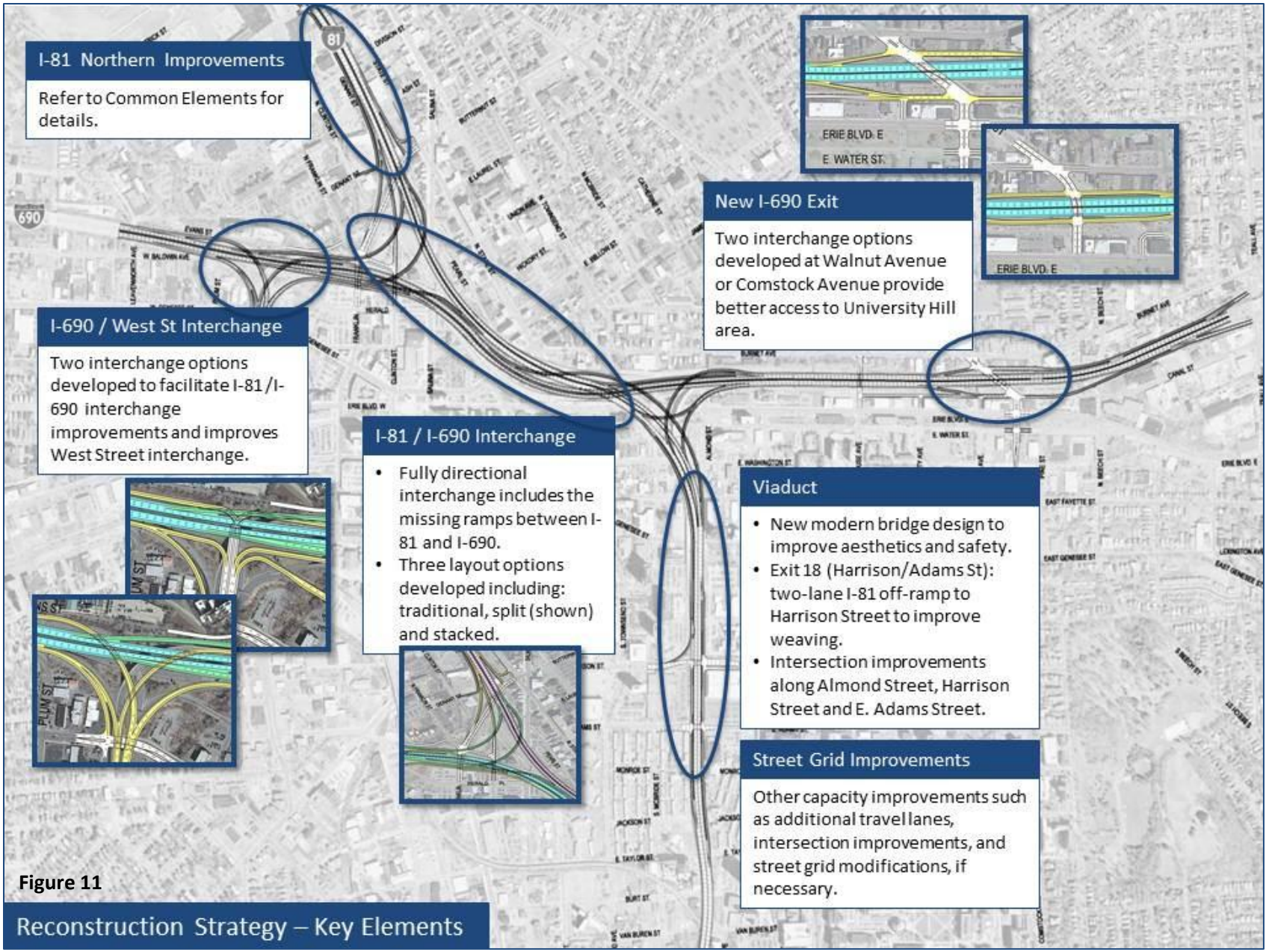


Figure 11

Reconstruction Strategy – Key Elements

3.4.3. Boulevard Strategy

The Boulevard strategy includes the common elements plus the removal of the viaduct and new construction of an at-grade urban arterial in the area of downtown Syracuse. This strategy covers broader regional highway limits (I-81, I-481 and I-690), as the boulevard strategy would involve:

- Designating I-481 as the new I-81.
- Retaining the I-81 segment from the I-481 northern interchange to the I-690 interchange as an interstate highway or a state route.
- Reclassifying the I-81 viaduct segment south of the I-81/I-690 interchange to a surface boulevard. The boulevard may be redesignated as a state highway or a city street, to be determined during the environmental review phase of the project.
- Retaining the I-81 segment south of the viaduct to the I-481 southern interchange as a state route.

This strategy includes developing solutions to mitigate the effects of the changes to the interstate designation to address overall transportation mobility, accessibility and function. The overall Boulevard Strategy has two sections:

- The Boulevard and its connections to the modified transportation network
- I-81 Redesignation: overall transportation system changes

The Boulevard

The boulevard is envisioned as a complete street containing an at-grade boulevard with pedestrian, bicycle, and transit and parking facilities. The boulevard may include street grid modifications to improve east-west and north-south traffic flow. Alterations to the local street network would be coordinated with and designed in partnership with the City of Syracuse. There are various options for the north and south ends of the boulevard, including starting the boulevard at Erie Boulevard connecting to I-690 with a modified Single Point Urban Interchange (SPUI). The present I-81 travel lanes would extend to Erie Boulevard and Water Street, which would serve as an east-west connector between former I-81 and the new at grade Boulevard. The boulevard south terminus options vary depending on whether it extends over or under the New York, Susquehanna and Western (NYS&W) Railroad.

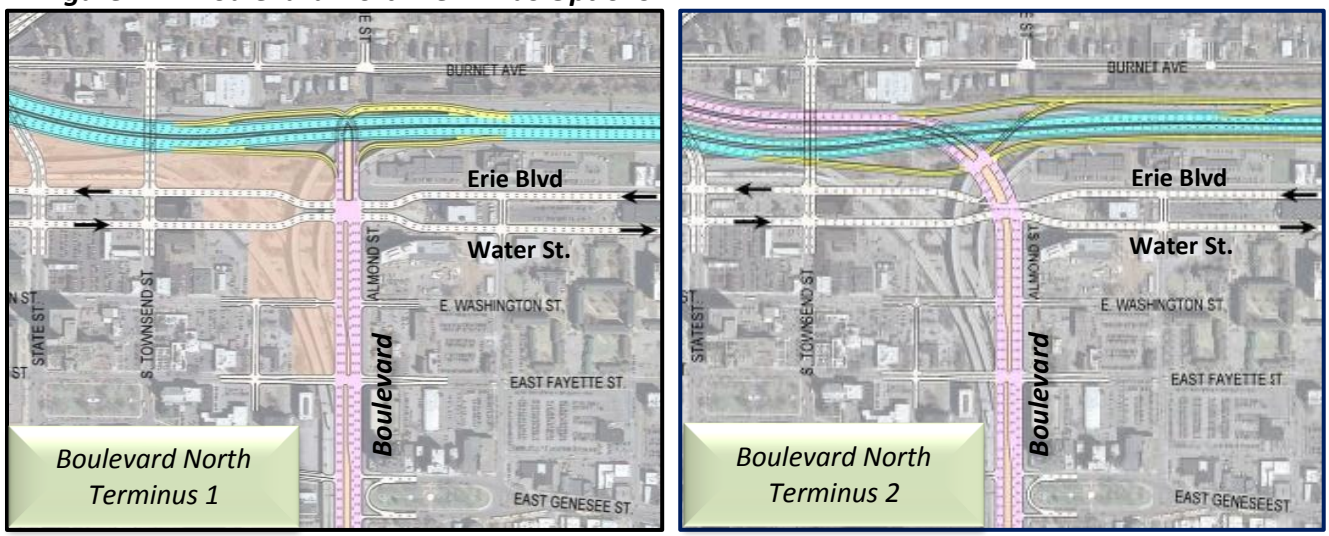
This strategy would reconstruct I-81 from the I-690 interchange north to Hiawatha Blvd to meet current design standards (60 MPH design speed). The boulevard would be designed in conformance with city street standards.

The Boulevard Strategy includes the Common Elements as well as:

- I-81/I-690 Interchange: developed a complete "T" interchange in the Salina/Franklin/ Butternut area. Two options were developed for the terminus at the north end of the new Boulevard as shown in Figure 12.
    - Boulevard North Terminus 1: Boulevard ends near Erie Boulevard and connects to I-690 with a modified Single Point Urban Interchange (SPUI). The former I-81 travel lanes would be extended to Erie Boulevard/Water Street which serves as an east-west connector between old I-81 and the Boulevard.

- Boulevard North Terminus 2: Similar to Terminus 1, however would extend the north end of the boulevard along the former I-81 alignment until it connects directly to former I-81 near Butternut Street. Requires a bridge from State Street to Salina Street (1600 linear feet). The Boulevard connects to I-690 in the Almond Street area via a unique interchange/CD Road layout.

Figure 12 – Boulevard North Terminus Options



- Boulevard South Terminus options include variations depending on if the Boulevard is carried over or under the NYS&W Railroad.
- Boulevard width: preliminarily assumes a six to eight lane boulevard with pedestrian, bicycle, transit and parking facilities.
- Local Street Grid Modifications: would include street grid modifications to improve east-west and north-south traffic flow. Specific corridor improvements are yet to be determined and would be identified in later stages of project development. Also considers West Street extension around the west and south sides of Downtown. Street grid modifications would be designed and coordinated with the City.
- This strategy alters the local street grid system with the new access point locations at the Boulevard, I-690 new interchange, and the I-81 terminus at James Street.

I-81 Redesignation (I-81 to I-481)

The I-81 route designation would be transferred to I-481. The I-81 north segment (I-481 Northern interchange to I-690) would remain as an Interstate or state highway. The I-81 south segment would most likely be converted to a state highway stub from the I-481 Southern interchange to the boulevard. The I-81 redesignation would provide an alternative route for the approximate 12 percent (11% autos, 1% heavy vehicles)[17] of traffic that uses the I-81 corridor without exiting; 9% (8% autos, 1% heavy vehicles) of these pass through traffic travel through the viaduct without stopping.

[17] *Technical Memo #1: Physical Conditions Analysis; January 2011, Figure 2.10 Pass Through Traffic in Viaduct Section, page 2-29* http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

The I-81 Redesignation would include:

- Possibly changing the highway classification for portions or possibly entire 12 mile corridor. The boulevard maybe designated as a state highway or a city street. This determination will be made during the environmental review phase.
- I-481 – possible additional capacity improvements from I-690 to Kirkville Road will be determined in the next phase of the project.
- I-81 Southern Interchange Modifications (I-81/I-481S):
  - Realign I-81 to connect directly to I-481 to the east.
  - Reconnect to former I-81 using much of the existing ramps.
  - Local ramp access would be modified such as rebuilding the Brighton Avenue bridge and possibly consider southbound access from NY 173.
- I-81 Northern Interchange Modifications (I-81/I-481N):
  - Realign I-81 to connect directly to I-481 to the east.
  - Reconnect to former I-81 using much of the existing ramps.
  - Two new crossover bridges required.
- This strategy may also include reconstruction of other segments near the I-690/I-481 interchange and improvements to the local street system.

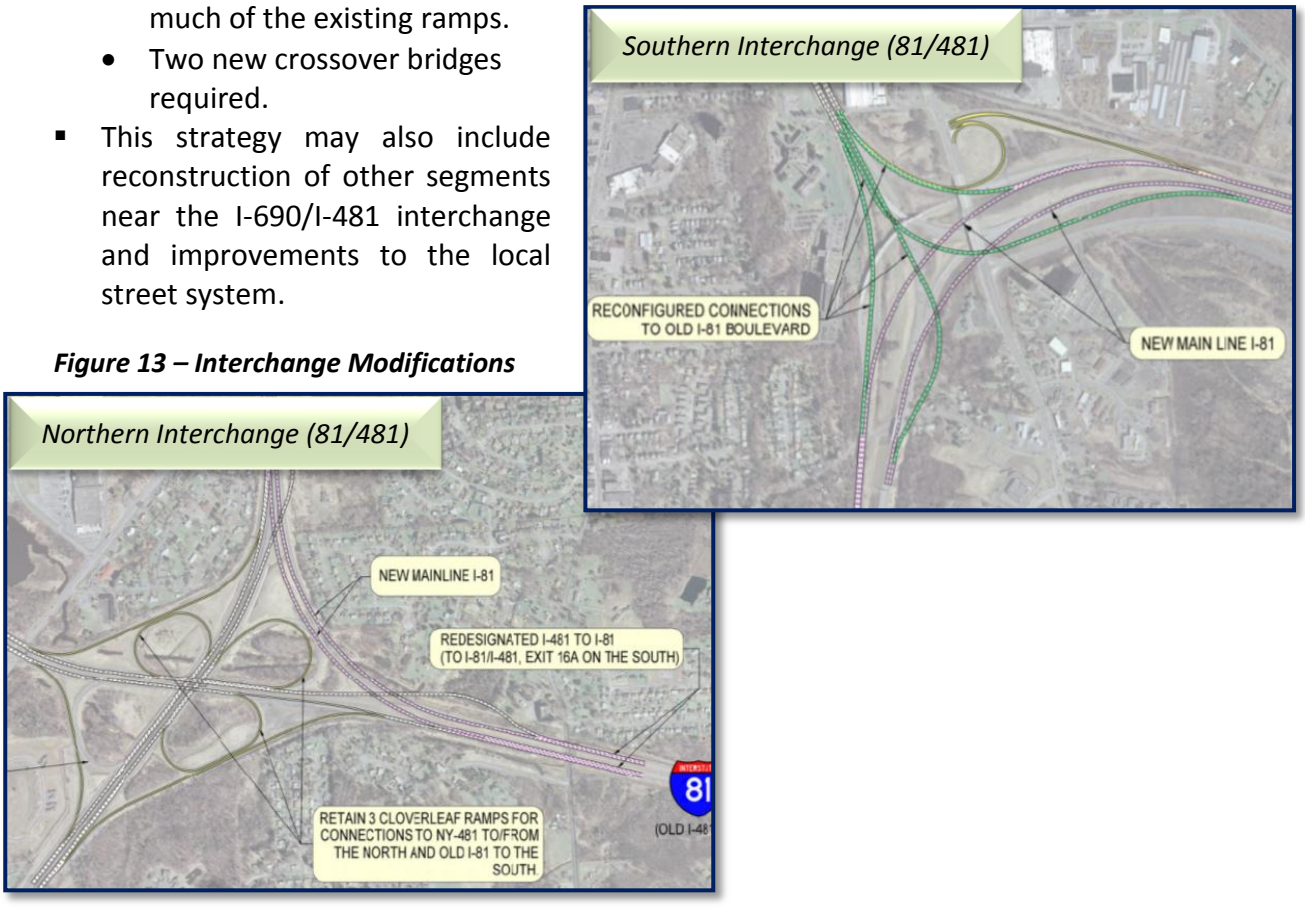


Figure 13 – Interchange Modifications

Major Geometric Design Constraints specific to this strategy:

- In order to minimize community impacts, interchange layouts would be heavily influenced by the existing transportation corridor right of way. The new I-81/I-690 layouts would meet current design standards and generally fit within the existing footprint.
- The Boulevard: the section width may be influenced by the existing right of way width. The space available for travel lanes, median widths, parking, bicycle, pedestrian and transit access would be a constraint. Closely spaced intersections at the north end of the new boulevard may heavily influence the intersections treatments. Buildings along Burnet Avenue limit the I-690 service roads/interchange layout.
- Other constraints may be noted as additional improvements along I-690, I-481 and local street network are introduced in support of the boulevard strategy.

Potential Notable Substantial Social, Economic and Environmental Effects:

- There may be notable opportunities for economic development and growth with better connections, improved non-motorized mobility, improved visual environment, and increased property values along the boulevard potentially resulting in long-term net benefits. These will be further evaluated in the next phase.
- This strategy reroutes regional and interstate traffic away from Downtown Syracuse resulting in potential negative economic impacts to that area. Additional capacity improvements along the broader highway network are yet to be identified and cannot be reviewed for impacts at this time.
- The Boulevard Strategy encourages sustainability and smart growth within the City; enhances neighborhood connectivity, improves visual character and is consistent with city and county vision.
- Environmental effects include a potential increase in emissions and noise levels, and high potential to impact known archaeological resources. There would be opportunities to incorporate green infrastructure to mitigate air, noise and stormwater infrastructure.
- I-81 Northern Interchange: There would be potential noise impacts related to increased traffic closer to the residential area in the northeast quadrant of the interchange.
- I-81/I-690 Interchange: There would be potential impacts to properties/buildings in the James Street/State Street and McBride/Erie Blvd areas due to the new alignment of I-81 and connecting ramps. These changes would alter access to medical facilities, businesses and residential neighborhoods around the interchange area.
- Construction Effects: The Boulevard Strategy is expected to include other transportation improvements such at street grid improvements and redesignation of I-81 which can potentially be constructed independently in advance of the boulevard construction and traffic can be re-routed to the new I-81.

Order of Magnitude Strategy Cost: An approximate order of magnitude cost in 2020 dollars was estimated and is projected to be in the range of $700-$800 Million. This preliminary estimate includes maintenance and protection of traffic, contingency and inflation adjustment. This estimate does not include costs for right of way acquisition, engineering, environmental impact mitigation or construction inspection; these cost would add an additional $250-$400 million.

Feasibility: Overall the transportation system modifications required by the Boulevard Strategy are considered feasible. This strategy falls in the middle range of construction costs for the strategies explored and has lower (reduced road infrastructure) life cycle maintenance costs than other strategies. The modifications required to the southern and northern I-81/I-481 interchanges (due to the I-81 redesignation) have been conceptually reviewed and generally fit within the existing right-of-way and are geometrically feasible. This strategy should be further refined including doing a full pre-screening of the bridges along the I-481 corridor.

Figure 14 highlights the Boulevard Strategy key elements.

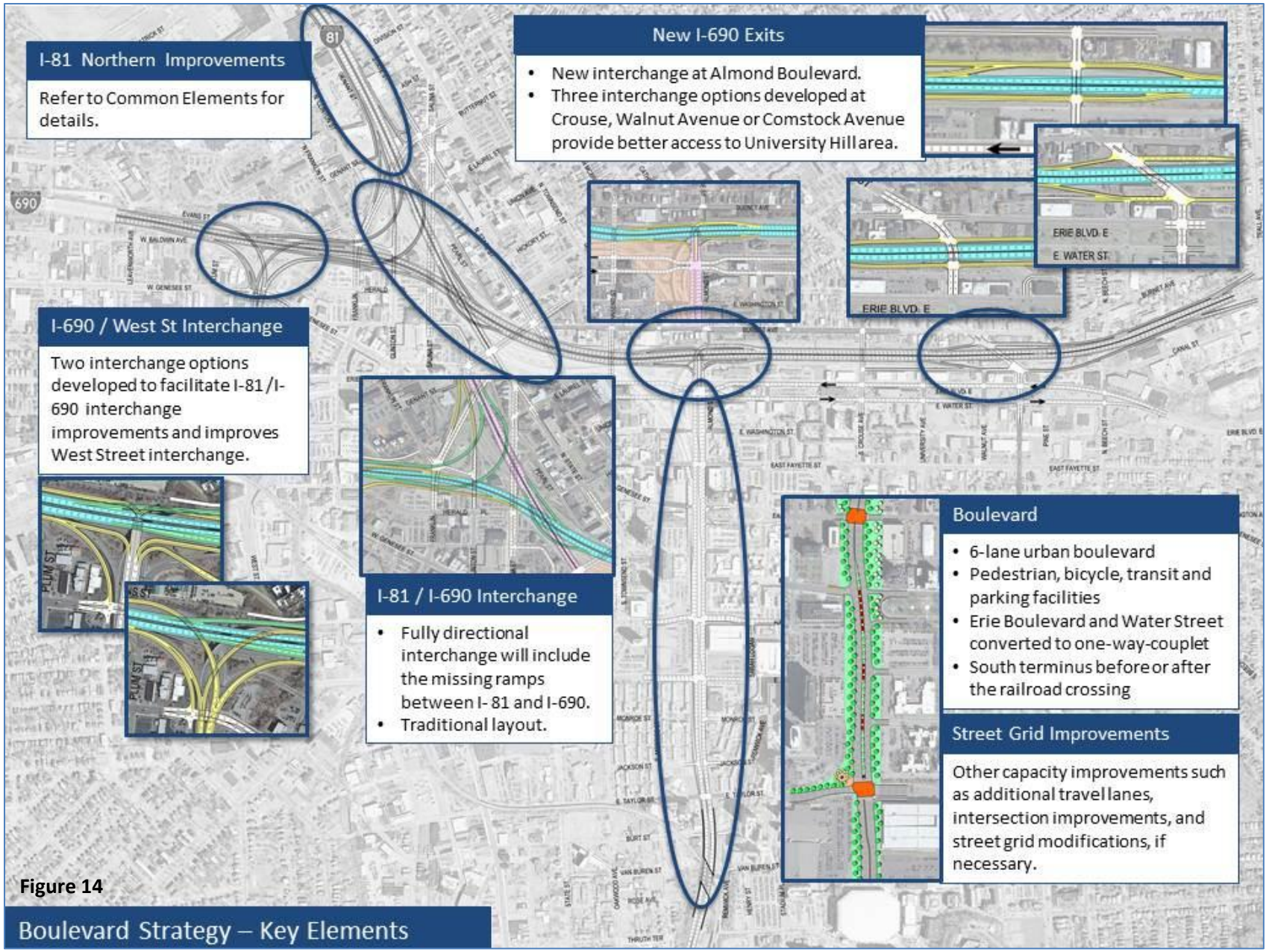

I-81 Northern Improvements
Refer to Common Elements for details.
New I-690 Exits
• New interchange at Almond Boulevard.
• Three interchange options developed at Crouse, Walnut Avenue or Comstock Avenue provide better access to University Hill area.
I-690 / West St Interchange
Two interchange options developed to facilitate I-81/I-690 interchange improvements and improves West Street interchange.
I-81 / I-690 Interchange
• Fully directional interchange will include the missing ramps between I- 81 and I-690.
• Traditional layout.
Boulevard
• 6-lane urban boulevard
• Pedestrian, bicycle, transit and parking facilities
• Erie Boulevard and Water Street converted to one-way-couplet
• South terminus before or after the railroad crossing
Street Grid Improvements
Other capacity improvements such as additional travel lanes, intersection improvements, and street grid modifications, if necessary.
ERIE BLVD. E
E. WATER ST.
Boulevard Strategy – Key Elements

Figure 14

3.4.4. Tunnel Strategy

The proposed Tunnel Strategy includes reconstructing the 3.5 mile segment of I-81 to meet current design standards, the common elements, and burying I-81 from the general vicinity of Van Buren Street on the south along the present I-81 alignment and reconnecting to surface level around Butternut Street. The actual tunnel would be a length of approximately 1.65 miles. A surface level boulevard would be provided above the tunnel for local access and connectivity.

The Tunnel Strategy would include a 1.65-mile, cut-and-cover tunnel with two-to-three lanes in each direction divided by a wall along its length. A mechanical ventilation system would be provided to maintain acceptable levels of air quality and visibility throughout the tunnel during normal operating condition. This system would control smoke and allow for safe egress from each direction of the tunnel in the case of a fire. Although a specific type of ventilation system for the tunnel has not been identified, it is anticipated that it would most likely include a ducting system for either or both supply and/or exhaust air, increasing the nominal cross section of the tunnel, and require a number of ventilation buildings that house necessary fans, mechanical systems and instrumentation. The precise number and locations of the ventilation buildings has not been determined, but it is anticipated that either one or two ventilation buildings would be required to ventilate each direction of the tunnel. The size of the ventilation buildings would be sufficient to house fans, instrumentation and mechanical systems of a scale required in the event of a "design fire" that is based on a fire that would be created by a heavy duty vehicle carrying liquid fuels. Passages would be provided between the two directions of the tunnel and to the surface to allow for the safe egress in the event of a fire.

A "real time" automated air pollutant monitoring and response system would be incorporated into the tunnel design to control the operation of the ventilation system. Although each direction of the tunnel would be self-ventilated by the "piston effect" of motor vehicles passing through the tunnel during free flow conditions, increased air pollutant levels during periods of congestion would require operation of the mechanical ventilation system. Necessary lighting and storm water drainage systems would be provided internal to the tunnel in each of its directions. Variable message signing would be provided prior to the entrance to each portal that would allow for warning of drivers in the case of a fire or other unsafe condition within the tunnel. It is assumed that NYSDOT would operate and maintain the ventilation system, requiring a full-time tunnel operation and maintenance staff.

The Tunnel Strategy includes the Common Elements as well as:

- The tunnel would assume three travel lanes in each direction with width allowances for exit and entrance ramps. Tunnel geometrics would conform to the I-81 current standards with extra width/height for safety walks and ventilation needs.
- Southern terminus options include terminating the tunnel near Taylor Street prior to the NYS&W railroad bridge or extending it under the railroad bridge to the Burt Street area.

Boston, MA – Central Artery

- The tunnel would be constructed using the cut and cover tunnel method due to the existing subsurface conditions (relatively weak mix of silt, sand, clay and some gravel) and the reasonably shallow depths of the tunnel (approximately 40 feet). It is anticipated the tunnel would be constructed in segments with substantial challenges associated with maintaining Almond Street and the viaduct.
- The Tunnel Strategy includes a boulevard at surface level over the tunnel to provide local access along the Almond Street corridor.
- I-81/I-690 Interchange: Tunnel Strategy would simplify the interchange as I-81 would be below grade.
- The transition section between the tunnel portals and the existing elevated roadway segments would sever East Washington, Erie Boulevard, Water Street, Fayette Street, McBride Street, Almond Street, and VanBuren Street (south terminus), significantly affecting east/west and north/south mobility among a number of Tomorrow's Neighborhoods Today (TNT) areas, and resulting in the diversion of a significant amount of traffic to Genesee or South Townsend Streets and increased levels of congestion on those roadways.
- Providing system connections in the I-690/Almond Street area would require major grade changes from the elevated I-690 about 30 feet above grade down to the tunnel about 40 feet below grade for a total drop of approximately 70 feet. To meet acceptable grades, Exit 18 (Harrison/Adams) that provides access to Downtown would be eliminated.
- The Tunnel Strategy would eliminate Exit 18 (Harrison/Adams) that provides current access to Downtown, University Hill and Eastside neighborhoods. There is insufficient spacing from the I-690 interchange to this location to provide an interchange. Full access to the tunnel is not feasible. This would cause a redistribution of vehicular trips onto the local street network and increase the response time for emergency vehicles providing service to the regional medical complex in Syracuse.
- Additional street grid modifications to improve east-west and north-south traffic flow would be necessary to offset the loss of ramps from the interstate system and severing local roads.
- The tunnel would require a complex mechanical ventilation system to address in-tunnel emission levels and to allow for safe egress in the event of a fire. Although a tunnel ventilation system has not been identified, it would most likely require additional right-of-way and large mechanical ventilation buildings, which would be difficult to site.

Major Geometric Design Constraints specific to this strategy:

- I-81/I690 Interchange: The system connections require substantial distance to go from one or two levels above grade (by I-690) to 25 feet to 30 feet below grade to tie into the tunnel. This limits the geometric design as follows:

  - Exit 18 (Harrison/Adams) interchange is too close to the I-81/I-690 interchange (approximately 600 feet weaving section exists versus 2000 feet required which constrains/influences system and local ramp spacing).
  - Limits the ability to reconnect the local street grid system and severs six city streets in the northern area as well as one near the southern terminus.
- Utilities: due to excavation required for the tunnel, significant utility disruption/conflicts are anticipated by the tunnel construction including: sewer and water crossings; gas, telephone, cable and electric relocation; and potential impacts to major transmission facilities. Of particular note is the University steam plant located at Taylor/McBride which provides steam heating and chilled water cooling for the University and most/all the hospitals on the Hill. This includes three crossings of steam lines, chilled water lines and a very high pressure compressed natural gas (CNG) line.

Potential Notable Substantial Social, Economic and Environmental Effects:

- Enhanced highway operations could encourage sprawl by facilitating through traffic and eliminating local access to the urban core. This strategy could benefit region-wide population growth and jobs access to commuting populations throughout the region. The limited access to urban core of the City acts as a disincentive to smart growth.
- Limited downtown access due to reduced ramps and severed local street system, limited multi-modal opportunities, and limited surface connections would provide little economic development opportunities. There would be improved visual connectivity without the viaduct.
- The overall cross section of the tunnel strategy after incorporation of necessary ventilation system ducting would be potentially greater than other strategies and require the acquisition of additional public right-of-way, including a school within a designated Environmental Justice (EJ) area, and reduce the amount of land available for future development.
- Development of required ventilation buildings would require the acquisition of additional public right-of-way and reduce the amount of land available for future development.
- Vehicular traffic entering and exiting the tunnel would result in elevated air pollutant and noise levels at the tunnel portals this may result in disproportionate adverse effects on EJ neighborhoods.
- Required lighting at the tunnel portals could result in significant adverse visual impacts on nearby land uses.
- I-81/I-690 Interchange: Potential substantial impacts to:
  - Properties/buildings along the I-81 corridor from Spencer St south to Genesee Street. This strategy does not fit within the current right-of-way and would have adverse impacts on immediately adjacent properties in order to provide the needed connecting ramps from the tunnel to the elevated I-690.
  - Circulation and access within the City would be greatly reduced with seven (7) major city streets being severed to accommodate the tunnel and connections.
  - Access to and from the expressway system is also substantially hampered with eight (8) ramps closed.

- Construction impacts which are expected to be substantial. This effort would be fairly time consuming and may substantial impact existing infrastructure which provides transportation and utility service to the area and the region (i.e. I-81 and Almond Street).

Order of Magnitude Strategy Cost: A preliminary order of magnitude construction costs in 2020 dollars was estimated to be in the range of $1.7 - $1.8 billion. This preliminary estimate includes maintenance and protection of traffic, contingency and inflation adjustment. This estimate does not include costs for right of way acquisition, engineering, environmental impact mitigation or construction inspection; these cost would add an additional $400-$500 million.

Feasibility This strategy does not perform well in comparison to the corridor goals and objectives. This strategy does offer improved visual environment between downtown and University Hill with the surface level boulevard; however, there would be substantial impacts to properties and community resources, severing of several local streets, and resultant in increased noise and emission levels near the tunnel terminals. This strategy is the most expensive and has the highest life cycle maintenance costs. This strategy would create substantial disruption during construction; construction would take longer and be more complex than other strategies. Additionally this strategy would create numerous utility conflicts/relocations which could be time consuming, disruptive and expensive. For these reasons, the Tunnel Strategy is not considered feasible.

Figure 15 highlights the Tunnel Strategy key elements.

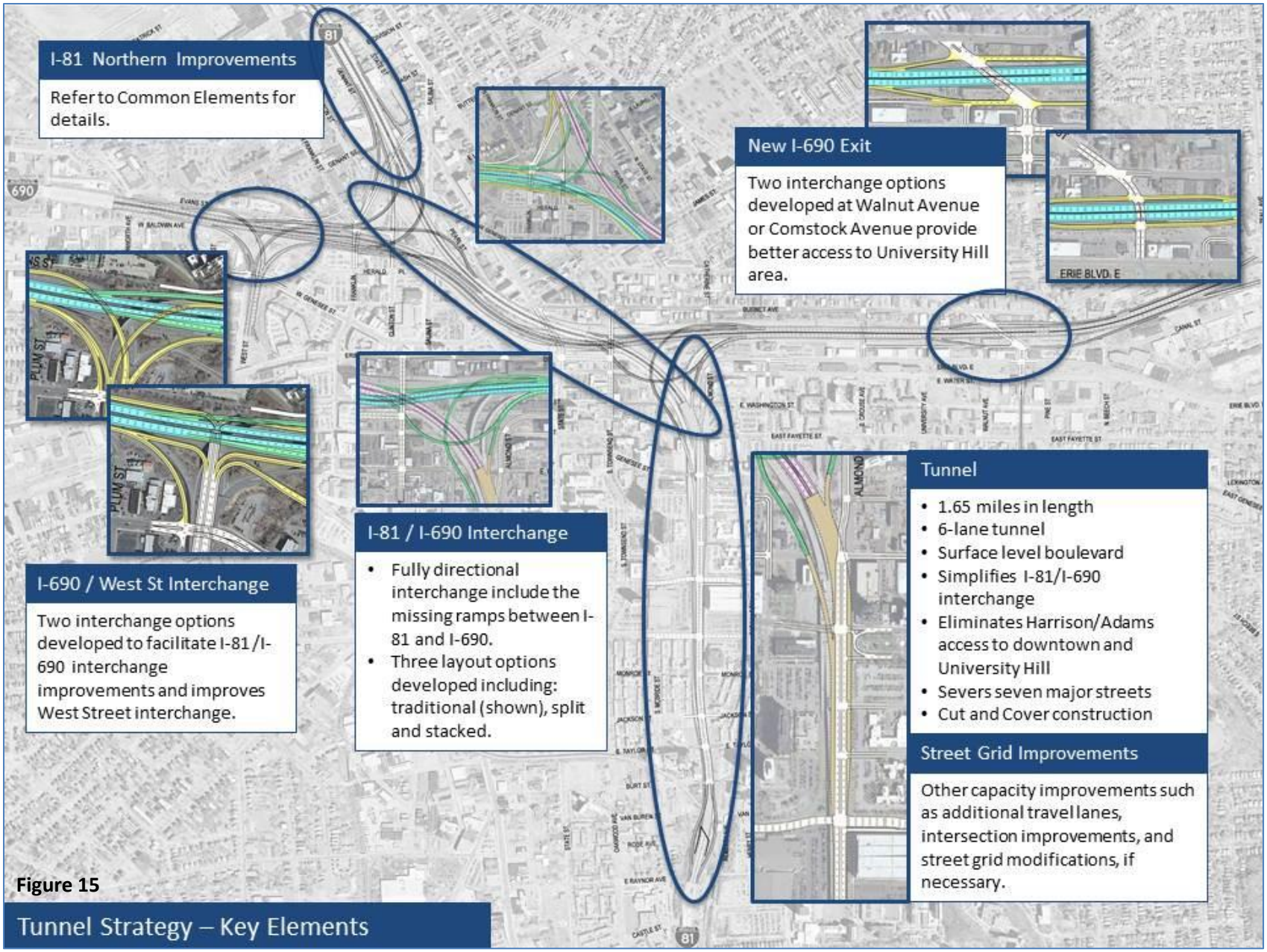


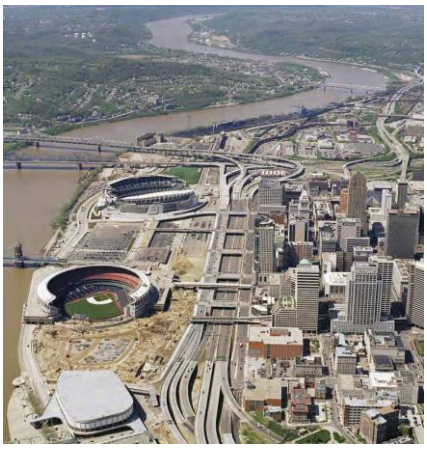
Figure 15

Tunnel Strategy – Key Elements

3.4.5. Depressed Highway Strategy

The proposed Depressed Highway Strategy includes the reconstruction of the 3.5 mile segment of I-81 to meet current design standards (60 MPH design speed) along with the Common Elements. Within this segment, the depressed I-81 starts at the general vicinity of Van Buren Street on the south along the present I-81 alignment and connecting to I-81 near Butternut Street, a length of approximately 1.65 miles. A surface level boulevard or straddling service roads are envisioned to provide local access and connectivity.

Cincinnati, OH –
Fort Washington Way



The Depressed Highway Strategy includes the Common Elements as well as:

- The depressed highway would include three lanes in each direction and access to/from Depressed Highway can be in the form of one-way services roads or a parallel street.
- The northern limit of the depressed highway would be just west of Salina Street where it connects to a similar depressed highway section on I-81 to the north. The southern terminus is dependent on going under or over the NYS&W Railroad and at least two options have been conceptually considered.
- This strategy would be constructed using steel sheet piling to support the open cut excavations (approximately 25 feet) into what is a relatively weak subsurface condition comprised of silt, sand, clay and some gravel. It is expected the depressed highway would be constructed in segments with substantial challenges associated with maintaining utilities and local and regional access.
- I-81/I-690 Interchange: Depressed Highway Strategy would simplify the interchange as I-81 would be below grade. Some system connections between I-690 and I-81 would occur in the Almond Street area.
- In order to meet grade requirements at the interchange connections, this strategy would sever seven (7) major streets in this area including: Erie Boulevard, Water Street, Washington Street, Fayette Street, Almond Street (to Northside), McBride Street (to Northside), and VanBuren Street at the south terminus area. Providing system connections in the I-690/Almond Street area would require major grade changes from elevated highway to a depressed highway, similar to the Tunnel Strategy.
- Eliminates Exit 18 (Harrison/Adams) that currently provides access to Downtown, University Hill and Eastside neighborhoods. There is insufficient spacing from the I-690 interchange to this location to provide the proper ramp spacing; hence, full access to the depressed highway is not feasible.
- Additional street grid modifications to improve east-west and north-south traffic flow would be necessary to off-set the severed streets and reduced interstate access. This may be in the form of additional crossings of the depressed roadway required to allow for circulation between the Downtown, University Hill and Eastside neighborhoods.

Major Geometric Design Constraints specific to this strategy:

- I-81/I690 Interchange: The system connections require substantial distance to go from one or two levels above grade (by I-690) to 25 feet below grade to tie into the Depressed Highway. This limits the geometric design as follows:
  - Exit 18 (Harrison/Adams) interchange is too close to the I-81/I-690 interchange (approximately 600 feet weaving section exists versus the 2000 feet required which constrains/influences system and local ramp spacing).
  - The ability to reconnect the local street grid system is limited, consequently severing six city streets in the northern area as well as one near the southern terminus.
- Utilities: significant utility disruption/conflicts are anticipated by the tunnel construction including: sewer and water crossings; gas, telephone, cable and electric relocation; and potential impacts to major transmission facilities. Of particular note is the University steam plant located at Taylor/McBride which provides steam heating and chilled water cooling for the University and most or all the hospitals on the Hill. This includes three crossings of steam lines, chilled water lines and a very high pressure CNG gas line.
- The available right of way along Almond Street is insufficient for the Depressed Highway and associated adjacent boulevard.

Potential Notable Substantial Social, Economic and Environmental Effects:

- Enhanced highway operations could encourage sprawl by facilitating through traffic and eliminating local access to the urban core. This strategy could benefit region-wide population growth and jobs access to commuting populations throughout the region. The limited access to urban core of the City acts as a disincentive to smart growth.
- Limited downtown access with reduced/severed local street system and limited multi-modal and surface connections would provide little economic development opportunities.
- Major property impacts include removal of numerous businesses, housing, portions of a park and sports fields; and impacts to a school within a designated Environmental Justice area. This strategy does not fit within the current right-of-way and would have adverse impacts on immediately adjacent properties in order to provide the needed connecting ramps from the depressed highway to the elevated I-690.
- I-81/I-690 Interchange: potential substantial impacts to:
  - Properties/buildings along the I-81 corridor from Spencer St south to Genesee Street.
  - Circulation and access within the City: connectivity is greatly reduced with seven (7) major city streets being severed to accommodate the depressed highway and expressway system connections.
  - Access to and from the expressway system is also substantially hampered with eight (8) ramps closed.
- The required width (depressed highway and adjacent surface boulevard) would have substantial community and property impacts along the Almond Street corridor from Washington Street to Burt Street due to the wider section width.
- Construction impacts are expected to be substantial. This effort would be fairly time consuming and may substantially impact existing infrastructure which provides transportation and utility service to the area and the region (i.e. I-81 and Almond Street).

It is expected the depressed highway would be constructed in segments with substantial challenges associated with maintaining local and regional access.

Order of Magnitude Strategy Cost: A preliminary order of magnitude cost in 2020 dollars was estimated to be in the range of $1.3 - $1.5 billion. This preliminary estimate includes maintenance and protection of traffic, contingency and inflation adjustment. This estimate does not include costs for right of way acquisition, engineering, environmental impact mitigation or construction inspection; these cost would add an additional $350 - $500 million.

Feasibility: This strategy does not perform well in comparison to the corridor needs and study goals and objectives. This strategy has the most impacts to community resources (including Environmental Justice areas), does not improve connectivity between downtown and University Hill, severs several local streets, and does not contribute to improved multimodal connectivity. The Depressed Highway trench (approximately 100 feet wide) could be considered as a barrier similar to the present elevated Viaduct, through the visual environment would be improved. The Depressed Highway trench noise levels are anticipated to increase noise exposure for sensitive resources at grade. This strategy is the second most expensive and has higher life cycle maintenance costs than other strategies (excluding the Tunnel). This strategy would create substantial disruption during construction; the construction phase would be longer and more complex than other strategies. Additionally this strategy would create numerous utility conflicts/relocations, and is disruptive and expensive. For these reasons, the Depressed Highway Strategy is not considered feasible.

Figure 16 highlights the key elements of the Depressed Highway Strategy.

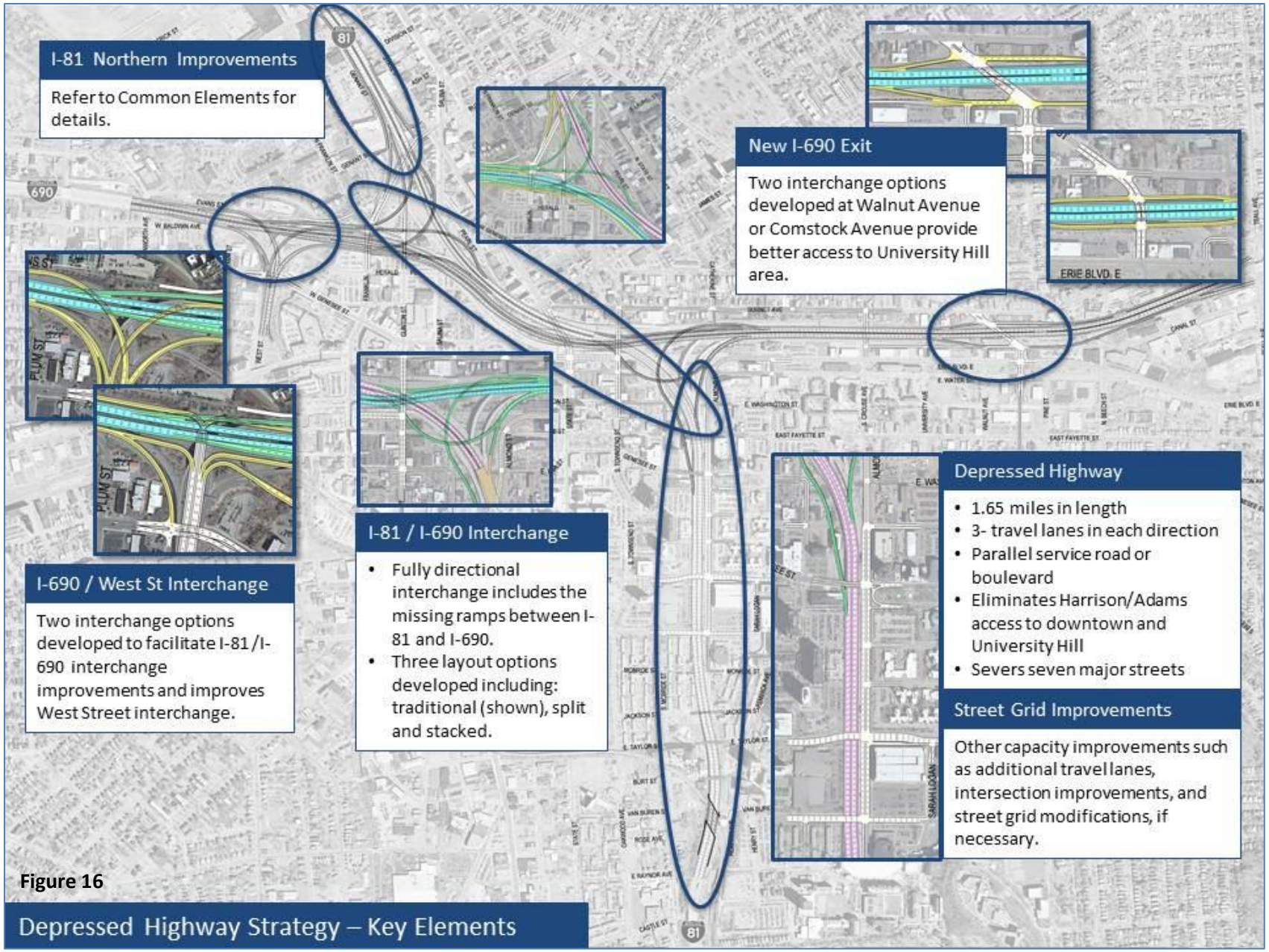

I-81 Northern Improvements
Refer to Common Elements for details.
New I-690 Exit
Two interchange options developed at Walnut Avenue or Comstock Avenue provide better access to University Hill area.
ERIE BLVD. E
I-690 / West St Interchange
Two interchange options developed to facilitate I-81 /I-690 interchange improvements and improves West Street interchange.
I-81 / I-690 Interchange
Fully directional interchange includes the missing ramps between I-81 and I-690.
Three layout options developed including: traditional (shown), split and stacked.
Depressed Highway
1.65 miles in length
3- travel lanes in each direction
Parallel service road or boulevard
Eliminates Harrison/Adams access to downtown and University Hill
Severs seven major streets
Street Grid Improvements
Other capacity improvements such as additional travel lanes, intersection improvements, and street grid modifications, if necessary.
Depressed Highway Strategy – Key Elements

Figure 16

3.4.6. Transit Integration

The Syracuse Transit System Analysis (Phase I) (STSA)[18] is a parallel effort intended to serve as a long-range vision that is consistent with the overall vision of the I-81 corridor being developed as part of The I-81 Challenge. The STSA presents a series of short-term and long-term recommendations detailing how the Syracuse metropolitan area's transit system could be structured to meet identified needs in a cost-effective manner. The analyses and recommendations provided in this report are intended to be incorporated into the overall I-81 Challenge study, as well as in other regional planning documents, including SMTC's Long Range Transportation Plan, and the master plans of the City of Syracuse and surrounding municipalities.

The STSA presents options that would assist the Syracuse metropolitan area in achieving a balanced transportation system looking at ways transit and other modes can enhance the system in a way that supports economic growth, improves quality of life, and supports the vision of the communities that it serves. Objectives of the STSA include:

- Reducing congestion within the City, particularly along corridors adjacent to I-81 and I-690;
- Facilitating sustainable economic development within the City, including the planned development in University Hill;
- Reducing parking demand in Downtown and on University Hill;
- Examining the feasibility of increasing the frequency and number of hours per day that buses operate;
- Improving connectivity and integration of Downtown with University Hill;
- Increasing transportation options for young, elderly, disabled, and low-income populations;
- Decreasing noise and air pollution generated from traffic; and,
- Improving transit travel times on commuter routes to be more competitive with vehicle travel time.

In order to meet the objectives of the STSA, several transit enhancement options are identified for key transit corridors within the Syracuse metropolitan area. The features associated with each option, as well as the selection of the key transit corridors are based on field data collection, public outreach (meetings and surveys), stakeholder feedback, and existing reports and studies. The options present various levels of investment in the transit system:

- Low Investment: A consolidated, simplified route structure based on the existing fixed-route system that incorporates enhancements such as bus lanes, queue jumpers, corridor

[18] *Syracuse Transit System Analysis, Phase I – Executive Summary, May 2013*
http://thei81challenge.org/cm/ResourceFiles/resources/130515 STSA Executive Summary Phase 1.pdf

branding, increased frequency, expanded operating hours, new/enhanced hubs and park-and-rides, and express bus services, among other features.

- Moderate Investment: A higher-intensity BRT system along key transit corridors that incorporates enhancements such as bus lanes, queue jumpers, signal priority, consolidated stops, rider amenities, unique streetscape, increased frequency, and modern vehicles, among other features.
- High Investment: A fixed-route on-street rail service (within travel lanes or on separate lanes) that incorporates consolidated stops, corridor branding, signal preemption or priority, high frequency service, distinctive streetscape features, and modern vehicles, among other features.

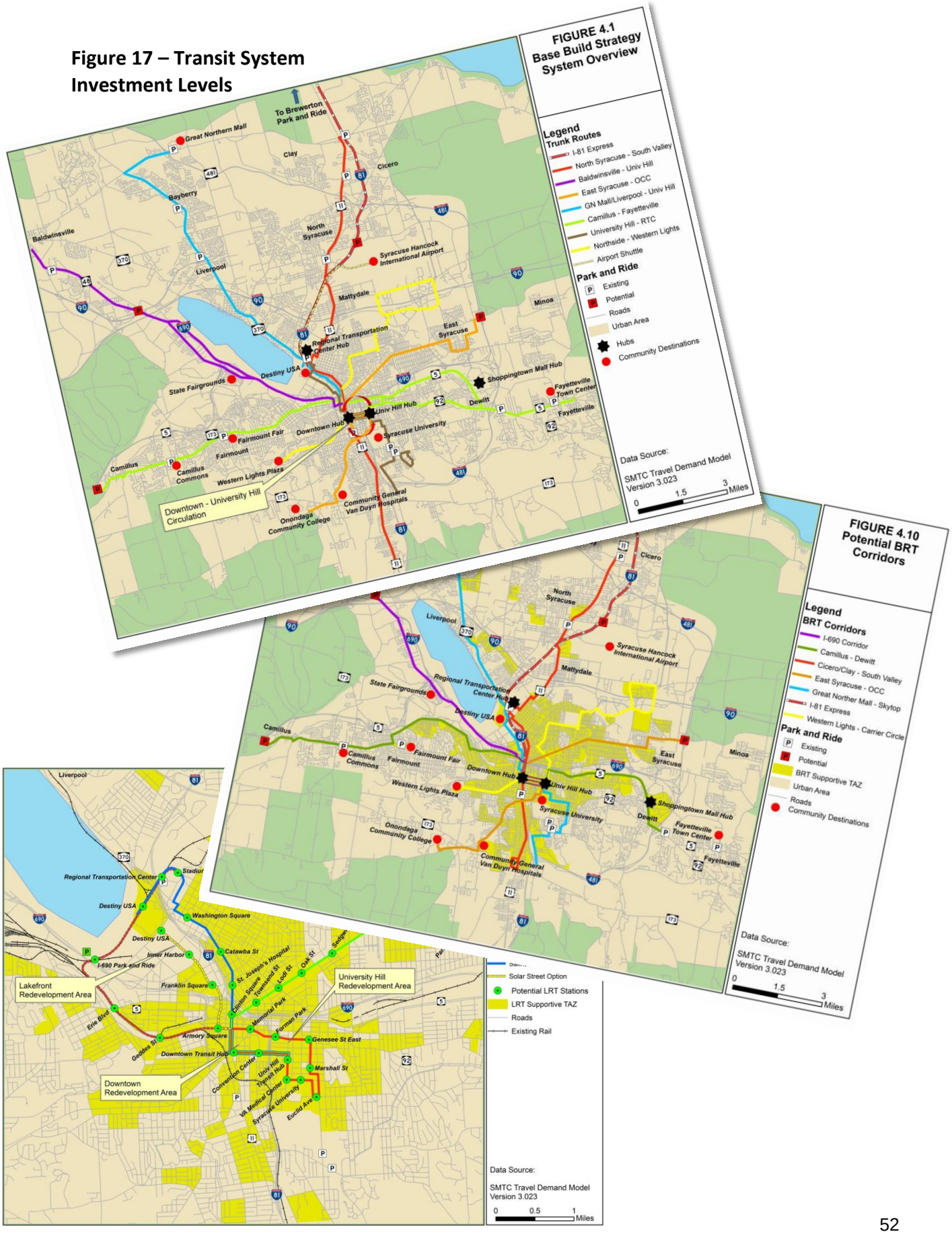
The options presented in the report are targeted to attract new ridership by improving the overall attractiveness of the transit system, as well as retain existing ridership by addressing existing needs. By reducing transit travel times to make transit more comparable to vehicles, expanding operating hours and frequency, branding services, improving ease of use through increased rider information, and enhancing connections between key areas of the City and region, more riders would likely try and continue using the transit system.

Each option would be evaluated based on several measures including ability to meet needs, public and stakeholder feedback, anticipated ridership, cost, and Federal Transit Administration New Starts and Small Starts funding criteria. Based on the results of the evaluation, an implementation option would be developed that identifies short-term and long-term recommendations for transit enhancements, and outlines a path for CENTRO to conduct corridor-specific alternative analyses that would allow them to pursue FTA funding for the transit enhancements.

The transit recommendations and implementation plan included in the study could have a much larger impact on the region than just better and more attractive transit services. An increase in transit ridership could lead to a modal shift that would reduce peak hour vehicle trips, reduce the need for parking in Downtown and on University Hill, and support smart economic growth, which would support the vision of the overall I-81 Challenge project. In addition, smart economic growth along transit corridors would improve overall quality of life, improve the walkability of the City and region, and lead to new economic opportunities for area residents. Therefore, the transit recommendations and implementation plan of the STSA study will be integrated into the I-81 strategies where appropriate. This would ensure that the transit recommendations do not preclude/inhibit future improvements/expansion of the I-81 system and vice versa.

Figure 17 shows the three levels of investment options for the transit system.

Figure 17 – Transit System Investment Levels



3.5. ENGINEERING CONSIDERATIONS

The following sections evaluate each of the strategies in terms of traffic and safety, multimodal (accommodation and connectivity) and infrastructure (geometrics, bridges, drainage and stormwater).

3.5.1. Traffic and Safety

3.5.1.1 Traffic, Delay and Mobility

The results presented herein are based on the SMTC's Regional Travel Demand Model. This model is intended for planning-level analysis and was used to determine impacts to regional mobility, which was one component of the feasibility assessment for each strategy. More detailed analysis to identify location-specific mitigation measures follows the modeling. The SMTC Regional Travel Demand Model was used to model how travel in the SMTC Region might change with each strategy. This included changes in the volume of traffic using the highway segments, as well as an indication of the changes in traffic volume using a segment in comparison to the ability of the segment to accommodate this traffic volume, i.e. Volume to Capacity ratio (V/C). In addition a number of Measures of Effectiveness (MOEs) were obtained from the SMTC model, on a regional and city level and in the major impact areas surrounding the I-81/I-690 Interchange. These MOEs allow a regional comparison of each strategy and the no build condition. All analysis is for traffic volumes expected on the highway network by the design year 2040.

The strategy model runs presented herein are based on the preliminary strategy concepts and assumptions. Further refinement of the model and method used to analyze the strategies will be conducted in subsequent phases of the project that would follow completion of the Corridor Study.

Five strategies were modeled and analyzed to identify the effects of each strategy and other regional Interstate capacity needs. While evaluating strategies for the I-81 viaduct priority area, ways that transit and other modes can enhance each of these strategies was explored. It is also assumed that enhancement to the transit system can be incorporated into any of these strategies and would again be modeled and further analyzed in subsequent study phases.

Regional Interstate Highway Capacity

The regional interstate system is forecasted to continue to provide reasonable levels of service on the I-81 outer segments slated for rehabilitation (8.5 miles); on I-690 east of Lodi and west of West Street; and all of I-481 in the year 2040 with a few exceptions as listed below. Note that the sections identified as approaching or at capacity conditions by 2040, may not require improvements until 2040.

I-690 west of West Street - Most sections would maintain acceptable level of service (less than 0.8 volume/capacity ratio) under all strategies through the year 2040, except for the

section between Bear Street (NY 298) and NY 695. This section is forecasted to approach or be over capacity by the year 2040.

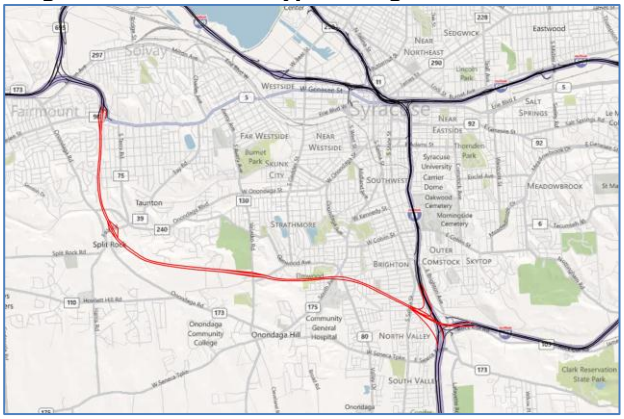
I-690 east of Lodi Street - Most sections would maintain reasonable level of service under all strategies through the year 2040, except for the section between Lodi Street and Midler Avenue under the No Build and Rehabilitation Strategies. The I-690 westbound direction is shown to be approaching capacity (0.8 to 1.00 v/c).

I-481 - Under all strategies, I-481 would maintain acceptable levels of service, except the Boulevard Strategy, where the section of I-481 between the I-690 ramps and the Kirkville Road ramps would approach capacity by 2040.

Boulevard Strategy - Western Bypass

As part of the Boulevard Strategy, the concept of considering the Western Bypass (Option 4) as a means to reduce traffic on the viaduct has been evaluated and dismissed. This concept of extending I-481 from the southern interchange with I-81 in a westerly direction and terminating at Route 695 in Fairmount was modeled using the Regional Travel Demand Model, Figure 18. The modeling results indicate that the Western Bypass would generally reduce east-west travel on I-690, however, it would have little, if any, effect on I-81. In fact on I-81 in the viaduct section the model indicates that it might slightly increase traffic. Regional travel patterns are generally east-west, such that traffic on I-81 would not be notably affected.

Figure 18 - Western Bypass Alignment



Based on this assessment, the Western Bypass would affect east-west traffic and not north-south traffic using I-81; would reduce traffic on I-690, however little, if any, decrease in traffic through the I-81 viaduct. In fact traffic in certain sections of the viaduct traffic may actually increase; and east-west traffic reduction on I-690 may improve traffic operations through the I-690/I-81 Interchange; however, the improved traffic operations would be minor.

The Western Bypass would have little effect on reducing traffic through the primary study area and improvements would still be needed on I-81 including the I-81/I-690 interchange and viaduct bridges. Hence, this option for potentially mitigating traffic capacity needs is dismissed from further consideration.

<u>Viaduct Priority Area Capacity Analysis</u>

The viaduct priority area reflects the traffic operations on I-81 from Hiawatha Boulevard on the north to approximately Castle Street on the south and along I-690 from the West Street Interchange to Teall Avenue. The traffic analysis includes the adjacent at grade arterials and

intersections with access to the Interstate system. Capacity issues vary in this area depending on the Strategy.

No Build Assessment - Under the No Build, most of I-81 southbound would be approaching or over capacity during the future morning peak hour from Hiawatha Boulevard to Castle Street. I-81 northbound would also be approaching or over capacity from Castle Street to Bear Street.

I-690 eastbound would be over capacity from West Street to I-81 in the future morning peak hour. In the future evening peak hour, I-690 westbound would be approaching or over capacity from Teall Avenue to West Street. The at-grade arterial system would generally continue to operate without capacity issues, except for certain sections of Almond Street, parts of East Adams and Van Buren Street.

Rehabilitation Strategy Assessment: Capacity analysis for the Rehabilitation Strategy shows similar results to the No Build Strategy, as might be expected since there were only minor safety and capacity improvements over the No-Build Strategy. In particular, the widening of East Adams to provide a left turn lane on the approach to Sarah Logan Drive is included along with improvements to the I-81 southbound ramp to Harrison Street which feeds traffic to Almond Street.

Reconstruction Strategy Assessment: For the Reconstruction Strategy, an additional mainline expressway lane may be required on I-81 and I-690 to address expressway capacity issues at various locations. In order to address future capacity issues it is anticipated that additional lanes on the expressway would be needed:

- I-690 westbound from Almond Street to I-81 northbound;
- I-690 eastbound from West Street to Almond Street;
- I-81 northbound from the I-690 to Hiawatha Boulevard; and,
- I-81 southbound from Hiawatha Boulevard to Butternut Street.

The initial review of overall traffic operations indicates this strategy is feasible with further refinements necessary in subsequent project phases including more detailed traffic analysis to identify intersection capacity needs and street grid improvements.

Boulevard Strategy Assessment: The strategy of removing I-81 over Almond Street and changing Almond Street into an at-grade urban boulevard is a unique concept that potentially affects other parts of the regional freeway system. In this case I-481 would be designated as the new I-81 which would route regional traffic around the City. The Boulevard along with modifications to Erie Boulevard and Water Street would carry traffic to/from the interstate system to University Hill and Downtown. Additional lanes on the expressway would be needed:

- I-690 westbound from Almond Street to I-81 northbound;
- I-690 eastbound from West Street to Almond Street.
- I-81 northbound from the I-690 to Hiawatha Boulevard;

- I-81 southbound from Hiawatha Boulevard to Butternut Street.

In addition, both the I-690 westbound ramp to I-81 northbound and the I-81 southbound ramp to I-690 eastbound would require two additional travel lanes.

As part of this strategy assessment, adjacent at grade intersections impacted by the expressway system changes were reviewed. While the at-grade intersections were found to provide reasonable LOS, when simulated individually, and further reviewed to determine how each intersection interacts with adjacent intersections using Synchro software, it was found that vehicles waiting to pass through various intersections would back up and effect the previous intersection operations. This includes the possibility of queued traffic backing up onto the expressway. Further review indicates that these backups can be resolved through modifications to the initial strategy layout in conjunction with additional analysis using the Regional Travel Demand Model. In particular, maintaining the West Street northbound off-ramp to Herald Place should divert a substantial amount of traffic to the I-81 Butternut/State Street on-ramp. Replacing the I-690 westbound off-ramp to Townsend Street would also alleviate some of the congestion projected on the local street network.

Further iterations of the travel demand model may be performed to incorporate alternative access options suggested above. Further traffic analysis and geometric refinements at the intersections are necessary and to be incorporated in subsequent project phases.

Tunnel/Depressed Highway Strategy Assessment

These strategies are both very similar from a transportation operation perspective. The Depressed Highway would show the greater impact with the added street width that would require additional signal clearance intervals and signal operations. In both cases (Tunnel and Depressed Highway) the I-81 Interchange at Harrison/Adams Street would be eliminated and as such traffic to Downtown and University Hill would redistribute itself to the at grade arterial system serving these areas.

The Tunnel/Depressed Highway were initially modeled with two travel lanes in each direction. Review of the modeling effort would indicate that both would have to be three lanes in each direction to maintain reasonable levels of traffic operations. Additional expressway widening would again be required on I-81 to the north and I-690 to maintain below capacity levels of traffic operations. In subsequent phases, further review of the street grid system would need to be considered.

Measures of Effectiveness

Table 4 shows some of the measures of effectiveness (MOEs) derived from the SMTC Regional Travel Demand Model for each of the strategies considered. The table and the following figures are broken down into three categories; the SMTC Region which extends beyond Onondaga County, the City of Syracuse, and the Center City. The Center City was defined by the area surrounding the I-81/I-690 interchange and includes areas both north and south of this area, including the Syracuse Downtown area and University Hill. Figure 19 shades this area based on transportation area zones (TAZ) boundaries.

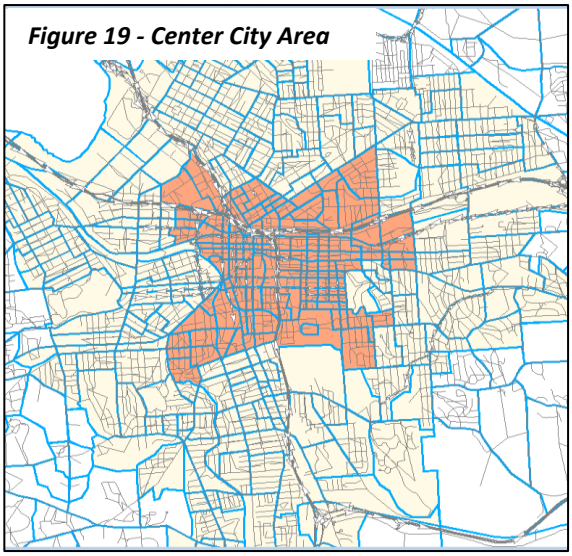


Figure 19 - Center City Area

The table shows a comparison of the MOE's for each of the strategies for their effects within the City Center, Syracuse and the Region. The rest of this section analyzes and compares the MOEs for each strategy. The results reflect impact of the initial strategy layouts; however, does not reflect improvements to the strategy as noted herein as a result of this assessment or further refinement under subsequent project phases.

Table4 - Measures of Effectiveness – Strategy Comparison

		City Center					Syracuse					SMTC Region				
		NO BUILD	BLVD	REHAB	RECON	TUNNEL	NO BUILD	BLVD	REHAB	RECON	TUNNEL	NO BUILD	BLVD	REHAB	RECON	TUNNEL
Intersections																
Mild Delay (>20s/veh)	**AM**	31.4%	40.3%	31.9%	35.6%	44.0%	35.6%	37.3%	35.1%	36.6%	41.6%	43.9%	44.5%	43.5%	44.4%	47.0%
	PM	35.1%	50.8%	35.1%	34.5%	47.2%	42.1%	48.4%	41.6%	41.0%	47.8%	52.2%	55.9%	51.9%	51.5%	55.2%
Intersections																
Moderate Delay (>35s/veh)	**AM**	4.2%	9.4%	3.7%	6.7%	8.3%	4.2%	6.2%	4.5%	5.4%	7.4%	8.2%	8.9%	8.4%	8.3%	9.5%
	PM	4.2%	8.9%	4.2%	6.2%	7.3%	5.4%	6.7%	5.4%	5.9%	6.4%	10.4%	11.0%	10.4%	10.6%	10.9%
Intersections																
Heavy Delay (>55s/veh)	**AM**	1.6%	2.1%	1.0%	1.0%	1.6%	0.7%	1.0%	0.5%	0.5%	0.7%	1.2%	1.3%	1.1%	1.1%	1.2%
	PM	0.5%	2.6%	0.5%	1.0%	0.5%	0.2%	1.2%	0.2%	0.7%	0.5%	1.2%	1.7%	1.2%	1.3%	1.2%
Delay (non-freeway)	**AM**	1,204	1,426	1,209	1,263	1,382	2,491	2,607	2,489	2,491	2,676	6,294	6,415	6,290	6,263	6,448
	PM	1,328	1,819	1,327	1,374	1,589	2,922	3,276	2,907	2,898	3,171	7,807	8,201	7,787	7,756	8,023
24H VMT		676,461	670,336	679,608	701,408	732,841	2,021,139	1,938,407	2,026,426	2,063,335	2,073,218	11,817,857	11,814,771	11,821,725	11,872,662	11,872,988
24H VHT		30,028	32,536	29,652	29,566	31,707	78,240	78,209	77,850	77,586	79,980	312,943	314,514	312,541	312,291	314,554
Avg Speed		22.5	20.6	22.9	23.7	23.1	25.8	24.8	26.0	26.6	25.9	37.8	37.6	37.8	38.0	37.7
Freeway VMT > Cap	**AM**	24.7%	2.6%	11.8%	13.8%	16.9%	13.4%	8.3%	11.5%	15.4%	16.7%	3.4%	2.5%	3.1%	4.0%	4.1%
	PM	38.6%	12.9%	29.9%	29.1%	31.0%	17.7%	12.7%	16.6%	16.3%	17.6%	3.8%	2.9%	3.7%	3.7%	3.9%
Freeway Lane Miles > Cap	**AM**	22.6%	3.9%	11.9%	14.2%	17.2%	10.3%	5.1%	8.3%	11.0%	11.9%	1.5%	0.9%	1.3%	1.6%	1.7%
	PM	35.4%	10.5%	30.2%	31.0%	33.3%	13.9%	7.8%	13.5%	13.6%	15.0%	1.8%	1.2%	1.8%	1.8%	1.9%
Local Bus Trips		10,408	10,393	10,417	10,441	10,415	16,186	16,205	16,187	16,230	16,153	22,779	22,852	22,776	22,873	22,782

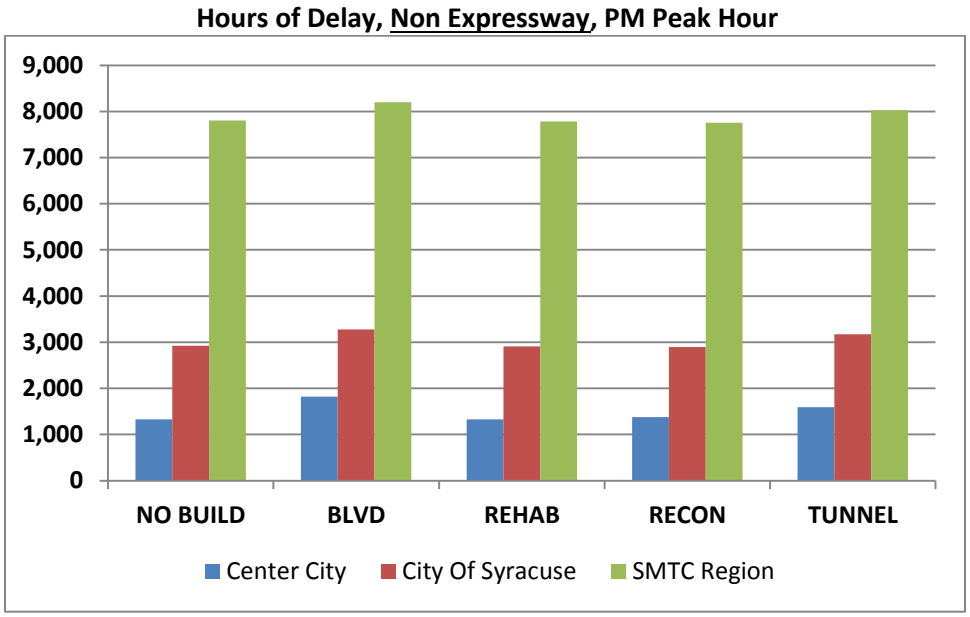
LM = Lane Miles

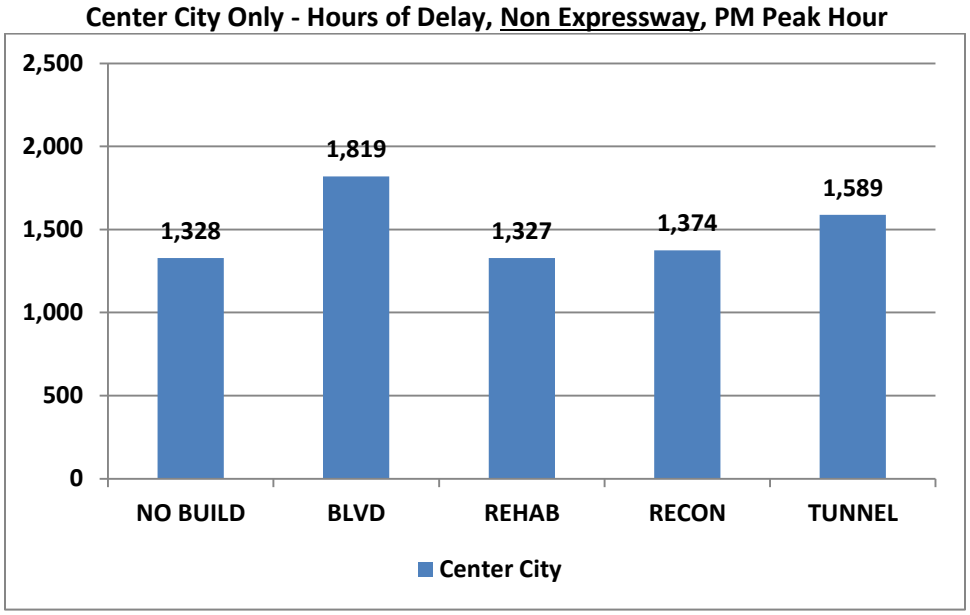
VoC = Volume over Capacity

VMT = Vehicle Miles Traveled

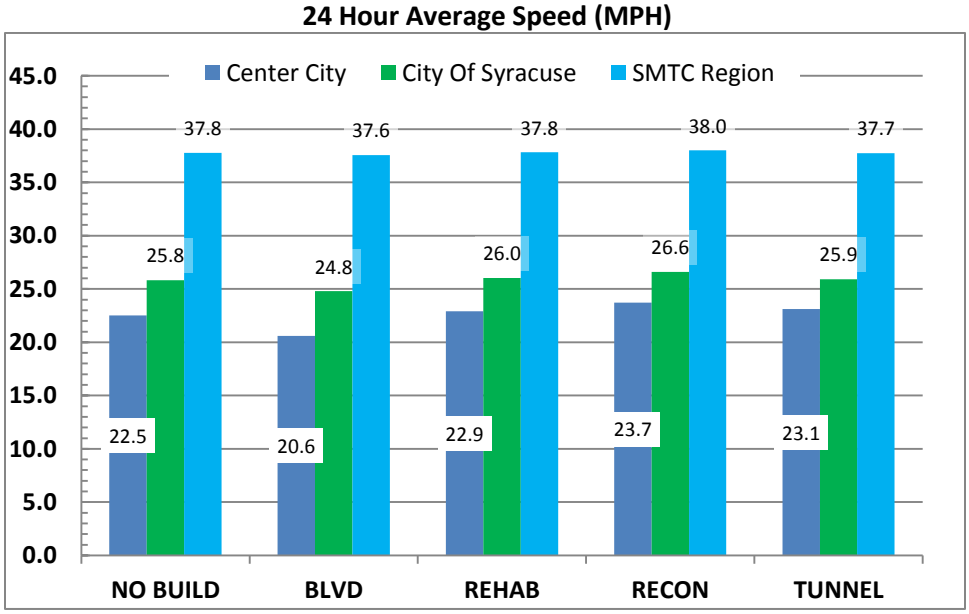
VHT = Vehicle Hours Traveled

The charts show that at a regional level there would be minor changes in delay on the arterial system under each Strategy. In the Center City, however, the Boulevard Strategy and the Tunnel/Depressed Highway Strategies would increase delays on the arterials and collector roads substantially (based on the initial model parameters). The model indicates a potential increase of 37% in hours of delay under the Boulevard Strategy and a potential increase of 20% in hours of delay for the Tunnel/Depressed Highway Strategies see graph below. Traffic operation mitigation measures may be able to offset this increase and will be evaluated in future study phases.



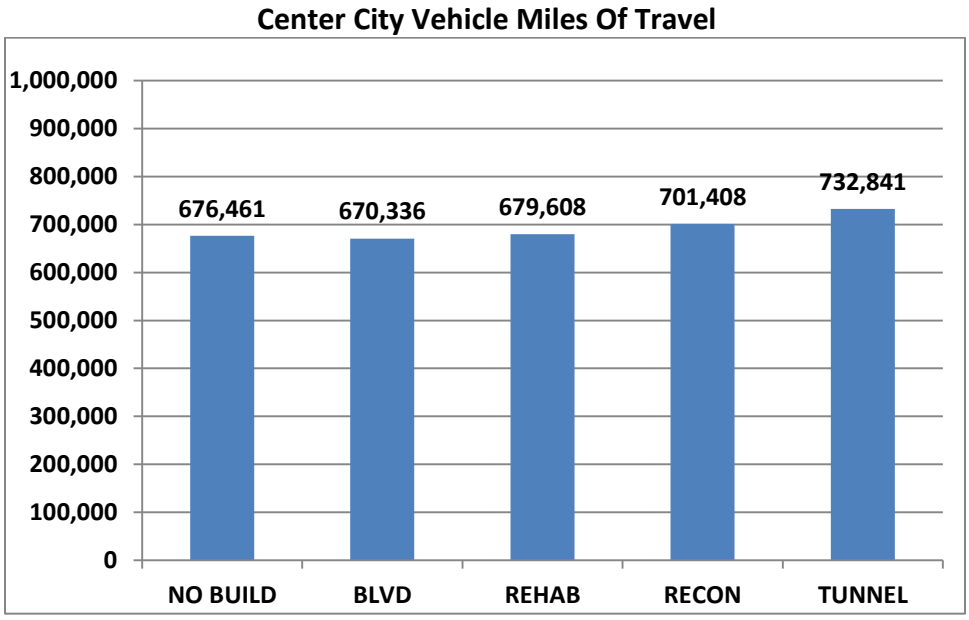


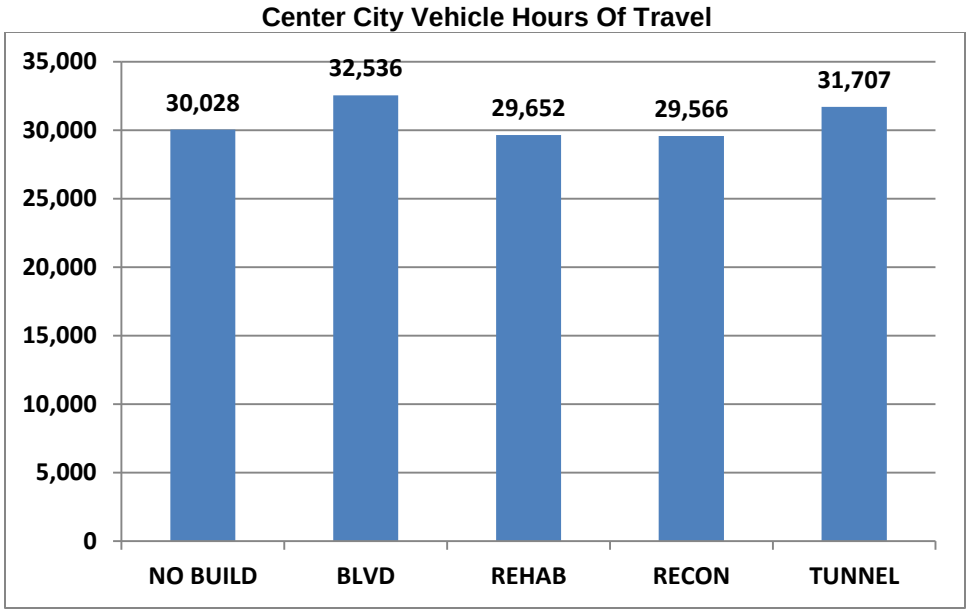
Looking at the average speed over the entire highway network, as shown below, only slight changes in average speed (in comparison to No Build) occur for all strategies analyzed on a regional basis. For the Boulevard Strategy, the Center City average speed would drop by nearly two miles per hour and by one mile per hour in the City Of Syracuse; this indicates noticeable increases in congestion and delays. The results reflect the effect of the initial strategy layouts and modeling parameters; however, it does not reflect improvements to the strategy as noted herein as a result of this assessment. Hence further iterative modeling and analysis refinement must be undertaken in subsequent project phases.



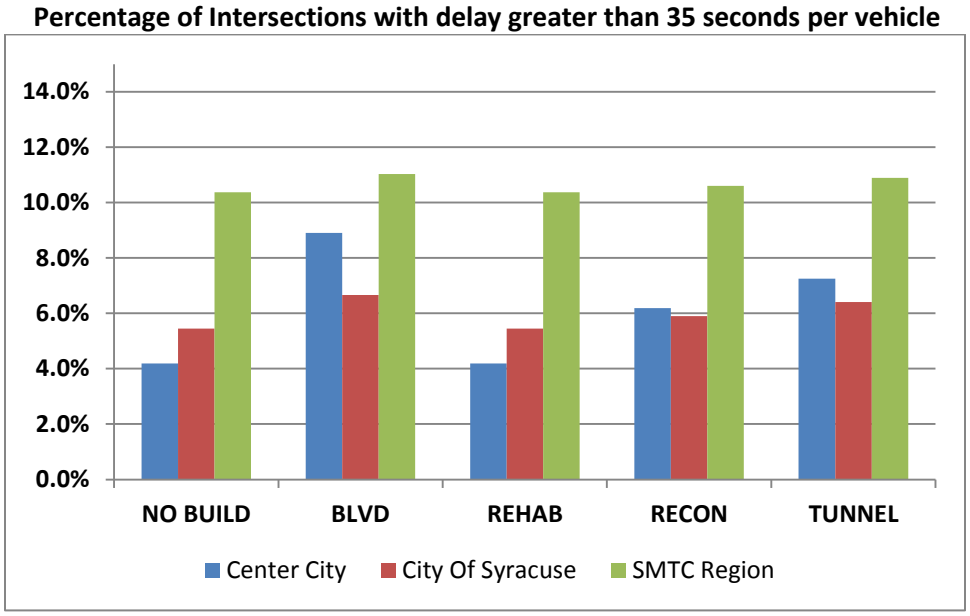
The graph below shows the Vehicle Miles Traveled in the Center City over 24 hours. It indicates that the Boulevard Strategy would reduce the number of miles traveled while the Tunnel/Depress Highway would increase travel in the Center City by about 8%.

While the Boulevard Strategy would reduce the miles traveled in the Center City, it would also increase the vehicle hours of travel by the approximately 8% in a 24-hour period. The results reflect the effect of the initial strategy layouts and modeling parameters; however, does not reflect improvements to the strategy as noted herein as a result of this assessment or further refinement under subsequent project phases. The Tunnel/Depress Highway would also increase miles of travel, while the Rehabilitation and Reconstruction Strategies would decrease miles of travel in the Center City area in a 24-hour period.





Intersection delay per vehicle is the total forecasted intersection delay minus delay under free flow speeds (delay that would occur if there was no congestion at an intersection). The following figure shows the percentage of intersections, in each area, with intersection delay greater than 35 seconds per vehicle during the weekday evening peak hour. Level of service D (approaching capacity conditions) reflects operations ranging in delay from 35-55 seconds per vehicle. The model results indicate, with exception of the Rehabilitation Strategy, the strategies would increase the number of intersections approaching capacity. The Boulevard Strategy has the most impact in the Center City area.



MOEs Conclusions

The results herein are based on the first iteration of the regional travel demand model and further refinement of the strategies and modeling will be undertaken in the next phase of the project. Comparison of the strategies to the No Build would indicate:

- The Rehabilitation and Reconstruction Strategies would improve traffic operations slightly over no build conditions.
- The Reconstruction Strategy in general would improve traffic operations more than the Rehabilitation Strategy, in comparison to the No Build.
- The Boulevard Strategy would result in the highest increase in non-expressway delay, the highest number of intersections approaching capacity, as well as a drop in the overall average speed on the local road network.
- The Tunnel/Depressed Highway Strategy would only improve the number of expressway lane miles over capacity in comparison to the No Build, but the number of lane miles over capacity would still be higher than any of the Build Strategies. It would also have the second greatest impact on non-expressway vehicle delay and on the number of intersections with delays greater than 35 seconds per vehicle.

Overall, the modeling for each strategy generally shows little change in overall travel on a region wide basis. Nearly all of the notable changes (congestion, speed, and delays) are shown to occur in the City Of Syracuse, and in particular in the Center City area.

3.5.1.2 Safety

The safety analysis indicates that the expressways in the priority area have a relatively high rate of accident occurrences when compared to statewide averages. For example, the accident rate on the northbound Viaduct section is two to three times the statewide average. I-81 through the I-690 interchange has sections where the accident rates reach five times the statewide average and proceeding north on I-81 towards Hiawatha Boulevard, the rate is generally two times the statewide average. There are five Priority Investigation Locations (PIL)

that encompass the viaduct priority area, with 10 PIL locations throughout the corridor. PIL's are locations where accidents occur on a regular basis and represent safety concerns. Each of the PIl locations are listed in the TM#1[19] report. Each of the strategies addresses the safety areas of concern to varying degrees. As each of the strategies are still at a conceptual stage and would be better defined as the project(s) progress to scoping and final design stages, the following summarizes the safety enhancements from a broad perspective for comparison purposes only. No detailed safety investigation has been performed to identify and validate these accident countermeasures.

Rehabilitation Strategy: Enhancing safety is the impetus for most of the improvements recommended in the Rehabilitation Strategy within the viaduct priority area and outer segments. This strategy is the only strategy on which a detailed review of accident patterns, contributing factors and countermeasures was performed. As a result of this assessment, basic safety countermeasures related to pavement and geometry are recommended:

- Add shoulder edge rumble strips;
- Add skid resistant pavement, reflectorized pavement markings, and/or audible delineators on elevated areas and on horizontal or vertical curves;
- Improve super-elevation where possible;
- Improve warning signs approaching horizontal curves; and
- Consider Fixed Automated Spray Technology (FAST) for de-icing at various elevated bridges.

In addition, there are various safety recommendations related to improving operations and addressing capacity areas of concern within the viaduct priority area. For example:

- Improving ramp acceleration/deceleration lengths would improve merging and diverging on the expressway: Bear Street; Court Street; State Street; Pearl Street; I-81 northbound ramp to I-690 westbound; I-690 eastbound ramp to I-81 southbound; and, at Harrison/Adams ramps.
- Widening the I-81 Viaduct and I-81/I-690 interchange bridges to provide shoulders would allow for vehicles to recover and avoid rear-end collisions, recover when slippery in inclement weather conditions, improve emergency vehicle access through this area and reduce backups during traffic incidents.
- Closure of the Genant Street I-81 southbound on ramp along with the elimination of I-81 Franklin Street exit would reduce interruptions of traffic and decrease decision points in this congested area.
- Minor capacity improvements such as widening the I-81 southbound off ramp at Harrison/Adams and other improvements along Almond Street would improve operations, relieving congestion and backups onto the expressway system.

[19] *Technical Memo #1: Physical Conditions Analysis; January 2011,* Section 2.3.1.9 Safety Consideration, Accident History and Analysis, page 2-40
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf
.

- All bridges are slated for some level of rehabilitation or replacement that would keep the structures in operable and safe condition for the motoring public.

Under the Rehabilitation Strategy only some of the safety concerns could be addressed, as mitigating some of the accident patterns would require a higher level of geometric improvements or reconstruction. The improvements noted under this strategy are focused in the highest priority area.

Reconstruction/ Boulevard/ Tunnel/ Depressed Highway Strategies: For the viaduct priority area, the Reconstruction, Boulevard, Tunnel and Depressed Highway Strategies would completely rebuild the bridges and pavement and introduce capacity improvements such that traffic operations would be at acceptable levels with further strategy refinement. Reconstruction would allow for most of the geometric deficiencies to be addressed; it would provide appropriate acceleration/ deceleration at all ramp locations; it would address superelevation and curvature concerns; it would eliminate left hand entrance ramps; and it would provide improved operations. Each strategy would vary slightly on all of these elements; however, the safety improvements for each of the build strategies are notable.

The build strategies have the ability to address substantial deficiencies that would have a positive effect on safety conditions. Continued discussion on the geometric deficiencies and potential safety effects can be found in section 3.5.3.1.

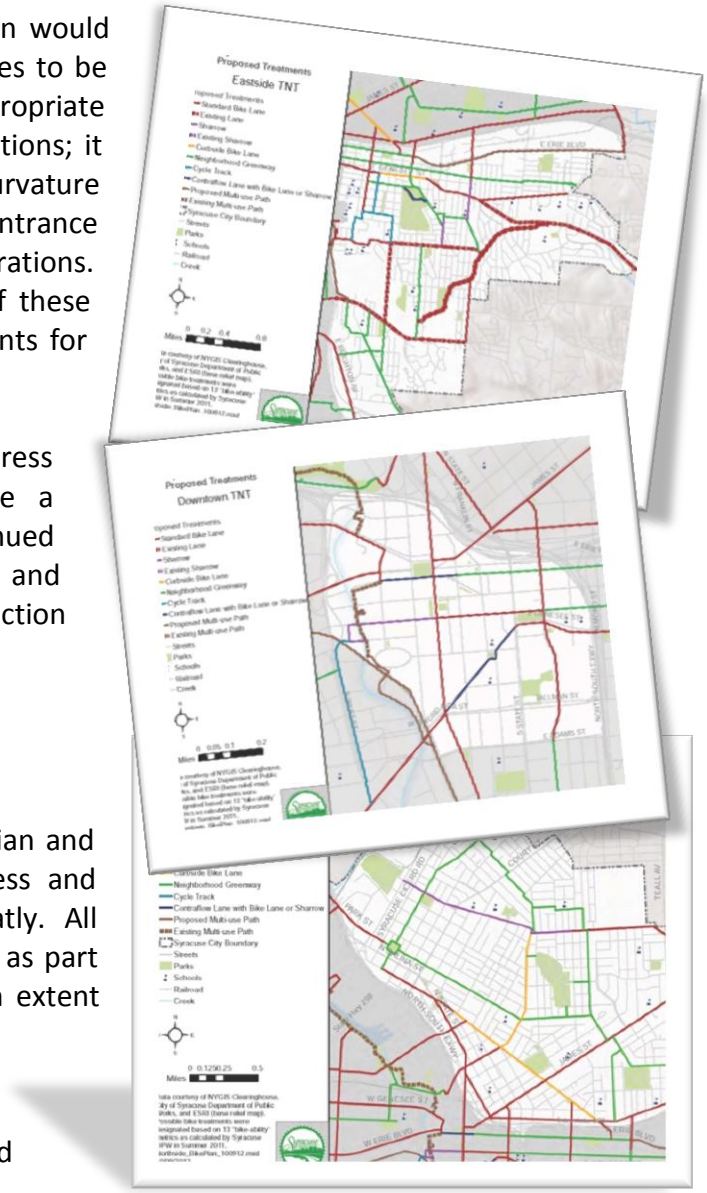


Figure 20 - Syracuse Bicycle Plan Excerpts

3.5.2. Multi Modal

3.5.2.1 Pedestrians and Bicycles

Each of the strategies can include pedestrian and bicycle facilities; however the effectiveness and safety of such facilities would vary greatly. All pedestrian facilities constructed or altered as part of the projects(s) would, to the maximum extent feasible, be accessible and useable by people with disabilities. Considering notable pedestrian accidents[20] at heavily-used intersections in the viaduct and

[20] *Technical Memo #1: Physical Conditions Analysis; January 2011,* Section 2.3.2.1 Pedestrians, Table 2.5 – Top Pedestrian/Vehicle Collison Locations, page 2-59
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf

downtown area, it is anticipated that careful consideration would be made in reconnecting the pedestrian facilities in and around the I-81 and I-690 corridors.

Similarly, existing and anticipated bicycle traffic would be considered to assure potential conflicts with motorized traffic would be addressed in order to minimize the possible detrimental effects on all users who share the facility. It is anticipated that both pedestrian and bicycle facilities and amenities would be better defined as the project progresses into scoping and final design stages.

The University Hill Bike Network Project completed by the SMTC and the Syracuse Bike Plan recently completed by City of Syracuse address bike needs in the University Hill and the City of Syracuse, Figure 20. The City determined a need to create a plan for a cohesive and connected bicycle network, a blueprint for future growth. This blueprint would ensure that development along targeted corridors would accommodate bicycle users, and that city resources would be deployed most effectively in expanding and maintaining bike infrastructure. The blueprint identifies short, mid and long term recommendations for major corridors in each of the areas of the City including: Downtown, Westside, Southside, Valley, Eastside, Eastwood, Northside and Lakefront neighborhoods.

Various proposed bicycle network treatments are identified such as the continuation of current systems, new bike lanes, sharrows, neighborhood greenways, extension of the Onondaga Creekwalk and adaptive reuse of the CSX rail line. In addition, various routes in each area are identified for traffic calming and road diets (reducing travel lanes to accommodate multimodal facilities).

The preferred strategy for the I-81 corridor will incorporate the recommended network treatments as appropriate and feasible. As specific plans for pedestrians and bicycle facilities are premature at this time, a global assessment comparing the major strategies was completed. The following can be summarized for each of the strategies:

Rehabilitation and Reconstruction Strategies: For both of these strategies, no major impact to connectivity for bicyclists and pedestrians is anticipated. The Reconstruction Strategy does offer the opportunity to improve pedestrian and bicycle facilities along the Almond Street corridor. The highway system would be improved, existing local roads would be minimally affected, and hence no notable effect would result. These strategies would allow for integration of road diets (reduction in the number of lanes on a roadway cross-section to improve safety or provide space for other users) along major routes such as South Salina Street, Erie Blvd West, James Street, East/West Onondaga Street, and Genesee Street, to name a few. The neighborhood greenways identified for Water Street and Fayette Street may continue to be desirable and feasible treatments for future consideration with these strategies.

Boulevard Strategy: The Boulevard Strategy may have the potential to spur infill development in center city neighborhoods which would improve sense of connectivity and

could include increased opportunities for bicycle and pedestrian circulation. The new boulevard would provide another north-south corridor to connect the east west bicycle network streets. The Boulevard Strategy, however, would affect plans for neighborhood greenways along Water Street and Fayette Street and therefore would need to consider integrating the proposed bike lanes along Salina Street, James Street, Townsend and Genesee Street, as traffic volumes are anticipated to increase as a result of the Boulevard Strategy.

Tunnel Strategy: The Tunnel may have the potential to spur infill development in center city neighborhoods which would improve sense of connectivity and could include increased opportunities for bicycle and pedestrian circulation. However obstructions and severing various roads under this strategy at Erie, Water, Fayette, Washington, and Genesee Street would not allow for the greenways and bike paths envisioned within the Bike Plan. Severing these various streets would result in increased traffic volumes along Genesee Street and possibly Townsend making it more challenging to incorporate the desired treatments.

Depressed Highway Strategy: The Depressed Highway would create gaps in the street grid system between Downtown and the Eastside. This would force the east-west connections for pedestrian and bicyclists at major streets only. The additional width of the Depressed Highway and adjacent boulevard/service roads would increase the crossing distance and potential for conflicts with vehicular traffic for both pedestrians and bicyclists.

3.5.2.2 Transit

A parallel study to the I-81 Challenge is underway to address the Syracuse Transit System needs. As previously identified, the transit study[21] would establish the basis for CENTRO and SMTC to pursue FTA New Starts, Small Starts, or Very Small Starts funding. The study identifies low, medium and high investment enhancement alternatives. While evaluating strategies for the I-81 viaduct priority area, ways to integrate transit and other modes to enhance each of these options are being explored. After the alternative is determined, the appropriate transit components related specifically to the I-81 corridor could be integrated. This integration would most likely evolve in the future scoping and final engineering phases of the project. Of importance at this time is to ensure strategies do not preclude future transit system improvements such as setting aside potential right of way for future dedicated bus lanes or other recommendations that may physically alter the streets.

3.5.3. Infrastructure

3.5.3.1 Special Geometric Design Elements

There are approximately 200 non-standard and non-conforming features in the 12 mile I-81 Corridor study area. These features are detailed in TM #1[22] and have been identified as contributing factors to the observed congestion, operations and safety concerns. The highest

[21] Syracuse Transit System Analysis, Phase I – Executive Summary, May 2013
http://thei81challenge.org/cm/ResourceFiles/resources/130515 STSA Executive Summary Phase 1.pdf

[22] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf ,

concentration of these features is in the viaduct priority area including the I-81/I-690 interchange and viaduct area where 102 design deficiencies are present, as shown in Table 5. It should be noted that not all these features should be viewed with the same weight such as comparing horizontal curve radii to median width, where the mainline curve radii has greater importance. These features are not weighted by importance, but simply identifies how many would most likely be fixed or remediated under the respective Strategy.

Table 5 -
Summary Existing Non-Standard & Non-Conforming Features

	Non-Standard Features							Non-Conforming		
	Shoulder Width	Grade	Horizontal Curve	Sight Distance	Super - Elevation	Lane Width	Median Width	Ramp Spacing	Accel/Decel Length	Total
Area A - South End										
I-481 South Interchange	0	4	2	7	7	0	0	0	0	20
Exit 17	0	0	0	5	0	0	0	0	0	5
Cemetery to Viaduct	2	0	2	0	0	0	1	0	0	5
Area A - North End										
Rt. 370 Interchange	0	0	1	2	3	0	0	1	0	7
7th North and Thruway	0	0	2	5	7	0	0	2	2	18
Mattydale Exit	0	0	2	4	2	0	0	0	0	8
Airport Exit	0	0	0	2	0	0	0	1	1	4
Taft Road	0	0	0	2	1	0	0	0	1	4
Church St	0	0	2	2	2	0	0	0	0	6
I-481 North Intechange	0	1	10	6	0	0	0	0	3	20
Interchange/Viaduct										
Viaduct	2	0	0	8	0	0	2	0	1	13
I-81 / I-690 Interchange	5	5	6	16	2	2	2	10	4	52
North Approach	0	0	2	6	4	0	0	1	3	16
I-690 / West Street	0	0	4	6	2	0	2	2	0	16
I-690 East Side	0	0	0	2	0	0	0	0	3	5
TOTAL	9	10	33	73	30	2	7	17	18	**199**

Table 6 shows the projected number of geometric deficiencies that would remain for each of the strategies.

No Build Strategy: No geometric features would be improved.

Rehabilitation Strategy: Under the Rehabilitation Strategy, Area A –Outer Segments is divided into the south and north segments and combined covers approximately 8.5 miles of the I-81 corridor and includes 97 (49%) of the geometric deficiencies. The Rehabilitation Strategy is anticipated to address safety and bridge conditions; however it would not address the geometric deficiencies, with the exception of three (shoulder and median width deficiencies in the south segment).

The Rehabilitation Strategy was explored for the viaduct priority area (3.5 mile) segment of I-81 from the south end of viaduct to Hiawatha Boulevard and I-690 from West Street to Teall Avenue. In this area, only 10 (10%) of the 102 geometric deficiencies would be addressed. If the interchange and viaduct bridges are replaced (as recommended), it offers opportunities to address an additional 10 to 15 deficiencies for a total of 25 (25%) of the 102. This means that limited geometric improvements can be achieved. It is important to note that safety improvements are typically correlated to geometric and capacity deficiencies, so therefore only limited safety improvements would be realized.

Reconstruction/Boulevard/Tunnel/Depressed Highway Strategies: Removal and replacement of the 3.5 mile segment of I-81 corridor from Hiawatha to the south end of the viaduct whether Reconstruction, Boulevard, Tunnel or Depressed Highway would offer an excellent opportunity to remediate most geometric deficiencies. Based on review of each strategy, the following non-standard/non-conforming features would remain. The build strategies are projected to address approximately up to 85% to 90% of the geometric deficiencies within the viaduct priority area.

Table 6 – Viaduct Priority Area – Project Geometric Deficiencies Remaining

	Existing/ No-Build Total	Rehabilitation	Rconstruction	Boulevard	Tunnel/ Depressed Highway
Viaduct	13	11	0	0	0
I-81 / I-690 Interchange	52	44	10	5	5
North Approach	16	16	2	2	2
I-690 / West Street	16	16	3	3	3
I-690 East Side	5	5	0	0	0
TOTAL	**102**	92	15	10	10
			85%	90%	90%

3.5.3.2 Structures

Overall there are 76 bridges in the 12 mile corridor area with 47 along I-81 and 29 along I-690. For each of these bridges the most recently available inspection report was reviewed and the NYSDOT Winbolts database was consulted. Regarding the I-81 bridges, 31 of the 47 are original construction from the Interstate era from the 1950's – 1970's, 34 are functionally obsolete and two are structurally deficient. The I-690 bridges are similar with all 29 being

from the 1960's. Additional screening of the I-481 brides is being conducted for the next stage of the study.

Rehabilitation Strategy: All 76 bridges were reviewed for rehabilitation using the NYSDOT's Bridge Needs Assessment Model (BNAM) program. This program uses a series of deterioration curves for the various bridge elements such that changes in the bridges overall condition rating can be identified. Also, an improvement program can be developed to achieve an overall condition rating target or element specific target. All bridges were reviewed for rehabilitation and the results are shown on the tables that follow which indicate the work that would be performed under rehabilitation and the resultant improvements to the condition rating. Review of bridge conditions, in particular the increased frequency of major deck problems, resulted in the recommendation to replace all bridges built prior to 1970 most of which are functionally obsolete and would be approximately 100 years old by the 2050 (ETC+30) bridge design year.

For the other strategies in the viaduct priority area (Reconstruction, Boulevard, Tunnel and Depressed Highway), it is anticipated that I-81 would be reconstructed from the south end of the viaduct to Hiawatha Boulevard such that these bridges would be reconstructed with a different configuration. I-81 bridges outside the viaduct priority area (i.e., 8.5 mile outer segments) would be either replaced or rehabilitated consistent with the Rehabilitation Strategy to achieve a bridge rating greater than 5.0.

Tables 7 through 9 show the proposed work by BIN broken down into five distinct areas and the work to be performed under the Rehabilitation Strategy:

- ***Area A: Outer Rehabilitation Limits*** – Replace 13 of 26 bridges and rehabilitate the remaining 13 bridges.
- ***Area B: Viaduct and I-81/I-690 Interchange*** – Replace 31 of 32 bridges.
- ***Area C: I-81 North Approach*** – Replace one bridge, rehabilitate two bridges of the total five bridges.
- ***Area D: I-690/West Street*** – All seven bridges are being rehabilitated under PIN 3506.32 (on going contract); long term plans for these bridges will need to be further evaluated.
- ***Area E: I-690 East side*** – Replace all six bridges.

Table 7 -
AREA 'A' BRIDGE TREATMENTS: REHAB, RECON, BLVD, TUNNEL AND DEPRESSED HIGHWAY STRATEGIES
(I-481S TO THE VIADUCT AND HIAWATHA BLVD TO I-481N)

DESCRIPTRION OF BRIDGE WORK						[5]Existing Condition Ratings	Repair to 6 on all Elements Rated 4 or Less	NOTES/ RECOMMENDATIONS
SECTION	BIN	Year Built	Feature Carried	Feature Crossed	Work Performed Under Rehabilitation			
South	1031501	1965	I-81	Route 173	Bearings replaced and total deck replacement	5.203	6.078	Replace
South	1031502	1965	I-81	Route 173	None[4]	6.519	6.519	Rehabilitate
South	1069090	1980	I-481 WB to I-81 SB	I-81	Primary Member Repairs, Bearings Replaced, Pedestals Replaced, Total Deck Replacement and Steel Painted	4.764	5.986	Rehabilitate
South	1069100	1980	I-81 SB to I-481 EB	I-81	Bearings Replaced, Wearing Surface Replaced, Fasica Repairs, Abutment Backwalls Repaired and Cap Beam Repairs	4.792	5.917	Rehabilitate
South	1031510	1965	East Glen Ave	I-81	Bearings Replaced, Pedestal Replacement and Total Deck Replacement	4.931	5.778	Replace
South	1031529	1965	I-81	E Calthrop Ave	Bearings Replaced, Total Deck Replacement and Paint Bottom Flanges in Span 2	4.922	5.984	Replace[1]
South	1031539	1965	I-81	E Brighton Ave	Bearings Replaced, Primary Member Repair, Total Deck Replacement and Wingwalls Concrete Repair	4.766	6.078	Replace
South	1031549	1965	I-81	East Colvin St	Bearings Replaced and Total Deck Replacement	5.203	6.234	Replace
South	1031559	1965	I-81	East Castle St	Primary Member Repair, Bearings Replaced, Abutment Pedestals Replaced, Total Deck Replacement and Steel Painted	4.797	5.906	Replace[1]
North	1031639	1959	I-81 to Route 370	CSX Trans/Amtrak	Primary Member Repairs, Bearings Replaced, Total Deck Replacement and Steel Painted	4.857	6.000	Replace
North	107134A	1987	Ramp V (Hiawatha)	Ramp B	Bearings Replaced and Pedestal Replacement	5.620	5.958	Rehabilitate
North	1071341	1984	I-81	I-81 to SH 370	Begin Abutment Pedestals Replaced	5.211	5.296	Rehabilitate
North	1071342	1984	I-81	From I-81 to SH 370	Pier Joint Replacement, Wearing Surface Repairs and Begin Abutment Pedestals Replaced	5.352	5.662	Rehabilitate
North	1031640	1986	Seventh North	I-81	Pedestals Replaced, Primary Member Repairs, Bearings Replaced, Pier Cap Beam Repairs and Total Deck Replacement	4.542	6.097	Rehabilitate
North	1031659	1986	I-81	I-90	Pedestals Replaced, Bearings Replaced, Abutment Stem Repairs, clean and paint steel and Total Deck Replacement	4.282	5.873	Rehabilitate[2]
North	1031660	1986	Ramp to I-81NB & I-90	I-81	Pier Bearings Replaced, Pier Pedestals Replaced, Pier Columns Repaired and Total Deck Replacement	5.437	6.310	Rehabilitate[3]
North	1031671	1959	I-81	Route 11	Steel Girders Painted - Pier Columns and Cap Beams have been repaired since last inspection	5.079	5.333	Replace
North	1031672	1989	I-81	Route 11	Joints Replaced, Abutment Ped. Replaced and Begin Abut. Conrete Repairs - Pier Columns, Pedestals and Cap Beams have been repaired since last inspection	4.915	5.592	Rehabilitate
North	1008530	1971	I-81SB Off Ramp	Route 11	Repair Section Loss to Girders, Abutment and Pier Concrete Repairs, Bearings Replaced, Pedestals Replaced and Total Deck Replacement	4.297	6.219	Rehabilitate
North	1031681	1963	Airport Rd (WB)	I-81	Bearings Replaced, Pedestal Replacement, Total Deck Replacement and Cap Beams Repaired	4.861	5.944	Replace
North	1031682	1963	Airport Rd (EB)	I-81	Pier Cap Beams Repaired, Pier Columns Repaired, Pier Pedestals Replaced, Bearings Replaced and Total Deck Replacement	4.750	5.944	Replace
North	1031690	1959	Taft Rd	I-81	Substructure Repairs, Pedestals Replaced, Bearings Replaced, Primary Member Repairs, Steel Painted, and Total Deck Replacement	4.297	6.109	Replace
North	1031701	1959	I-81	CR 20 - Church Rd	Bearings Replaced, Total Deck Replacement and Span 2 Left Girder Painted	4.953	5.859	Replace
North	1031702	1959	I-81	CR 20 - Church Rd	Bearings Replaced, Pedestals Replaced and Total Deck Replacement	4.625	5.844	Replace
North	1031711	1986	Route 481	I-81	Bearings Replaced, Abutment Pedestals Replaced, Total Deck Replacement and Begin Wingwall Repair	5.250	5.986	Rehabilitate
North	1031712	1986	Route 481	I-81	Bearings Replaced, Abutment Pedestals Replaced and Total Deck Replacement	5.319	6.056	Rehabilitate

[1] Scheduled for full deck replacement in 2013 as part of the Accelerated Bridge Program
[2] Rehabilitate under 3501.64, 2014 deck overlay and element specific repairs
[3] Polymer overlay, element specific repairs and pedestal repairs 2010, 2012
[4] Major rehabilitation in 1980. Rehabilitation work to be determined.
[5] Condition ratings based on 2010 and 2011 inspection reports.

Table 8 - AREA 'B' BRIDGE TREATMENTS: REHABILITATION STRATEGY
VIADUCT AND I-81/I-690 INTERCHANGE
DESCRIPTION OF BRIDGE WORK

BIN	Year Built	Feature Carried	Feature Crossed	Work Performed Under Rehabilitation	[1] Existing Condition Ratings	Repair to 6 on all Elements Rated 4 or Less	NOTES/ RECOMMENDATIONS
1008489	1958	I-81	North Salina St	Bearings Replaced, Total Deck Replacement and Steel Painting	5.176	5.971	Replace
1031569	1966	I-81	East Adams St	Primary & Secondary Member Repairs & Paint, Bearing Replacement, Total Deck Replacement and Pier Column Conrete Repairs	4.417	6.139	Replace
103156A	1966	I-81	Jackson St	Primary Member Repair, Bearings Replaced and Total Deck Replacement	4.759	6.278	Replace
103156B	1966	I-81	Jackson St	Primary Member Repair, Bearings Replaced and Total Deck Replacement	4.537	6.315	Replace
103156C	1966	I-81NB On Ramp	Relief (From Harrison)	Primary Member Repair, Bearings Replaced and Total Deck Replacement	4.759	5.926	Replace
103156D	1966	I-81SB Off Ramp	Route 92 (Genesee to Harrison)	Bearings Replaced and Total Deck Replacement	4.944	6.037	Replace
1064590	1968	I-81	East Fayette St	Pedestals Replaced, Bearings Replaced, Total Deck Replacement and Steel Painted	5.083	6.153	Replace
1050851	1968	I-690	North Franklin St	Bearings Replaced, Begin Abutment Backwall Repair and Total Deck Replacement	5.547	6.313	Replace
1050852	1968	I-690	North Franklin St	Bearings Replaced, Begin Abutment Pedestals Replaced, Steel Painted and Total Deck Replacement	5.234	6.188	Replace
1054020	1968	I-690	North Clinton St	Bearings Replaced, Total Deck Replacement, Wingwall Repairs and Steel Painted	4.938	6.109	Replace
1050910	1966	I-690	North Salina St	Bearings Replaced, Pedestals Replaced and Total Deck Replacement	4.921	6.032	Replace
1050921	1968	I-690 WB To I-81 NB	Willow St	Bearings Replaced, Pedestals Replaced, Bottom Flanges Painted and Total Deck Replacement	5.391	6.281	Replace
1050922	1968	I-690	Willow St	Bearings Replaced, Pedestals Replaced, Bottom Flanges Painted and Total Deck Replacement	5.313	6.281	Replace
1050950	1968	I-690	North State St	Bearings Replaced, Pedestals Replacement, Total Deck Replacement and Steel Painted	4.833	5.694	Replace
105095A	1968	I-690	North State St	Bottom Flanges Painted	5.708	5.708	Replace
105100A	1968	I-690	North State St - Route 11	Bearings Replaced, Pier Pedestal Replacement and Total Deck Replacement	5.204	6.463	Replace
1051000	1968	I-690	I-81	Bearings Replaced, Begin Abutment Pedestals Replaced, Steel Painted and Total Deck Replacement	4.761	5.859	Replace
1050779	1968	I-690	I-81	Bearings Replaced, Pedestals Replaced, Total Deck Replacement, End Abutment Stem Repaired and Wingwalls Repaired	4.688	6.281	Replace
1095510	1968	I-690	I-81	Bearings Replaced, End Abutment Pedestals Replaced and Total Deck Replacement	5.097	5.958	Replace
1051030	1968	I-690	N Townsend St	Bearings Replaced, Pedestals Replaced and Total Deck Replacement	5.328	6.281	Replace
1051050	1968	I-690	North McBride St	Bearings Replaced, Pedestals Replaced, Total Deck Replacement and End Abutment Backwall Repair	4.813	6.281	Replace
1051061	1968	I-690	Catherine St	Bearings Replaced, Begin Abutment Pedestals Replaced and Total Deck Replacement	5.444	6.175	Replace
1051062	1968	I-690	Catherine St	Bearings Replaced, End Abutment Pedestals Replaced and Total Deck Replacement	5.250	6.188	Replace
1051063	1968	Ramp O to I-690 EB	Catherine St (Almond)	Bearing Replaced and Total Deck Replacement	5.190	6.016	Replace
1053840	1968	I-81	Erie Blvd	Pedestals Replaced, Primary Member Repairs, Steel Painted, Bearings Replaced and Total Deck Replacement	4.333	5.917	Replace
105384A	1968	I-81	Erie Blvd	Primary Member Repairs, Bearings Replaced, Abutment Pedestals Replaced, Steel Painted and Total Deck Replacement	4.847	6.097	Replace
1053860	1968	I-81	N Townsend St	Bearings Replaced, Cap Beam Painted and Total Deck Replacement	4.875	6.139	Replace
1053870	1968	I-81	N Townsend St	Bearings Replaced, Pedestals Replaced and Total Deck Replacement	5.078	6.328	Replace
1053881	1968	I-81	North State St	Bearings Replaced, Begin Abutment Pedestals Replaced and Total Deck Replacement	5.181	5.986	Replace
1053882	1968	I-81	North State St	Primary Member Repairs, Bearings Replaced, Begin Abutment Pedestals Replaced, Total Deck Replacement and Steel Painted	5.111	6.194	Replace
105388A	1968	I-81 Ramp to I-690 EB	James St	Bearings Replaced, Pedestal Replacement and Total Deck Replacement	4.852	5.926	Replace
1031570	2010	Butternut St	I-81	None	7.000	7.000	New

[1] Condition ratings based on 2010 and 2011 inspection reports.

Table 9 – Area C, D, E – Bridge Treatments

AREA 'C' BRIDGE TREATMENTS: REHABILITATION STRATEGY I-81 NORTHERN APPROACH DESCRIPTION OF BRIDGE WORK					[1] Existing Condition Ratings	Repair to 6 on all Elements Rated 4 or Less	NOTES/ RECOMMENDATIONS
BIN	Year Built	Feature Carried	Feature Crossed	Work Performed Under Rehabilitation			
1031580	2009	Spencer St	I-81	None	6.917	6.917	New
1031590	2009	Court St	I-81	None	6.809	6.809	New
1031600	1959	Route 298 (Bear St)	I-81	Fascia Repairs and Bottom Flange Painting in Span 1	5.265	5.324	Replace
1031610	1987	Hiawatha Blvd	I-81	None	5.597	5.597	Rehabilitate
1031620	1987	From I-81 to Hiawatha Blvd	I-81	Bearings Replaced, Total Deck Replacement and End Abutment Backwall Repairs	5.549	6.338	Rehabilitate

[1] Condition ratings based on 2010 and 2011 inspection reports.

AREA 'D' BRIDGE TREATMENTS REHABILITATION STRATEGY I-690 /WEST STREET DESCRIPTION OF BRIDGE WORK					[1] Existing Condition Ratings	Repair to 6 on all Elements Rated 4 or Less	NOTES/ RECOMMENDATIONS
BIN	Year Built	Feature Carried	Feature Crossed	Work Performed Under Rehabilitation			
1050780	1968	Ramp BB	I-690	Pedestals Replaced, Bearings Replaced, Total Deck Replacement, Steel Painted, Pier Columns and Cap Beams Repaired	4.063	5.906	Rehab under PIN 350632 [2]
1050790	1968	Ramp DD	I-690	Pedestal Replacements, Primary Member Repairs, Bearings Replaced, Total Deck Replacement, Paint & Substructure Concrete Repairs	3.797	6.141	Rehab under PIN 350632 [2]
1050800	1968	Ramp FF to West St	Onondaga Creek	All Pedestals Replaced, Primary Member Repairs, All Bearings Replaced, Total Deck Replacement, Paint & Substructure Concrete Repair	3.944	6.056	Rehab under PIN 350632 [2]
105080A	1968	I-690WB to West St SB	Onondaga Creek	Pedestals Replaced, Bearings Replaced, Joints Replaced, Steel Painted, Total Deck Replacement and Substructure Concrete Repairs	4.063	6.219	Rehab under PIN 350632 [2]
1050821	1968	I-690	Onondaga Creek	Pedestals Replaced, Bearings Replaced, Total Deck Replacement and Substructure Repairs	4.453	6.172	Rehab under PIN 350632 [2]
1050822	1968	I-690	Onondaga Creek	Pedestals Replaced, Bearings Replaced, Total Deck Replacement and Substructure Repairs	4.000	5.859	Rehab under PIN 350632 [2]
1050840	1968	Ramp CC	Onondaga Creek	Pedestals Replaced, Bearings Replaced, Total Deck Replacement and Substructure Repair	4.125	5.781	Rehab under PIN 350632 [2]

[1] Condition ratings based on 2010 and 2011 inspection reports.

[2] The I-690/West Street interchange area bridges are currently nearing completion of a major rehabilitation. Under the Rehabilitation Strategy these will need to be reviewed for either a longer term rehabilitation program or replacement of all seven bridges from 1968.

AREA 'E' BRIDGE TREATMENTS: REHABILITATION STRATEGY I-690 EAST OF I-81 DESCRIPTION OF BRIDGE WORK					[2] Existing Condition Ratings	Repair to 6 on all Elements Rated 4 or Less	NOTES/ RECOMMENDATIONS
BIN	Year Built	Feature Carried	Feature Crossed	Work Performed Under Rehabilitation			
1051091	1968	I-690	Crouse Ave	Bearings Replaced, Total Deck Replacement and Pedestals Replaced	4.719	6.047	Replace[1]
1051092	1968	I-690	Crouse Ave	Primary Member Repair, Bearings Replaced, Total Deck Replacement and Pedestals Replaced	4.453	6.125	Replace[1]
1051119	1968	I-690	Lodi St	Bearings Replaced, Pedestals Replaced, Total Deck Replacement and End Abutment Stem Repaired	4.792	6.014	Replace
1051139	1968	I-690	Beech St	Pedestals Replaced, Primary Member Repairs, Bearings Replaced, Total Deck Replacement, Substructure Repairs and Steel Painted	4.094	6.016	Replace
105113A	1968	I-690 EB Ramp	Relief (to I-81/Harrison)	Bearings Replaced, End Abutment Pedestals Replaced and Total Deck Replacement	5.281	6.141	Replace
1051149	1968	I-690	Teall Ave	Bearings Replaced, Pedestals Replaced and Total Deck Replacement	5.016	6.203	Replace

[1] Decks replaced in 2012

[2] Condition ratings based on 2010 and 2011 inspection reports.

Bridge conditions along the I-81 corridor and in particular the Interchange and Viaduct area are in poor to very poor condition. The bridges are experiencing an accelerated rate of

deterioration in particular major deck issues. Of the 76 bridges in the corridor, the 31 of the 32 bridges located in the Interchange and viaduct area are all circa 1965 and need to be replaced along with six other bridges on I-690.

Reconstruction Strategy: This strategy includes the construction of 63 new bridges in the priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate.

Boulevard Strategy: This strategy includes the construction of 53 new bridges in the priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate.

Tunnel Strategy: This strategy includes the construction of 53 new bridges in the priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate.

Depressed Highway Strategy: This strategy includes the construction of 60 new bridges in the priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate.

3.5.3.3 Drainage and Stormwater

The 12 mile segment of the I-81 Corridor has been reviewed from a stormwater management perspective. In general the existing facility was constructed prior to the Stormwater Pollutant Discharge Elimination System (SPDES) regulations and as such has limited to no stormwater management provisions. The overall drainage patterns have been reviewed and the following items are noted:

- I-81 from the south I-481 interchange to approximately Brighton Avenue is a single drainage area that discharges to the west (towards Onondaga Creek) via a 84" RCP pipe along Ostrander Avenue.
- I-81 from Brighton Avenue to Hiawatha Boulevard typically drains to the surface streets and into the City's combined sewer system.
- I-81 from Hiawatha Boulevard to a point south of 7th North Street typically drains to Ley Creek which discharges to Onondaga Lake near DestinyUSA.
- I-81 from south of 7th North Street to Taft Road typically sheet drains to Bear Trap Creek which discharges to Ley Creek and then to Onondaga Lake.
- I-81 from Taft Road to I-481 north interchange typically has an open drainage system which drains northerly and westerly to Mud Creek and then to the Clay Marsh.

All strategies would increase impervious area and would be subject to SPDES requirements. Green infrastructure can be incorporated in the project designs to address stormwater management.

Below is a comparison of the impervious areas for existing conditions and the respective Strategies. The outer segments of I-81 were excluded from this analysis as these areas would

be rehabilitated with little to no change in the impervious area. In reviewing the 3.5 mile segment of I-81 in the viaduct priority area, the existing highway covers approximately 56 acres of impervious area. The following notes the changes regarding the build strategies:

Reconstruction Strategy: 69 total acres of impervious surface for an increase of 23%.

Boulevard Strategy: 72.1 total acres of impervious surface in the priority area plus the I-481 interchange modifications and widening (5 acres) for a total increase of 29%.

Tunnel Strategy: 55.1 total acres of impervious surface for a decrease of one acre or a 2% reduction. With the I-81 expressway being buried under ground with this strategy, the impervious area is reduced. However, pumping stations may be needed to handle stormwater.

Depressed Highway Strategy: 62.4 total acres of impervious surface for a total increase of 11%.

Overall the existing drainage system and any new system allows for improvements to water quality and/or water quantity characteristics. The first consideration is the potential change in impervious area which generates the need for water quality and water quantity features. The first goal would be to reduce this area through the application of porous surfaces. The areas where surface detention could be applied are limited by the built environment. The opportunity exists with each strategy to include green infrastructure to treat stormwater.

3.5.3.4 Utilities

Each of the Strategies would have varying degrees of impacts on public and private utilities. It is anticipated that utility impacts would be better defined as information becomes available and the project(s) progresses into the next phases. However, with the various strategies for the viaduct priority area, preliminary review of the available utility information and their potential impacts was conducted. Utility information is still being collected along the viaduct/Almond Street corridor. Substantial utility disruption/conflicts are anticipated to be generated by the construction including sewer and water crossings; gas, telephone, cable and electric relocation; and potential impacts to major transmission facilities (to be determined). Of particular note is the University steam plant located at Taylor/McBride which provides steam heating and chilled water cooling for the University and most/all the hospitals on the Hill. This includes three crossings of steam lines, chilled water lines and a very high pressure compressed natural gas (CNG) line. It is expected that major disruption to these buried utilities would be experienced with excavation for the Tunnel and Depressed Highway Strategies, with a lesser degree from the other strategies.

3.6 CORRIDOR RECOMMENDATIONS

This corridor study identifies problems and issues, transportation needs and possible strategies to address the future of the 12-mile I-81 corridor in the Syracuse metropolitan area. This planning study takes into account the community context and the environment in

which I-81 exists. It is recommended that work in the viaduct area be advanced as the first priority. The overall project level program for the corridor includes:

- Priority project(s): I-81 viaduct replacement and I-81/I-690 interchange project along with associated I-81 north approach improvements to develop the Court Street interchange and modify ramps; I-690 east approach project to construct the interchange improvements; and I-690/West Street project to construct the interchange improvements.

- I-81 northern segment rehabilitation: develop multiple contracts within the next 5-10 years to keep this segment in the state of good repair.

- I-81 southern segment rehabilitation: rehabilitate the two mile segment of I-81 from the south end of the viaduct to the I-81/I-481 southern interchange within the next 10-15 years.

CHAPTER 4 – STRATEGY EVALUATION

As noted on the AASHTO Center for Environmental Excellence website[23], current and future transportation growth patterns and the way that we develop transportation systems are important factors in sustaining the world's limited economic, environmental, and social resources and capacity. Through the *I-81 Challenge* focus groups, community members and stakeholders developed an initial and important list of emerging community principles and community impact areas. The detailed summary of these activities is provided in Technical Memo #1[24] and in White papers and other public involvement documents on *The I-81 Challenge* website[25].

The initial emerging community principles and community impact areas evolved into the corridor goals and objectives as shown in Table 10. These goals and objectives served as criteria for strategy evaluation, as presented in the discussion below with an assessment matrix for each strategy. The goals are grouped to reflect the transportation assessment as well as the sustainability triple bottom line principles of economic competitiveness, social equity/quality of life, and environmental stewardship. Strategies were evaluated against these community-identified objectives.

In its 2011 Capital Program Update guidance, NYSDOT recognized that a sustainable approach to planning considers the relative and cumulative value of transportation assets as they benefit the public, economy and environment. In this way, the decision-making process looks broadly at the wider benefits of transportation improvements as they relate to sustainability[26]. Those benefits, which mirror the community-identified goals for the I-81 Challenge as described above, are defined as follows:

- *Economic competitiveness:* improve efficiencies in work/business travel and freight movement; improve tourism access and inter-modal connectivity; develop investments which complement or enhance the strategic investments proposed by Regional Economic Development Councils.

- *Social equity/community:* improve accessibility for transit, recreation, education, health care; support smart growth, complete streets and livability; increase safety; weigh climate-associated risk to transportation infrastructure.

- *Environmental stewardship:* increase energy efficiency and reduce greenhouse gas emissions; reduce resource consumption; limit impacts that encroach on the environmental footprint; improve air quality.

[23] http://environment.transportation.org/
[24] *Technical Memo #1: Physical Conditions Analysis; January 2011*
http://thei81challenge.org/cm/ResourceFiles/resources/Technical_Memorandum_s.pdf
[25] http://thei81challenge.org/Home/SubMenuContent/StudyReportsAndDocuments
[26] *2011 NYSDOT Capital Program Update Guidance*

Table 10 - MATRIX OF I-81 CORRIDOR GOALS AND RELATED OBJECTIVES

Category	Goals	Objectives
Transportation	**Enhance the Transportation Network**	▪ Eliminate structural deficiencies using treatment strategies which provide the lowest life cycle maintenance costs and restore bridge condition ratings, where applicable, to good condition for at least 30 years. ▪ Improve existing geometric design through the application of appropriate design standards and the reduction of non-standard elements and/or geometries. ▪ Identify alternative mode improvements in the vicinity of I-81.
	Enhance Region-wide Mobility	▪ Improve peak period mobility and reduce delay on the highway system (primary, secondary and city streets) by providing acceptable operating speeds, improving level of service. Preserve regional mobility by maintaining travel times. ▪ Improve access to key destinations (i.e.: the airport, hospitals, and downtown businesses). Improve connectivity of alternative modes of transportation (pedestrian, bicycle, transit).
	Improve Public Safety	▪ Reduce accident occurrences to at or below the statewide average for similar facilities. ▪ Improve the safety of alternative modes of transportation (pedestrian, bicycle, transit).
Economic Competitiveness	**Maintain or Improve Economic Opportunities**	▪ Maintain or improve economic opportunities by addressing multi modal access. ▪ Improve transportation system efficiency, reliability and reduce travel costs. ▪ Maintain or improve the overall economic environment and infrastructure.
	Exercise Fiscal Responsibility	▪ Minimize capital costs by ensuring that transportation system investments are cost-effective. ▪ Minimize long term operation and maintenance costs.
Social Equity/ Quality of Life	**Support Community Quality of Life**	▪ Encourage sustainable land use patterns within the city and county. ▪ Enhance local connectivity (such as linking University Hill with downtown). ▪ Encourage smart growth: sustainable regional land use patterns that minimize suburban sprawl which increases demand for infrastructure and services. ▪ Improve the visual built environment through context sensitive design that contributes to roadside/street ambiance, community character and public safety. ▪ Promote other planning and development visions and initiatives (county, city, and region).
	Share Burdens and Benefits	▪ Share the burden of impacts during construction and long term across stakeholders (e.g. suburbs, adjacent neighborhoods, low income communities, Onondaga Nation). ▪ Share the benefits across stakeholders (e.g. suburbs, adjacent neighborhoods, low income communities, Onondaga Nation).
Environmental Stewardship	**Preserve or Enhance Environmental Health**	▪ Support local, regional and state environmental initiatives. ▪ Maintain or improve air quality (overall emissions and odor). ▪ Minimize air quality and noise impacts on adjacent neighbors. ▪ Minimize impacts on designated community landmarks and historic resources. ▪ Minimize storm water impacts and improve water quality.

The following sections identify how the proposed strategies comply with each category of goal and their related objectives.

4.1 TRANSPORTATION

4.1.1. Goal 1 – Enhance the Transportation Network

Transportation Objective - Eliminate Structural Deficiencies using Treatment Strategies which provide the Lowest Life Cycle Maintenance Costs and Restore Bridge Condition Ratings, where applicable, to Good Condition for at least 30 years.

Overall there are 76 bridges in the primary study area, with 47 located along I-81, and 29 along I-690. For each of these bridges the most recently available inspection report was reviewed and the NYSDOT Winbolts database was consulted. Regarding the I-81 bridges, 31 of the 47 are original construction from the Interstate era (i.e., from the 1950's – 1970's), 34 are functionally obsolete, and two are structurally deficient. The I-690 bridges are similar with all 29 being from the 1960's.

No Build Strategy: The No Build strategy includes simply maintaining the current 12-mile system as-is through the year 2040. This would include cleaning, painting and standard maintenance efforts. Routine maintenance efforts include filling pavement cracks, patching holes in the bridge decks and maintaining the highway drainage system. The No Build strategy does not address current design deficiencies, deteriorating highway and bridge infrastructure conditions, existing and future traffic congestion levels, or public safety.

Rehabilitation Strategy: Thirty one of the 32 bridges in the viaduct/interchange area would be recommended for replacement (versus rehabilitation) because of their overall age, condition and functionality. Due to the substantial deterioration of the bridge conditions, almost all the bridges would need to be replaced; even so, capacity/congestion needs would not be addressed under a Rehabilitation Strategy. The Rehabilitation Strategy would not address the major capacity, safety and geometric needs retained by the outdated 1960's era design. The fiscal investment of this strategy would not be cost effective in the viaduct priority area.

BUILD STRATEGIES

Reconstruction Strategy: The reconstruction strategy would completely remove and replace the existing interchange and viaduct pavement and bridges in the viaduct priority area; a new viaduct would be built within the same vicinity of the current highway. This strategy would incur normal life cycle maintenance costs to upkeep the new infrastructure. In addition to the Build Strategy common elements, 63 bridges would be restored to good condition or better to meet this objective.

Boulevard Strategy: The Boulevard Strategy would include the construction of 53 new bridges in the viaduct priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate. This strategy would have lower (reduced road infrastructure) life cycle maintenance costs than other strategies. This strategy meets the objective

Tunnel Strategy: this strategy would include the construction of 53 new bridges in the viaduct priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate. This strategy addresses the deficiencies and restores the bridges but would have the highest life cycle maintenance costs of all strategies.

Depressed Highway Strategy: This strategy would include the construction of 60 new bridges in the viaduct priority area under the proposed layout. All new bridges would conform to current standards and aesthetic treatments would be applied where appropriate. This strategy addresses deficiencies and restores the bridges but has higher life cycle maintenance costs than other strategies (excluding the Tunnel).

Transportation Objective - Improve Existing Geometric Design through the Application of Appropriate Design Standards and the Reduction of Non-Standard Elements and/or Geometries.

There are approximately 200 non-standard and non-conforming features in the 12 mile I-81 Corridor study area. These features are detailed in TM #1 Physical Conditions Analysis and have been identified as contributing factors to the observed congestion, operations and safety concerns. The highest concentration of these features is in the viaduct priority area including the I-81/I-690 interchange and viaduct area where 102 design deficiencies are present. It is important to note that safety improvements are typically directly correlated to geometric and capacity deficiencies.

No Build Strategy: The No Build Strategy maintains the status quo through 2040; therefore, geometric features/deficiencies would not be improved under this strategy.

Rehabilitation Strategy*:* Within the viaduct priority area, only 10% of the 102 geometric deficiencies would be addressed. If the interchange and viaduct bridges are replaced, it offers additional opportunities to address an additional 10 to 15 deficiencies for a total of 25 (25%) of the 102.

BUILD STRATEGIES

All of the Build Strategies include elements that would eliminate current geometric deficiencies and non-standard features and they would also be designed to current standards (60mph design speed). Some of these elements would include new, fully-functioning interchanges as well as the consolidation and closure of ramps to eliminate existing safety hazards and geometric features that are not consistent with current design standards. Based on review of each strategy the Build Strategies are projected to address approximately 85 to 90% of the geometric deficiencies within the viaduct priority area. Each of the build strategies meet this objective.

Reconstruction Strategy: Reconstruction of the I-81 corridor in the viaduct priority area would offer an excellent opportunity to remediate most geometric deficiencies and would result in 85% of the geometric deficiencies in this area being addressed. Interchange layouts would be heavily influenced by the size of the existing transportation corridor right-of-way to minimize community impacts.

Boulevard Strategy: This strategy would reconstruct I-81 from the I-690 interchange north to Hiawatha Boulevard to meet current design standards (60 mph design speed). The Boulevard

would be designed in conformance with city street standards. The Boulevard Strategy is projected to address approximately 90% of the geometric deficiencies within the viaduct priority area.

Tunnel Strategy/Depressed Highway Strategy: Under each of these strategies, reconstruction of the viaduct priority area would offer an opportunity to remediate most geometric deficiencies. Both strategies are projected to address approximately 90% of the geometric deficiencies within the viaduct priority area. Both the tunnel and depressed highway would be designed in conformance with current highway design standards for such elements.

Transportation Objective - Identify Alternative Mode Improvements in the Vicinity of I-81

To date, each of the strategies has been presented at a concept level so that the feasibility of each can be determined; therefore, detailed recommendations have not been identified for alternative modes of transportation including transit and bicycle and pedestrian facilities. Each of the strategies would consider ways to integrate transit and other modes as a means of enhancing that particular strategy.

The on-going Syracuse Transit System Analysis will evaluate transit enhancements such as park-and-rides, express bus routes, bus lanes, a simplified route structure, and improved connectivity between major destinations and along specific corridors within the region. While the transit investment strategies identify transit corridors, the features associated with each transit strategy would be integrated, as appropriate, to all I-81 strategies, and would not impact the evaluation of I-81 alternatives.

Each of the Build Strategies would ultimately assure adequate pedestrian facilities or other accommodations would be provided within the project area, thus meet this objective. All pedestrian facilities constructed or altered as part of the projects(s) would, to the maximum extent feasible, be accessible and useable by people with disabilities. Considering notable pedestrian accidents at heavily-used intersections in the viaduct and downtown area, it is anticipated that careful consideration would be made in reconnecting the pedestrian facilities in and around the I-81 and I-690 corridors.

Similarly, existing and anticipated bicycle traffic would be considered to assure potential conflicts with motorized traffic would be addressed in order to minimize the possible detrimental effects on all users who share the facility. It is anticipated that both pedestrian and bicycle facilities and amenities would be better defined as the project progresses into the project development stages. The preferred strategy for the I-81 corridor would incorporate the recommended network treatments, as appropriate and practicable. As specific plans for pedestrians and bicycle facilities are premature at this time, a global assessment comparing the major strategies was completed. The following can be summarized for each of the strategies:

No Build Strategy: The No Build Strategy maintains the status quo through 2040. No improvements would be made to allow for alternative modes.

Rehabilitation Strategy: Minor highway improvements would be incorporated to enhance current facilities. Minimal multi-modal improvements would be incorporated. In locations where local intersection improvements are proposed, current crossing locations would be enhanced. Additional components that could be integrated include improved lighting, crossings, sidewalks bike lanes and transit features.

BUILD STRATEGIES

As stated above, each of the Build Strategies would ultimately assure opportunities to incorporate adequate bicycle and pedestrian facilities as well as enhanced safety within the project area. However, since the Build Strategies have only been developed to a conceptual level, the final location and design of bicycle and pedestrian improvements has not yet been determined. As such, the paragraphs below discuss the potential opportunities for pedestrian and bicycles that could be created under each Build Strategy.

Reconstruction Strategy: The Reconstruction Strategy would provide substantial opportunities to enhance existing pedestrian crossing locations and safety especially along the Almond Street corridor, and between Downtown and University Hill. These improvements could include intersection improvements, enhanced crossings, aesthetic viaduct design, and lighting. The Reconstruction Strategy would reflect the needs of the transit study.

Boulevard Strategy: The Boulevard is envisioned as a complete street containing an at-grade boulevard with opportunities for pedestrian, bicycle, and transit and parking facilities. The Boulevard would provide opportunities for another north-south at-grade corridor to facilitate connections across the east–west bicycle network streets. The Boulevard Strategy, however, would affect plans for neighborhood greenways along Water Street and Fayette Street; special consideration would also be needed regarding the integration of the proposed bike lanes along Salina Street, James Street, Townsend and Genesee Street as traffic volumes are anticipated to increase as a result of the Boulevard Strategy. Transit facilities proposed as part of the Syracuse Transit System Analysis along the Boulevard could be prominent.

Tunnel Strategy: Under the Tunnel Strategy, obstructions to east-west connectivity and severing various roads at Erie, Water, Fayette, Washington, and Genesee Street would not allow greenways and bike paths as envisioned within the City Bike Plan. Severing these various streets would result in increased traffic volumes along Genesee Street and possibly Townsend, making it more challenging to incorporate the desired multi-modal treatments. Transit facilities proposed as part of the Syracuse Transit System Analysis along the Boulevard could be integrated into this strategy.

Depressed Highway Strategy: Similar to the Tunnel Strategy, the Depressed Highway would create gaps in the street grid system between Downtown and the Eastside. This would force the east-west connections for pedestrian and bicyclists at major streets only. The additional

width of the Depressed Highway and adjacent boulevard/service roads would increase the crossing distance and potential for conflicts with vehicular traffic for both pedestrians and bicyclists.

4.1.2. Goal 2 – Enhance Region-Wide Mobility

Transportation Objective - Improve Peak Period Mobility and Reduce Delay on the Highway System (Primary, Secondary, and City Streets) by providing Acceptable Operating Speeds, Improving Level of Service

This section evaluates how each strategy may improve peak period mobility. It should be noted that only an initial run of SMTC's Regional Travel Demand model has been conducted to date with very rudimentary strategy characteristics. The model has not been updated to reflect the improvements identified in Chapter 3 - Traffic Assessment. Further model refinement under subsequent project phases would be completed. In general, the strategies show little change in overall travel throughout the SMTC region, with nearly all of the notable changes in the City of Syracuse, and in particular within the viaduct priority area. Again, these are preliminary model outputs and would need to be further assessed in subsequent phases of the project.

At this time, the following basic statements can be made:

***No Build Strategy*:** The No Build Strategy maintains the existing highway network through 2040 and would not meet this objective. Under the No Build Strategy, most of I-81 southbound would be approaching or over capacity conditions during the morning peak hour from Hiawatha Boulevard to Castle Street. I-81 northbound would also be approaching or over capacity from Castle Street to Bear Street. I-690 eastbound would be over capacity from West Street to I-81 in the morning peak hour. In the evening peak hour, I-690 westbound would be approaching or over capacity from Teall Avenue to West Street. The at-grade arterial system would generally continue to operate without capacity issues, except for certain sections of Almond Street, parts of East Adams and Van Buren Street.

Rehabilitation Strategy: The Rehabilitation Strategy maintains the existing highway network with minor safety and capacity improvements and would not meet the objective to improve mobility or reduce delay. This strategy would improve traffic operations slightly over No Build conditions. The capacity analysis for the viaduct priority area shows similar results to the No Build Strategy, since only minor safety and capacity improvements are included under this strategy. In particular, the widening of East Adams to provide a left turn lane on the approach to Sarah Logan Drive is included along with improvements to the I-81 southbound ramp to Harrison Street which feeds traffic to Almond Street.

BUILD STRATEGIES

Reconstruction Strategy: This strategy would improve traffic operations slightly over the No Build and Rehabilitation strategies and does meet this objective. For the Reconstruction

Strategy, an additional mainline expressway lane may be required on I-81 and I-690 to address expressway capacity issues at various locations.

Boulevard Strategy: The Boulevard Strategy would result in the highest increase in local street congestion and intersection delay. Hence, the elimination of the viaduct traffic would divert to the local street network more so than under existing viaduct conditions and would not meet this objective based on preliminary concepts. Further design engineering and traffic optimization improvements such as Intelligent Transportation Systems (ITS) may address this. The intent of this strategy would meet this objective.

Tunnel/Depressed Highway Strategy*:* These strategies would be very similar from a transportation operation perspective. The Depressed Highway would have the greater impact with the added street width that would require additional signal clearance intervals and signal operations. In both cases (Tunnel and Depressed Highway) the I-81 interchange at Harrison/Adams Street would be eliminated and as such traffic to Downtown and University Hill would redistribute itself to the at-grade arterial system serving these areas. Preliminary modeling indicates these strategies would have the highest number of expressway sections operating at over capacity conditions, causing potential increased travel times, lower speeds and congestion. These strategies would also potentially have the second highest level of congestion and delay at the local level and would not meet this objective.

Transportation Objective - Preserve Regional Mobility by Maintaining Travel Times

This section evaluates how each Strategy may preserve regional mobility. As noted above, only an initial run of SMTC's Regional Travel Demand model has been conducted to date with very rudimentary strategy characteristics. The model has not been updated to reflect the improvements identified in Chapter 3 - Traffic Assessment. Further refinement of the model will occur under subsequent phases.

No Build Strategy: The No Build Strategy maintains the current highway system through 2040; therefore current regional mobility is maintained under this strategy.

Rehabilitation Strategy: Similar to the No Build Strategy, current regional mobility would be maintained. Additionally, there would be a slight increase in vehicle miles travelled.

BUILD STRATEGIES

Reconstruction Strategy: The Reconstruction Strategy meets the objective and would result in slightly better regional mobility than the No Build and Rehabilitation Strategies. This strategy would also result in slightly increased speeds.

Boulevard Strategy: The Boulevard Strategy would result in improved regional mobility but the diverted traffic may affect other streets and highway segments, which may increase congestion at local intersections. The intent of this strategy would meet the objective.

Tunnel Strategy: Travel patterns to destinations in close proximity to the interchange would be altered resulting in circuitous travel patterns and increased delay. Regional mobility would be slightly improved. Notable benefits would result to the regional system efficiency, reliability, safety, and capacity. The intent of this strategy would meet this objective.

Depressed Highway Strategies: The objective is met in that regional mobility would be slightly improved over the No Build Strategy.

Transportation Objective - Improve Access to Key Destinations (i.e.: the Airport, Hospitals, and Downtown Businesses)

This section evaluates how each strategy may effect or improve access to key destinations. Several of the transit investment strategies identified in the Syracuse Transit System Analysis would provide improved multimodal access to key destinations within the Syracuse metropolitan area. Each of the transit strategies include features that would simplify connections between key destinations through the use of simplified route structures, higher-intensity transit services, and increased frequency and hours of operation, and could result in increased transit ridership and fewer single-occupancy vehicle trips. Furthermore, enhancements to commuter services, proposed as part of the Syracuse Transit System Analysis such as new or improved park-and-ride facilities and express bus services could be implemented and result in a small increase in transit mode share during peak periods. However, it should be noted that the features associated with each transit investment strategy would be common to all I-81 strategies, and would not impact the evaluation of I-81 alternatives.

Information on the location of police and fire stations as key destinations was collected to gain an understanding of the routes emergency vehicles might take within the study corridor. It was found that police, fire and rescue providers, and EMS all use the highways and adjacent connecting roads. Five public safety centers serve the greater Syracuse area, four of which are located within the study area. In addition, a substantial cluster of medical facilities (hospitals/service centers/medical offices) is concentrated within the I-81 viaduct priority area and access to these facilities is critical.

Regardless of the Strategy, temporary impacts to access from construction activities are expected and would be addressed as the project(s) progress. Each strategy has distinctive long term impacts on key destinations as follows:

No Build Strategy: The No Build Strategy maintains the existing highway system through 2040; therefore access improvements to key destinations are not expected under this strategy.

Rehabilitation Strategy: The Rehabilitation Strategy would have the least amount of long-term benefits and the least amount of construction impacts during the construction phase. As

only minor capacity improvements are proposed with the viaduct priority area, congestion would increase thereby potentially affecting emergency access and service delivery. Widening of the I-81 viaduct and I-81/I-690 interchange bridges to provide shoulders would allow for vehicles to avoid rear-end collisions and recover when slippery during inclement weather conditions; these factors may decrease the number of accident occurrences. In addition, the provision of shoulders would improve emergency vehicle access through this area. This strategy does not meet this objective.

BUILD STRATEGIES

Reconstruction Strategy: Major capacity improvements would reduce travel times and thus improve access to key destinations. Removal of local access ramps may impact emergency service access. Overall, this objective is met.

Boulevard Strategy: This strategy is distinct from the other strategies in that it would maintain through streets from the University Hill neighborhood to Downtown and Southside across I-81; however, there could be an increase in emergency service response times. Overall, this objective is met.

***Tunnel/Depressed Highway Strategies*:** These strategies incorporate safety and various geometric and capacity improvements, and as such congestion would decrease and safety would be enhanced thereby potentially improving emergency access and service delivery. However, these strategies truncate and disconnect various local streets that connect Northside, Downtown and Eastside neighborhoods. These changes make roadway connections between the medical facilities and adjacent neighborhoods more indirect and complex. Similar to the Boulevard strategy, the Tunnel option would create a number of at grade intersections facilitating travel from the Southside to Eastside and altering local travel patterns somewhat. Overall, these strategies do not meet this objective.

Transportation Objective - Improve Connectivity of Alternative Modes of Transportation (Pedestrian, Bicycle, Transit)

All of the multi-modal investment strategies identified in the Syracuse Transit System Analysis and City Bicycle Plan would provide improved connectivity between modes of transportation within the region to varying degrees. Features being evaluated, such as new or improved park-and-rides at interchanges, express bus services, and bus lanes could enhance the integration of transit in the overall transportation system and increase the visibility of the transit system. Providing better facilities on a simplified, easier-to-use system may also result in a slight increase in transit mode share, particularly among commuters destined for Downtown or University Hill. Furthermore, enhanced transit stops, higher-intensity transit services, and improved rider amenities could also support more walkable and bikeable communities, increasing transit use while reducing single-occupancy vehicle trips to key destinations at all times of the day. These features would be integrated in the I-81 strategies, and would not impact the evaluation of I-81 alternatives. The Strategies have been evaluated to determine how they could improve connectivity of alternative modes.

No Build Strategy: The No Build Strategy maintains the existing highway system through 2040; therefore improvements to modal connectivity are not expected under this strategy.

Rehabilitation Strategy: There would be opportunities for connectivity improvements within the viaduct priority area would enhance current facilities where spot intersection improvements are proposed along the Almond Street corridor.

BUILD STRATEGIES

***Reconstruction Strategy*:** Unlike the No Build, the Reconstruction Strategy would include opportunities to enhance pedestrian and bicycle facilities and connections consistent with the City Bike Plan. Improved aesthetic and cross connections are anticipated between Downtown and University Hill improving current safety under the viaduct. Transit facilities proposed as part of the Syracuse Transit System Analysis are expected to be integrated with this strategy. The intent of this strategy would meet the objective.

Boulevard Strategy: The Boulevard Strategy would meet the objective by providing opportunities to enhance pedestrian and bicycle facilities and connections consistent with the City Bike Plan. The new Boulevard would provide a north-south corridor to facilitate connections among the east–west bicycle network streets. The Boulevard Strategy, however, would affect plans for neighborhood greenways along Water Street and Fayette Street; and would have to pay special attention to integrating the proposed bike lanes along Salina Street, James Street, Townsend and Genesee Street as traffic volumes are anticipated to increase as a result of the Boulevard Strategy. Transit facilities proposed as part of the Syracuse Transit System Analysis are expected to be integrated with this strategy.

Tunnel Strategy: The Tunnel Strategy would result in obstructions and would sever various roads at Erie, Water, Fayette, Washington, and Genesee Street; as such it wouldn't allow greenways and bike paths envisioned within the City Bike Plan. Severing these various streets would result in increased traffic volumes along Genesee Street and possibly Townsend making it more challenging to incorporate the desired treatments. Transit facilities proposed as part of the Syracuse Transit System Analysis along the Boulevard are expected to be integrated with this strategy. The intent of this strategy would meet the objective.

Depressed Highway Strategy: Connectivity would be compromised with the Depressed Highway as it would create gaps in the grid system. Severance of local streets would minimize the ability to integrate the City Bike Plan and potential transit enhancements. This strategy does not meet this objective.

4.1.3. Goal 3 – Improve Public Safety

Transportation Objective - Reduce Accident Occurrences to at or below the Statewide Average for Similar Facilities

The safety analysis indicates that the expressways in the viaduct priority area have a relatively high rate of accident occurrences when compared to statewide averages. For example, the accident rate on the northbound viaduct section is two to three times higher than the statewide average. I-81 through the I-690 interchange has sections where the accident rates reach five times the statewide average. Proceeding north on I-81 towards Hiawatha Boulevard, the rate is generally two times the statewide average. There are five priority investigation locations (PIL) that encompass most of the viaduct priority area.

Each strategy addresses the safety areas of concern to varying degrees. The strategies are still at a conceptual level and as such the accident review strongly considers the improvements to the geometric and capacity deficiencies as the basis. Future accident assessments would be refined as the project progress to scoping and final design stages. The following summarizes the safety enhancements from a broad perspective for comparison purposes only.

No Build: The No Build Strategy maintains the existing highway system through 2040. No safety improvements are anticipated. Under this strategy, motorists would continue to experience the current high rate of accident occurrences.

Rehabilitation Strategy: In the viaduct priority area, the Rehabilitation Strategy would include limited maintenance, safety and capacity enhancements, which would consist of spot improvements to various ramps along I-81. However, since not all design related deficiencies would be addressed limited safety benefits would be experienced. This objective would not meet the objective.

BUILD STRATEGIES

For the 3.5-mile viaduct priority area, the Reconstruction, Boulevard, Tunnel and Depressed Highway Strategies would completely rebuild the bridges, pavement and introduce capacity improvements such that traffic operations would be at acceptable levels and accidents would be reduced. As such each of the build strategies would meet this objective. Reconstruction would allow for most of the geometric deficiencies to be addressed; it would provide appropriate acceleration/deceleration at all ramp locations; address superelevation and curvature concerns; eliminate all left-hand entrance ramps; and it would provide improved operations. Each strategy would vary slightly on all of these elements; however, the safety improvements for each of the Build Strategies are notable.

Transportation Objective - Improve the Safety of Alternative Modes of Transportation (Pedestrian, Bicycle, Transit)

Since the strategies have only been developed to a conceptual level, detailed recommendations have not been identified for the various alternative modes of transportation. However, each strategy has the ability to provide opportunities to improve safety of alternative modes of transportation. Potential enhancements to the transit system are being evaluated as part of the on-going Syracuse Transit System Analysis, which is evaluating bus only lanes, improved transit stations, queue jumpers, signal priority, and bus

pull-outs as part of the overall transit investment options. These features would be common to all I-81 strategies, and would not impact the evaluation of I-81 alternatives.

Similar to the transit enhancements, each I-81 strategy may affect opportunities to improve safety of pedestrian and bicycle modes as follows:

No Build: The No Build Strategy would maintain the existing highway system through 2040. It would not include improvements to enhance current facilities. Safety concerns, in particular under the viaduct and downtown would remain.

Rehabilitation Strategy: Since all or most bridges in the viaduct priority area would be replaced under this strategy, improved aesthetics and cross connections would be incorporated between Downtown and University Hill. The enhancement opportunities would have a positive effect on safety for alternative modes.

BUILD STRATEGIES

Reconstruction Strategy: Opportunities for improved aesthetics and cross connections are anticipated between Downtown and University Hill, which could have a positive effect on the safety of alternative modes. Consistent with the City Bike Plan, these improvements in the viaduct priority area could include intersection improvements, dedicated bike lanes, enhanced pedestrian crossings, and improved street lighting; also green space and art/murals would create a sense of space creating a more desirable and pleasant area that in turn could improve safety and connectivity under the viaduct. The intent of this strategy would meet this objective.

Boulevard Strategy: Consistent with the City Bike Plan, the Boulevard Strategy would include substantial opportunities to enhance the safety of alternative modes; however, the overall width of the Boulevard could pose a safety concern for pedestrians and bicyclists and would need to be addressed further during the subsequent phases of this project. The substantially enhanced at-grade crossing opportunities, including more streets between Downtown and University Hill, could improve safety for all modes. The removal of the Viaduct would provide a positive visual effect on the area and remove a perceived barrier. The intent of this strategy would meet the objective.

Tunnel Strategy: The substantially enhanced at-grade crossing opportunities between Downtown and University Hill could improve safety for all modes, thus meeting this objective. The higher speed through-traffic would be diverted to the tunnel; the surface boulevard would serve less volume than with the Boulevard Strategy. The removal of the Viaduct would provide a substantial visual change on perceived safety expressed by the community.

***Depressed Highway Strategy*:** The Depressed Highway Strategy would create minimal crossing opportunities which would create gaps in the street grid system; no mid-block crossings would be available. The distance traveled to cross the highway and boulevard by a

pedestrian would not be notably enhanced, and may be more difficult. Consequently, this objective is not met.

4.2 ECONOMIC COMPETITIVENESS

4.2.1. Goal 4 – Maintain and/or Improve Economic Opportunities

This economic assessment qualitatively reviews the impacts of each Strategy for I-81 using two main criteria:

1) The likely impacts to the transportation system; Each Strategy would impact transportation system efficiency and connectivity differently, which in turn would affect reliability, travel time, congestion, multi-modal transportation opportunities, safety of users, and the environment in different ways. In turn, these factors would impact economic sustainability and opportunities. For example, enhanced connectivity between University Hill and Downtown could facilitate connections between the labor force in the former neighborhood and employers in the latter.

2) How the impacts of each strategy affect economic growth, create economic constraints, and facilitate economic sustainability - economic growth would be primarily affected by land use and access changes. Economic impacts of land use and access change in association with changes to the transportation system include effects on access to jobs and real estate.

As the detailed traffic data for this study is still under development, the discussion below qualitatively summarizes the monetized values for costs per crash (safety), costs per ton of emissions (environmental effects), and travel time savings (related to reliability, congestion, multimodal opportunities) to provide an order-of-magnitude sense of the economic value associated with each. This information would be utilized more formally (quantitatively) in subsequent phases of this study to evaluate the project alternatives; once more detailed traffic data for the Strategies becomes available.

Safety - Each Strategy is intended to improve safety, which reduces overall crash incidence along I-81. Table 11 shows the cost per crash type using the Maximum Abbreviated Injury Scale (MAIS). This scale is used by USDOT for crash analysis by injury type and required analysis under the competitive discretionary funding program, Transportation Investments Generating Economic Returns (TIGER).[27] The costs associated with MAIS classified injuries include productivity losses, suffering, lost quality of life, and medical expenses paid by the individual. In addition to injury costs, there is an estimated average of $3,432 in property damage per crash. Once crash data (projections) for each strategy becomes available, per crash cost reduction for injuries and property damage can be applied to estimate the change in safety costs associated with a particular Strategy. This approach can be utilized in a more formal benefit-cost analysis once the Strategy alternatives are further developed.

[27] Developed by the Association for the Advancement of Automotive Medicine

Table 11 - Costs per Crash Type
(by Maximum Abbreviated Injury Scale and Property Damage in 2012 Dollars[28])

MAIS 1 - Minor injury	$ per injury	$18,890
MAIS 2 - Moderate injury	$ per injury	$297,430
MAIS 3 - Serious injury	$ per injury	$664,470
MAIS 4 - Severe injury	$ per injury	$1,683,330
MAIS 5 - Critical injury	$ per injury	$3,752,690
MAIS 6 - Fatal	$ per fatality	$6,328,310
Property Damage only	$ per accident	$3,430

Sources: "Treatment of the Economic Value of a Statistical Life in Departmental Analyses" and "The Economic Impact of Motor Vehicle Crashes 2000"

Environmental Effects - Improvements to I-81 can impact environmental conditions through an increase in transportation system efficiency. Improvement in environmental conditions is measured as the change in tons of the following pollutants and greenhouse gases: carbon dioxide (CO2), nitrogen oxide (NOX), volatile organic compounds (VOC), particulate matter (PM), and sulfur dioxide (SO2). A reduction in vehicle emissions can occur through a reduction in the number of Vehicle Miles Traveled (VMT), an increase in average speeds, decline in traffic congestion, and transportation mode shift adopted by users. For example, mode shift can take place when users take public transit or walk instead of driving, which reduces VMT and traffic congestion leading to other environmental benefits.

Table 12 shows the social costs per ton for each pollutant. The social costs represent the external costs to society due to greater pollution, in terms of the cost of health care to those affected and the cost of remediation. Each Strategy has the potential to reduce emissions due to transportation mode shift on the part of users (e.g., automobile to walking). These benefits can be monetized using the costs per ton of pollutant emissions provided below to better estimate the social costs associated with a particular Strategy. These are standards established by USDOT's TIGER program guidance and would be used in a formal benefit-cost analysis once the Strategy alternatives are more defined and additional data becomes available.

Table 12 - Costs per ton of Emissions[29]

Nitrogen Oxides (NOx)	$5,869	$ per long ton (2012 $)
Volatile Organic Compounds (VOC)	$1,440	$ per long ton (2012 $)
Fine Particulate Matter (PM)	$321,123	$ per long ton (2012 $)
Sulfur Dioxide (SO2)	$34,327	$ per long ton (2012 $)
Carbon Dioxide (CO2)	$25.1	$ per metric ton (2012 $)

Sources: NHTSA, "Final Regulatory Impact Analysis, CAFE for MY 2012-MY 2016 Passenger Cars and Light Trucks", Mar 2010 and IWGSCC, "Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866", Feb 2010

[28] Based on Value of Statistical Life (VSL) of $6.2 million, which ranges from $3.4 to $8.9 million
[29] Adjusted to 2012 dollars using the Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) for the US City Average

Travel Time Savings - The change in travel time by trip purpose measures the aggregate time savings due to the project. Change in travel time is often the single largest benefit of transportation improvements and typically based on changes in vehicle hours of travel (VHT) for highways (an output from travel demand models). Improvements that reduce overall congestion, increase average speeds, increase reliability and reduce delays, or otherwise improve traffic flows generate time savings. Aggregate time savings for transit, bicycle, and pedestrian modes are estimated on a per-user basis.

Every transportation facility has a different mix of travel purpose, and there are accepted dollar values of time that vary by trip type, business versus personal. Under the TIGER program, USDOT recommends using a rate of $24.50 for business travel and $12.84 for personal travel.[30] Additionally, this analysis could then review the severance impacts to non-motorized modes in the community, which predominantly affect children, elderly, disabled, and people without access to vehicles.[31] Once travel demand model data for each scenario is available, the travel time savings for auto, truck, transit, and non-motorized modes can be estimated.

The performance of each of the strategies relative to economic competitiveness from the perspective of the factors described above follows. In addition, the economic impact in terms of cost for construction of each strategy is estimated.

Economic Competitiveness Objective – Maintain or improve the overall economic environment and infrastructure.

This objective targets how each strategy supports City-wide, County-wide, and region-wide economic growth and facilitates economic sustainability. In this context, such economic sustainability would primarily be affected by the quality of the highway infrastructure, highway/roadway linkages, and associated ease of access to economic opportunity sites. The net impact of the strategies relative to the overall economy and these factors on a City, County and regional scale is discussed below.

No Build Strategy: The No Build strategy would maintain the existing highway network in its current state and would not alter the effects of the highway system on overall economic conditions. It would not improve the highway infrastructure or its linkages and may over time act as an impediment to economic growth due competition from other locations with a superior transportation network, making the Syracuse metro-region less attractive to businesses, particularly as the transportation infrastructure continues to age. Consequently, the No Build strategy would not meet this economic competitiveness objective.

Rehabilitation Strategy: The Rehabilitation Strategy would improve the overall quality of the highway infrastructure, but would not provide any improved access to economic opportunity

[30] Value of time estimates are adjusted to 2012 dollars using the Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) for the US City Average

[31] Department for Transport, "Transport Analysis Guidance: The Severance Sub-Objective" April 2011

sites, nor would it provide any additional roadway capacity since there would be no change in the width of lanes, site distances or available shoulders on the roadway. However, the rehabilitated structure would result in limited improvement to the overall visual quality of the viaduct priority area resulting in improved conditions at some economic opportunity sites. Overall, the Rehabilitation Strategy would not provide additional support to meet the economic competitiveness objective.

Reconstruction Strategy: The Reconstruction Strategy would both improve the quality of the highway infrastructure, including lane widening, improvements to site distances, provision of shoulders for use in the case of incidents, and improvements to the ramp structures providing access to economic opportunity sites in the viaduct priority area. Improvements in the roadway stormwater management system and enhancements to the visual quality of the viaduct structure would also improve the overall appeal of the viaduct priority area to businesses who are considering locating in Syracuse. The region's attractiveness for access to existing businesses and quality of infrastructure available to potential new businesses would be improved. In this manner, the Reconstruction Strategy would strengthen economic competitiveness of the City, County and region more so than the No Build. The Reconstruction Strategy would, however, reduce the number of access ramps that may have effects on the immediately adjacent businesses. Consequently, the Reconstruction Strategy would result in the improved economic competitiveness of Syracuse, particularly in the viaduct priority area.

Boulevard Strategy: The Boulevard Strategy would improve the quality of the highway infrastructure and enhance linkages among the highway and economic opportunity sites in the viaduct priority area and the Syracuse metropolitan area to a greater degree than No Build Strategies and other strategies since it would include enhancements to more interchanges between I-81 and I-481 and I-690. It would also direct a portion of regional traffic around Syracuse's downtown and, in doing so, shorten connections and strengthen linkages among the metro-area edge cities. The Boulevard Strategy would, however, reduce the number of access ramps and may have effects on the immediately adjacent businesses. The Boulevard Strategy would include low-impact stormwater systems that would indirectly improve the attractiveness of the viaduct priority area for new business. In addition, opportunities for improved at-grade landscape treatments would result in a superior setting for the development of businesses in the viaduct priority area. Consequently, the Boulevard Strategy would support maintenance and improvement of the economic competitiveness of the area and thus meet the objective.

Tunnel and Depressed Highway Strategies: The Tunnel and Depressed Highway Strategies would have the same benefits as the Boulevard Strategy to economic competitiveness due to improvements in the quality of infrastructure and linkages creating access to economic opportunity sites. The cost for constructing and maintaining the infrastructure improvements, including utilities necessary to maintain a dry tunnel or depressed highway, would be substantially greater than that for the other strategies, however. The benefits of the improved infrastructure would be offset by these long-term costs. However, both strategies

would sever at least several streets and require the abandonment of the Harrison and Adams Street interchange limiting access to economic opportunity sites in the viaduct priority area and increasing congestion on roadways providing access to businesses in other parts of the City. Overall, the intent of the Tunnel and Depressed Highway Strategies would support maintenance and improvement of the economic environment and infrastructure, thus meet the objective.

Economic Competitiveness Objective – Maintain or Improve Economic Competitiveness by Addressing Multi-modal Access

No Build Strategy: No multi-modal access would be improved or altered under the No Build strategy. As such, it would have no impact to economic competitiveness by increasing multi-modal options in the study area.

Rehabilitation Strategy: This strategy would provide for minor improvements in the viaduct priority area to multi-modal access or connections; however it would not conflict, with City's long-term bicycle system plans. The elimination of two access ramps may affect adjacent businesses.

BUILD STRATEGIES

All of the build strategies offer the opportunity to include more sidewalk connectivity, added bicycle lanes or other facilities, and expanded transit options as the design process advances. Strategies offering the strongest enhancement to connectivity on local roadway system would also offer the greatest opportunities for enhanced economic competitiveness. The intent of the build strategies except the Depressed Highway Strategy would meet this objective. Although construction investment for the build strategies would temporarily boost local construction employment, access to businesses along the I-81 corridor is likely to be substantially affected during construction.

Reconstruction Strategy: The Reconstruction Strategy focuses on finding the optimal placement of I-81 and I-690 in the east-west portion of the interchange from Clinton and Franklin Streets to Almond Street. The Reconstruction Strategy layout would improve performance and optimize system connections. While this Strategy generally maintains existing access patterns, it would modify and shift some access ramps Downtown that would minimize some interstate access.

The Reconstruction Strategy would create new ramp connections between the northern approach of I-81 and the western approach of I-690. Additionally, there would be options for a new I-690 east exit to improve interstate access to University Hill. For construction, there would be a phasing program to expedite construction while minimizing impacts to traffic. Delays and inconsistencies in traffic access patterns are possible given the complexity of the work and locations. Nonetheless, construction would limit access around the viaduct and potentially affect access by alternate modes to businesses along the corridor until the reconstruction is complete. Once the reconstruction is complete, connections between Downtown and University Hill would not likely improve multi-modal access. This Strategy

does not change the overall alignment of I-81; however the improved aesthetics, connectivity and system operations on the corridor as a whole have the potential to improve the economic environment.

Following the completion of the Reconstruction Strategy, access along the corridor is expected to improve as compared with the Rehabilitation and No Build strategies.

Boulevard Strategy: In further developing this proposed strategy, regional modeling results would provide a better understanding of traffic redistribution induced by the creation of the at-grade boulevard, operational effects of the revised expressway network, and the impacts to multi-modal access.

The Boulevard Strategy could impact both local and interstate traffic. It would involve removal of the viaduct, which could facilitate better connections between Downtown and University Hill and an increase in opportunities to improve and create new multi-modal access. By removing the raised highway, there would be opportunities to create more green space along with ease of non-motorized mobility. Although businesses and properties would be impacted during construction, the long-term effects of more foot traffic and walkability could provide more opportunities for economic development and improved economic connectivity among neighborhoods in the City of Syracuse. This would likely include retail opportunities for businesses in redeveloped areas once construction is complete. Additionally the increase in access and livability would be reflected in property values in the affected areas.

Tunnel Strategy: The proposed Tunnel Strategy construction would use the cut and cover tunneling method due to soil conditions and a shallow tunnel depth. The areas closest to the tunnel and Almond Street would be most impacted during the lengthy construction period because of reduced access during construction and property impacts As noted above, the tunnel would also have the longest construction duration, creating substantial disruptions that require the most traffic detours for all vehicles, including transit among the Strategies.

The Tunnel Strategy provides a boulevard over the new tunnel at surface level for local connections along the Almond Street corridor. Transit access would be affected considering Downtown interstate access would be reduced under the Tunnel Strategy due to fewer exits. A number of major surface roads would be severed connecting the north-side, Downtown, and east-side. While some areas would be adversely affected, other areas would benefit from improved surface level access, providing long-term transportation access for walking, cycling, pedestrians, and public transit. In particular, there would be improved access to University Hill through better surface access to Downtown via the new boulevard above the tunnel.

Following the construction phase, the improved Downtown and University Hill access would facilitate more non-motorized transportation. There would also be opportunities to expand public transit, especially between Downtown and University Hill. The long-term benefits of

walkability, access, and new amenities would likely create lasting economic development opportunities similar to those experienced by other cities that have removed sections of raised highways.

Depressed Highway Strategy: Access impacts to the viaduct priority area interstate during the lengthy construction period and after it is built would be similar to the Tunnel strategy with a greater number of disruptions to connectivity on existing east-west streets and diversion of traffic to alternate routes. This would have comparable impacts to multimodal access, reducing it overall.

The Depressed Highway Strategy's construction phase would impact and potentially disrupt transit and other multi-modal access along Burnet Avenue and areas north of Erie Boulevard. The extensive width requirements for this strategy may also affect opportunities to provide more sidewalks and bicycle lanes on Almond Street.

Economic Competitiveness Objective –Improve Transportation System Efficiency, Reliability and Reduce Travel Costs

No Build Strategy: As no improvements to the transportation system would occur under the No Build strategy, this strategy would have no impact to economic competitiveness by increasing system efficiency, reliability or reduced travel costs.

Rehabilitation Strategy: Safety benefits would come by way of intersection improvements and wider shoulders. Once a traffic analysis is performed, the actual safety benefits can be monetized using estimates of accident reduction and the monetized per unit cost of accidents discussed above. Capacity improvements would reduce travel time and peak congestion. Idling reductions may provide environmental benefits as well, by reducing fuel consumption. Emissions decreases via increased speeds and reduced idling can provide substantial social benefits to the region for each ton of pollution reduced.

The Rehabilitation Strategy would not have much potential for economic impacts, as the system efficiency, reliability and reduce travel costs would not be substantially altered. Construction staging may impact traffic patterns and adjacent properties in the short-term.

BUILD STRATEGIES

Reconstruction Strategy: The Reconstruction Strategy focuses on finding the optimal placement of I-81 and I-690 in the east-west portion of the interchange from Clinton and Franklin Streets to Almond Street. The Reconstruction Strategy layout would improve performance and optimize system connections. While this Strategy generally maintains existing access patterns, it would modify and shift some access ramps Downtown that would minimize some interstate access.

The Reconstruction Strategy meets this objective as it would create new ramp connections between the northern approach of I-81 and the western approach of I-690. Additionally, there would be options for a new I-690 exit east of the viaduct to improve interstate access to University Hill. For construction, there would be a phasing program to expedite construction while minimizing impacts to traffic.

Improved geometric features, ramps and local access improvements can provide travel time savings. Capacity improvements would reduce travel time, peak congestion, and reduced idling. These may provide environmental benefits as well, due to decreased fuel consumption and associated travel costs. Changes to I-81 north could alter traffic patterns. Additionally, construction would limit access around the viaduct and potentially affect businesses along the corridor until the reconstruction is complete. Following the completion of the Reconstruction Strategy, access along the corridor is expected to improve somewhat. With this, travel time reductions may also be possible.

Boulevard Strategy: The operational effects of the boulevard with revised expressway network and the impacts to the local system are unknown at this time. Future regional modeling results would provide a better understanding of traffic redistribution created by the boulevard. Nonetheless, the Boulevard Strategy impacts both local and interstate traffic. Safety benefits would occur from specific improvements at intersections, wider shoulders, and improved ramp radii. Improved ramp access and signal upgrades can provide travel time savings. Capacity improvements would reduce travel time, peak congestion, and reduced idling on the expressway system may provide environmental benefits as well, by decreasing fuel consumption. The intent of the Boulevard Strategy does meet the objective as it would also provide opportunities for better public transit and non-motorized modes, which can help reduce peak congestion and idling.

Tunnel Strategy: The Strategy provides a boulevard over the new tunnel at surface level for local access along the Almond Street corridor. While a number of major surface roads would be severed connecting the north-side, Downtown, and east-side, certain areas would benefit from improved surface level access, providing long-term transportation access for enhanced system efficiency over existing conditions. This strategy does meet the intent of the objective.

Efficiency and reliability would likely improve due to the better surface access, as well as improvements in the tunnel. Crash incidence may decline, providing benefits to area visitors and commuters. The Tunnel Strategy may provide opportunities for reduced travel time and congestion from higher average speeds and signal improvements, which would ultimately reduce travel costs from reduced fuel consumption and vehicle emissions.

Construction and staging impacts for the Tunnel option would likely affect the reliability of traffic, in turn affecting the community, and businesses, thus requiring a comprehensive traffic management plan during construction. The areas closest to the existing alignment and

Almond Street would be most impacted because of reduced access during construction and property impacts.

Following the construction phase, the long-term benefits of system efficiency and reliability, walkability, access, and new amenities would likely create lasting economic development opportunities similar to those experienced by other cities that have removed sections of raised highways.

***Depressed Highway Strategy*:** The lengthy Depressed Highway construction phase would substantially influence the efficiency and reliability of traffic during that period.

This strategy would meet the intent of the objective as safety improvements to ramps would likely improve efficiency and reliability due to reduced crash incidence, providing benefits to visitors and commuters. Additionally, the Depressed Highway Strategy may provide opportunities for reduced travel time and congestion, which would ultimately reduce travel costs associated with fuel consumption and vehicle emissions.

4.2.2 Goal 5 – Exercise Fiscal Responsibility

Transportation Objective - Minimize Capital Costs by Ensuring that Transportation System Investments are Cost-Effective

No Build Strategy: As no improvements to the transportation system would occur under the No Build strategy, this strategy would minimize capital costs but would not demonstrate cost-effective use of fiscal resources.

Rehabilitation Strategy: The rehabilitation strategy in the viaduct priority area would require a high cost for the bridge replacements with little to no improvements in capacity, safety and reliability. Hence, this strategy would not be financially sound for the priority area.

BUILD STRATEGIES

Reconstruction and Boulevard Strategies: These strategies require medium-range investment, with a moderate level of community benefits and impacts, but with substantial operational, capacity and safety improvements. These strategies meet this objective.

Tunnel/Depressed Highway Strategies: These strategies require a higher-range investment, with high level of community impacts and high level of operational, capacity and safety improvements. These strategies meet this objective.

4.3 SOCIAL EQUITY/QUALITY OF LIFE

4.3.1. Goal 6 – Support Community Quality of Life

Quality of Life Objective - Encourage Sustainable Land Use Patterns within the City and County

Sustainable land use is the concept of development that uses resources to meet human needs of today while ensuring the long term health of natural systems, communities, and the environment so that needs can also be met for generations to come. Sustainability of City and County land use patterns could be positively impacted by the I-81 strategies to the extent that the strategies would:

- Strengthen visual cohesion and perception of seamless connection within and among neighborhoods; to strengthen neighborhood "sense of place".
- Create opportunities to travel among neighborhoods by a variety of modes of travel, particularly by bicycle or on foot.
- Create opportunities for meeting the land use vision of both the City and the County for community form.
- Protect valued community resources and access to them including institutions and structures important to the cohesive social, architectural or historic fabric of a neighborhood or the City as a whole.
- Support growth in targeted economic development areas through improved access, support for infill development, and avoiding property impacts to homes and businesses.
- Create opportunities for transit oriented development (TOD).

Community resources important to sustainable land use patterns and neighborhood cohesion include community centers, cultural centers, day care facilities, fire stations, government buildings, hospital/health care facilities, libraries, major retail centers, places of worship, police stations, recreation areas, schools, historic resources, parks, and cemeteries. The loss of these resources or access to them could adversely affect social interaction within the City and its neighborhoods diminish public safety, and quality of community life.

No Build Strategy: The No Build alternative would maintain the status quo. As such, to the extent that existing highway conditions create perceived barriers to social interaction among neighborhoods, encourage commutes to suburban residential clusters, contribute to gaps in connectivity among neighborhoods and the downtown in particular, and do not promote City and County goals for future land use patterns, this strategy would be counterproductive to achieving this sustainability objective. Under existing conditions, the I-81 viaduct is a visual and physical barrier between the Downtown and neighborhoods on the east side of I-81 and north of I-690. As an elevated highway, I-81 discourages pass-through travelers from stopping in the Downtown or other adjacent neighborhoods to patronize local businesses. The highways also support suburbanization, by making it convenient to live at the urban edges. The City and County envision an overall land use pattern that is characterized by a strong, mixed-use urban core with satellite villages or towns and decreasing density of development, with less mix of uses from the urban core outward. The existing highway network encourages

single-occupancy vehicle travel and, as such, acts as a disincentive to the establishment of that pattern. This strategy does not meet the objective.

Rehabilitation Strategy: For the viaduct priority area, this strategy would add connectivity between the Downtown and Hanover Square and 'Little Italy' with the extension of Genant Street and full interchange at Court Street, but might also result in some property impacts to accommodate the roadway reconfiguration. More substantially, while there would be some intersection improvements for enhanced traffic flow along Almond, Harrison, and E. Adams streets, this strategy would maintain the I-81 viaduct as an elevated highway. This would retain all of the disincentives to sustainability noted with the No Build strategy. Consequently, the viaduct priority area segment for this strategy would have very limited improvement to sustainability of land uses patterns and thus it does not meet the objective.

BUILD STRATEGIES

All the build strategies include the northern improvements. The northern elements would enhance access to the outer segments of the study area and, more locally, to the area of the Carousel Mall. There would be some property impacts in the Lakefront TNT, an area targeted for economic development and growth. These improvements would also improve access to the Northside TNT, a primarily residential neighborhood. Property impacts with some loss of businesses would be expected in the vicinity of the widening of I-81 between Spencer Street and Butternut Street and the addition of a Franklin Street extension to connect with Butternut Street. This could adversely affect cohesion of the North Salina neighborhood business district. At the same time, the Franklin Street connector would improve roadway connectivity between the Northside TNT and Downtown.

Overall, the northern improvements would support sustainability with more dense development in the Lakefront and Northside TNTs due to increased highway access and local street improvements, offset by some potential loss of business properties there, but also enhance commute patterns from the City to its edges and throughout the region. Conversely, the northern improvements would also support long distance commute patterns, additionally, because the highway improvements would allow for easier access to outlying areas, the northern improvements have the potential to encourage suburban development and sprawl, detracting from the sustainability of outlying towns such as Salina and acting as a disincentive to mixed-use development in the urban core in keeping with the City and County land use visions.

Improved access and connections on the local street system are fundamental to creating neighborhood cohesion, connectivity among neighborhoods, and thereby, supporting the City and County land use visions and sustainability. Each of the build strategies, to varying degrees, would make some improvements to operations on the local street network in the viaduct priority area. This would add some connectivity to the local road system, yet would alter access patterns to and from the highway, as well as along local roads. This would also improve highway system functionality. As a consequence, each of the build strategies would somewhat improve sustainability in the viaduct priority area.

None of the build strategies yet include detailed system amenities to improve travel by means other than the automobile for multi-modal connectivity among neighborhoods. All of the build strategies, however, offer the opportunity to include more sidewalk connectivity, added bicycle lanes or other facilities, and expanded transit options as the design process advances. Strategies offering the strongest enhancement on the local roadway system would also offer the greatest opportunities for enhanced travel by other modes and support for sustainable land use patterns.

Similarly, the strategies do not specifically create opportunities for transit oriented development (TOD); however, the initial transit recommendations considers express bus service on I-81, additional park and ride and BRT corridors. Well-developed transit stations or stops in concert with a comprehensive transit network are essential to creating TOD. Still, when the regional transit study is complete, each of the build strategies would offer an opportunity to integrate its recommendations for transit improvements and establish a foundation for TOD.

The notable differences among the build strategies in terms of sustainable land use patterns within the City and County include the following:

***Reconstruction Strategy**:* The Reconstruction Strategy rebuilds the roadway/highway network to meet current design standards and with some limited additions to the system. One notable variation from the Boulevard, Depressed Highway, and Tunnel strategies is that the current configuration of Almond Street would remain the same with some aesthetic and connectivity improvements, where the three other strategies would modify or eliminate its alignment. As with the three other build strategies, the Reconstruction Strategy would also create a new interchange on I-690 east of the viaduct. This would offer improved highway connections to the University Hill and Lincoln Hill neighborhoods. This would, however, be at the expense of a number of property impacts, primarily to large-scale business or office complexes and multi-family residential properties. The extent of property impacts would vary relative to three conceptual design options for the I-690 Exit east.

This strategy would also maintain the I-81 viaduct as an elevated highway. This would continue the physical and visual barrier (albeit with potential aesthetic improvements) to neighborhood interaction and, in particular, the perception of a lack of connections to the Downtown. This, in turn, would not support City sustainability. Yet, the Reconstruction Strategy does create an opportunity to enhance the aesthetics and scale of the reconstructed viaduct to make it more complementary to the architectural themes within the neighborhoods and less visually disruptive.

Finally, this strategy would improve highway access to and from Adams and Harrison streets, but with more limited property impacts than with the three other strategies. Overall, this strategy would maintain the sustainability barriers created by the viaduct, and provide fewer local street network improvements for improved connectivity, yet also fewer property

impacts relative to the three other build strategies. The intent of this strategy meets the objective.

Boulevard Strategy: The Boulevard Strategy does meet the objective as it would offer the greatest number of access improvements for connections among highways and the local roadway network of all the strategies.

The Boulevard Strategy would enhance roadway connectivity between Downtown and the Butternut and North Salina neighborhoods. With the unique creation of the one-way pair street system, it would potentially enhance connections between the Downtown and the Eastside TNT (University Hill and Westcott neighborhoods) as well. The Boulevard Strategy is also distinct in that it would provide complete intersections among the local roads and the Boulevard with Almond Street and would maintain through streets from the University Hill neighborhood to the Downtown and Southside TNTs across I-81. These features would result in stronger roadway connectivity among neighborhoods, greater opportunities to enhance access by other modes of travel, and with substantially fewer property impacts than posed by the remaining two strategies.

Tunnel Strategy: The Tunnel strategy would provide for I-81 as a highway within the tunnel and a local arterial road on top. This strategy would have similar and even stronger disincentives to sustainability when compared to the strategies that would retain the viaduct in that it would include no exits allowing through travelers to stop in the Downtown to patronize businesses there. Travelers would need to choose between travel on the surface arterial interrupted by numerous intersections or through uninterrupted travel via the tunnel. In addition, East Washington, Erie Boulevard, Water Street, Fayette Street, McBride and Almond Street would all be truncated and disconnected from access across the I-81 corridor. As a result, both east-west and north-south traffic traveling among the Downtown, Eastside, and Northside TNTs would be diverted to Genesee or South Townsend streets, making those roadway connections between the Downtown TNT and adjacent neighborhoods more indirect and complex.

The Tunnel option would also create a number of at grade intersections facilitating travel from the Southside to Eastside TNTs and altering local travel patterns south of the Downtown somewhat. With the ramp configurations necessary at the junction of I-81 and I-690 with the tunnel, this strategy would, however, have substantial property impacts to the Downtown/CBD. The southern terminus of the tunnel would also pose some unique issues, with property impacts in the vicinity of Renwick and Van Buren streets.

While the major through traffic would use the tunnel, removal of local access ramps to the interstate may impact the response time of emergency services. The surface arterial above the tunnel may provide improved connectivity to some key destinations on either side of the highway and south of the downtown including Pioneer Homes, a Syracuse Housing Authority complex located in the immediate vicinity of the proposed right-of-way. With a tunnel system, additional properties would be taken for the construction of the tunnel and access

ramps. These takings include a school within a designated Environmental Justice area. The construction of the tunnel would also include the closing a portions of some local streets severing direct access to the city's government buildings, places of worship, schools and community centers, as well as pedestrian flow in the area. Local street widening for the accommodation of additional traffic lanes would have the potential to impact the overall width and uses of the streetscape. Less space could be available for sidewalks, bike lanes and on-street parking. This could, in turn, reduce opportunities to establish a cohesive network of sidewalks, parking and bicycle access; thereby reducing the capacity for the neighborhood residents as well as visitors to move throughout the area. Under these conditions, City sustainability could be diminished.

Finally, it is notable that this option would take the longest to construct of the build strategies. As such, it would create the longest period of construction-related adverse travel, traffic, convenience, and noise disruptions to the neighborhoods abutting I-81. Consequently, this strategy would provide the least support for sustainability of City and County land use patterns among the build options. Overall, this strategy would pose some of the same benefits as the Boulevard strategy but with many challenges to sustainability including the additional disincentives noted above coupled with substantial property impacts; thus this strategy does not meet the objective.

Depressed Highway Strategy: The Depressed Highway strategy would have sustainability effects comparable to those for the Tunnel. Although this strategy would provide a surface level arterial road along one side of I-81, through travelers would need to choose between the depressed highway section with no access to adjacent neighborhoods and the surface road with incomplete connections across the corridor. As such, the surface boulevard does little to compensate for the loss of opportunities for through travelers to access the Downtown and adjacent neighborhoods. It also would have one more truncated street; Jackson Street would be discontinued across the depressed highway. This strategy would, in addition, necessitate substantial property impacts for construction, affecting both residences and businesses in the Downtown, Southside, Northside, and Eastside TNTs. Depending on its design and aesthetics, the Depressed Highway strategy could also create a perception of a physical barrier between the east and west side neighborhoods along the highway. This is because there would be a physical gap between the east and west sides of I-81 coupled with loss of several existing local street connections. Options for neighborhood interaction would be reduced.

While the major through traffic would use the depressed highway, at street level the removal of local access ramps to the interstate may impact the response time of emergency services. Also at street level, Pioneer Homes, a Syracuse Housing Authority complex, could have an increase of connectivity within the complex. Conversely, a major impact would be the removal of multiple buildings within Pioneer Homes, as well as impacts to the park and open space at Pioneer Homes.

With a depressed highway system, additional properties would be taken for the construction of the depressed highway and access ramps. These takings include a school within a designated Environmental Justice area. The construction of the depressed highway would also include the closing a portions of some local streets severing direct access to the city's government buildings, places of worship, schools and community centers, as well as pedestrian flow in the area. The Depressed Highway strategy would displace community resources. Overall, City sustainability would be diminished with this strategy; thus this strategy does not meet the objective.

Quality of Life Objective - Enhance Local Connectivity (such as linking University Hill with the Downtown)

Enhanced connectivity among City neighborhoods could be facilitated by the I-81 strategies where they:

- Create new local street connections.
- Improve on existing local roadway access patterns and traffic flow.
- Provide for access by other modes including bicycle, transit and on foot.
- Improve the visual setting by removing roadway infrastructure that creates a visual barrier in order to enhance perception of connectivity between them.

Detailed system amenities will be defined during future phases to improve travel by means other than the automobile for multi-modal connectivity among neighborhoods. All of the build strategies, however, offer the opportunity to include more sidewalk connectivity, added bicycle lanes or other facilities, and expanded transit options as the design process advances. Strategies offering the strongest enhancement on the local road system would also offer the greatest opportunities for enhanced travel by other modes. In addition, and as noted above, EJ populations generally tend to be more dependent on transit and other alternate modes of travel than the general population. Because the build strategies do not yet reflect opportunities to travel by other modes, the potential benefits to EJ populations is not yet well defined.

No Build Strategy: The No Build alternative would maintain the status quo. As such, no change to connectivity between the University Hill and Downtown would occur. This strategy does not meet the objective.

Rehabilitation Strategy: This strategy would make some limited improvements to traffic operations on Almond Street but would not otherwise directly or indirectly enhance access between neighborhoods in the viaduct priority area. It would also retain I-81 as an elevated viaduct, and the visual barrier it creates to neighborhood connectivity. As such, this strategy offers no benefit in terms of improved local connectivity between the Downtown and University Hill. As the viaduct bridges would need to be replaced, however, opportunities for improved aesthetics would improve and reduce the perceived barrier.

In general, this strategy would not result in any changes in existing community structure and access. Local street widening along Almond Street and East Adams Street for the accommodation of additional traffic lanes would have the potential to impact the overall width and uses of the streetscape. Less space could be available for sidewalks, bike lanes and on-street parking. This could, in turn, reduce opportunities to establish a cohesive network of sidewalks, parking and bicycle access; thereby reducing the capacity for the neighborhood residents as well as visitors to move throughout the area. This strategy does not meet the objective.

BUILD STRATEGIES

Reconstruction Strategy: This strategy would maintain the current local street network configuration in the vicinity of the Downtown with some intersection enhancements along Almond, Harrison, and E. Adams streets. The single major change to access to University Hill would be to and from the highway with the new I-690 east exit. In contrast, several local ramps at the nexus of the Downtown and University Hill would be removed to enable new system connection ramps between I-81 and I-690 to be constructed. This strategy would also retain I-81 as an elevated viaduct, and the visual barrier that it creates to neighborhood connectivity. Overall, the reconstruction strategy offers little benefit, and could actually reduce direct connectivity between University Hill and the Downtown core.

Notably, however, reconstruction of the viaduct creates an opportunity to improve the aesthetics of the new bridge with design treatments that would better blend it in with the neighborhood and minimize the perception of a barrier. To this extent, the reconstruction strategy like the Rehabilitation Strategy would provide a more complementary design for the viaduct than the No Build strategy. One other benefit of this strategy is that it doesn't sever any existing local road connections. Traffic would not be diverted to other local streets. Because of this, the Reconstruction Strategy is complementary to City bicycle system improvement plans, allowing for greater ease of integration of those plans into the strategy design. At the same time, local street widening along Almond Street and East Adams Street where necessary for the accommodation of additional traffic lanes has the potential to impact the overall width and uses of the streetscape. Less space could be available for sidewalks, bike lanes and on-street parking. This could, in turn, reduce opportunities to establish a cohesive network of sidewalks, parking and bicycle access; thereby reducing the capacity for the neighborhood residents as well as visitors to move throughout the area.

In general, this option would not result in any changes to the current community structure, although changes in the local ramps may impact the local access to community facilities, such as schools, community centers and places of worship. The removal of some local ramps to the elevated highway may also impact the response time for various emergency services. The viaduct's supporting structural elements, particularly if the viaduct is elevated higher than it stands today, would be reduced substantially, providing opportunities to improve the aesthetics, safety and connectivity along Almond Street. Elements, such as lighting, benches, softscape/hardscape treatments under the viaduct, murals and/or street art could improve

the pedestrian and bicycles flow, safety and perceived connectivity along Almond Street. If the viaduct bridges were raised such that the overall structure would be higher than it exists today, this may increase opportunities to reuse the space below for public purposes and to offset the visual barrier for better local connectivity and sense of place. The intent of the strategy does meet the objective.

Boulevard Strategy: The Boulevard Strategy would convert I-81 to a surface arterial road which would connect directly with Almond Street at the interface between the Downtown and University Hill. As East Water Street and Erie Streets would be converted to a one-way pair, traffic flow between the Downtown and University Hill would be expected to improve. New at-grade connections across the I-81 Boulevard would also be provided at East Washington and East Fayette streets. In addition, this strategy would remove the viaduct as a visual barrier between the neighborhoods. Overall, this strategy would provide the strongest enhancement to connectivity between the Downtown and University Hill of all of the strategies.

With traffic all at-grade, this strategy for the viaduct priority area may, however, affect the ability of the community to access and connect directly or with ease to resources such as schools, community centers and places of worship. Added traffic along with impediments it can create to walking and bicycling could make ease, safety of access, and perception of connectivity more challenging. Local street widening for the accommodation of additional traffic lanes similarly has the potential to impact the overall width and uses of the streetscape. Less space could be available for sidewalks, bike lanes and on-street parking. This could, in turn, reduce opportunities to establish a cohesive network of sidewalks, parking and bicycle access; thereby reducing the capacity for the neighborhood residents as well as visitors to move throughout the area. Additionally, the increase in at-grade traffic, as well as the removal of local ramps may impact the response time for various emergency services. The Boulevard may, conversely, provide improved physical connectivity south of the downtown among many key neighborhood destinations including Pioneer Homes, a Syracuse Housing Authority complex located in the immediate vicinity of the proposed right-of-way. This strategy will be refined and the intent does meet the objective.

Tunnel Strategy: While the Tunnel Strategy would include new highway access to University Hill on I-690 east of the viaduct, it would also require severing the connection of several east-west and north-south local roads. East Fayette, Erie Blvd, Water Street, McBride Street, East Washington, and Almond Street would no longer have direct connections from University Hill to Northside or the Downtown. An alternative route from University Hill via the Lincoln Hill and Hawley Green neighborhoods would be created utilizing South Townsend Street. An alternate connection would be possible across East Genesee Street. Additionally, drivers using the tunnel would have no opportunity to exit to either University Hill or the Downtown for local access there. The arterial road on top of the tunnel would not compensate for this. Consequently, this strategy would make connections between the Downtown and University Hill as well as other neighborhoods more indirect. Although the visual barrier of the viaduct would be removed, overall ease of access among the City's core neighborhoods would be

more limited than under existing conditions or the Boulevard option. The intent of the strategy does not meet the objective.

Depressed Highway Strategy: The Depressed Highway alternative does not meet the objective as it would have effects similar to that for the Tunnel Strategy. In addition, depending on its design and aesthetics, the Depressed Highway strategy could also create a perception of a new and different physical barrier between among neighborhoods in the void created by the depressed highway.

Quality of Life Objective - Encourage Smart Growth: Sustainable Regional Land Use Patterns that minimize suburban sprawl which increases demand for infrastructure and services

The I-81 Strategies could encourage Smart Growth from a regional perspective to the extent they serve the following objectives:

- Support or create opportunities for employment and population growth within and outside the City of Syracuse.
- Encourage growth to be focused in targeted development areas throughout the region and discourage region-wide sprawl.
- Promote the efficient use of existing infrastructure before expanding infrastructure systems.

No Build Strategy: The No Build alternative would maintain the status quo. As such, it would have no benefits to Smart Growth and region-wide sustainability and does not meet the objective.

Rehabilitation Strategy: Similarly, the Rehabilitation Strategy within the viaduct priority area would offer limited improvements that would positively affect access to jobs in the City of Syracuse core and no encouragement to focusing development in targeted growth areas. While it would extend the life of the existing roadway infrastructure, it would not encourage Smart Growth overall or the efficient use of other infrastructure such as water and sewer services. This strategy does not meet the objective.

BUILD STRATEGIES

Overall, the build strategies do meet the objective as each make some improvement to the functionality of both the highways and local roadways within and outside the City of Syracuse. With exception of the Tunnel and Depressed Highway Strategies which would have some disincentives to Smart Growth within the City. This would improve the commute from homes to jobs throughout the region, supporting both population and employment stability and growth.

All the build strategies would include the northern improvements. The northern improvements would enhance access to the DestinyUSA retail area in the Lakefront TNT as well as the residential Washington Square and Northside neighborhoods east of I-81. The

northern improvements would also include some enhancements to highway operations for better access to towns north of the City of Syracuse including communities such as Salina, Mattydale, and Geddes. The Lakefront TNT is an area targeted for in-fill development and both retail and high-density residential growth that would be better served under the build strategies. All of the build strategies would support sustainable residential populations and jobs with these northern improvements. The notable differences among the build strategies in terms of Smart Growth and sustainable regional land use patterns include the following:

Reconstruction Strategy: The Reconstruction Strategy would include new system connection ramps both where I-81 meets I-690 and from I-690 to neighborhood edges east and west of the Downtown, including Westside and Lincoln Hill to the east and Park Avenue to the west. The Westside TNT and eastern edges of the Eastside TNT experienced the strongest population growth in the City between 2000 and 2010. The proposed reconstruction strategy would support this trend.

Boulevard Strategy: The Boulevard Strategy for the viaduct priority area would enhance connectivity and quality of place for the urban core of Syracuse. As such, it would support enhanced livability within the urban core and support Smart Growth in the City as a whole.

I-81 Redesignation: In association with the Boulevard Strategy, there would be some system modifications including re-designating portions of 481 as I-81 in the outer segments to facilitate traffic bypassing the urban core of Syracuse. This could act as a somewhat of a disincentive to population and jobs growth within the City while at the same time encouraging population and jobs to be dispersed throughout the region. Consequently, this would conflict with Smart Growth principles to concentrate growth in targeted development nodes to create dynamic community centers. Sprawl could also place pressures on municipal and county governments to expand infrastructure such as water, sewer, and local roads to meet the needs of population and employment centers located on undeveloped lands at the edges of the region. Resources needed to revitalize the urban core and surrounding villages or communities could be diverted to meet those edge development needs.

Tunnel and Depressed Highway Strategies: The Tunnel and Depressed Highway strategies would have benefits to region-wide population and jobs growth comparable to the Reconstruction Strategy. To the extent that each would adversely impact access to Syracuse's urban core, they would each also have some disincentives to Smart Growth within the City. These strategies do not meet the objective.

Quality of Life Objective - Improve the Visual Built Environment through Context Sensitive Solutions that Contribute to Roadside/Street Ambiance, Community Character and Public Safety

The visual built environment creates the sense of place experienced by those living, working, and visiting any community. Strong community character and sense of cohesion creates more livable communities that attract sustainable development. The I-81 viaduct is a prominent

visual element within the City of Syracuse, generally identified by the public as a barrier to sense of place. Nonetheless, there are no protected views or visual resources identified along the I-81 corridor in the "2010 Development Guide for Onondaga County" or the "City of Syracuse Comprehensive Plan 2025."

No Build Strategy: The No Build strategy would include no enhancements to the visual built environment and does not meet the objective.

Rehabilitation Strategy: Once rehabilitated, the viaduct would remain in its current location, resulting in minimal changes to visual quality and views. Elements of the viaduct, including the roadway bed and viaduct supporting structural elements would remain in place as substantial contributing elements to existing views and the overall urban landscape. Shadows cast by the existing viaduct would substantially remain in their current locations. Street widening along Almond/East Adams Streets for the accommodation of additional traffic lanes would have the potential to impact the streetscape due to the removal of street trees and vegetation. As the viaduct bridges would need to be replaced, however, opportunities for improved aesthetics would arise and would improve and reduce the perceived visual barrier. The intent of this strategy does not meet the objective.

BUILD STRATEGIES

Reconstruction Strategy: As with the Rehabilitation strategy, once reconstructed, the viaduct would remain in its current location, resulting in minimal changes to visual quality and views. Elements of the viaduct, including the roadway bed would remain as substantial contributing elements to existing views and overall urban landscape, although may be raised to allow additional natural light along Almond Street while balancing shadows. The viaduct's supporting structural elements would be reduced substantially, providing opportunities to improve aesthetics, safety and perceived barrier along Almond Street. Elements, such as lighting, benches, softscape/hardscape treatments under the viaduct, murals and/or street art, could improve the visual quality of Almond Street. This could offset adverse impacts of street widening for the accommodation of additional traffic lanes which would alter the streetscape due to the removal of street trees and vegetation. The intent of the strategy meets the objective.

Boulevard Strategy: This strategy would include the removal of the current elevated highway and viaduct and the construction of a boulevard. Elimination of the elevated roadway would eliminate both the visual barrier and shadows cast by the existing viaduct and supporting structural elements. Development of the boulevard would also result in substantial changes to the at-grade streetscape through the provision of street trees and other new landscape elements depending on the street width. The intent of the strategy does meet the objective.

Tunnel Strategy: This strategy would include the replacement of the existing elevated roadway and viaduct with a tunnel running beneath a new surface boulevard. Removal of the viaduct, a substantial contributing element to the existing overall urban landscape, would

result in dramatic changes to visual quality and views, including elimination of the structural elements that current restrict predominately east/west views between neighborhoods on either side of the viaduct within the City. Elimination of the viaduct would also eliminate shadows cast by the existing viaduct and supporting structural elements. Development of the surface boulevard would also result in substantial changes to at-grade streetscape through the provision of street trees and other new landscape elements, depending on the street width. The intent of the strategy meets the objective.

Depressed Highway Strategy: This strategy would include the removal of the current elevated highway and viaduct with a new depressed highway running beneath street level, adjacent to a boulevard. Removal of the existing viaduct, a substantial contributing element to the existing overall urban landscape, would result in dramatic changes to visual quality and views, including elimination of the structural elements that currently restrict predominately east/west views between neighborhoods on either side of the viaduct within the City. Elimination of the elevated roadway would also eliminate shadows cast by the existing viaduct and supporting structural elements. Development of the boulevard would also result in substantial changes to at-grade streetscape through the provision of street trees and other new landscape elements. However, street widening for the accommodation of additional traffic lanes particularly with this strategy as it has the widest combine road width has the potential to impact the streetscape with the removal of street trees and vegetation. This strategy does not meet the objective.

Quality of Life Objective - Promote Other Planning and Development Visions and Initiatives (county, city, region)

The I-81 Strategies support or are consistent with the Onondaga County's 2010 Development Guide and the City of Syracuse's 2025 Comprehensive Plan to varying degrees. Consistency with the following key policies was considered for this objective:

- *The Onondaga County 20120 Development Guide*: The two most relevant Onondaga County long range goals are for 1) economic growth, and 2) an attractive community. Strategies included in the 2010 Development Guide to direct implementation of those goals include sustainable development patterns and cost-effective infrastructure.
- The County envisions an overall land use pattern that is characterized by a strong, mixed-use urban core with satellite villages or neighborhoods and decreasing density of development with less mix of uses from the urban core outward.
- *City of Syracuse Comprehensive Plan 2025*: The City's vision is summarized in the plan as "The City of Syracuse is a great place to LIVE, LEARN, WORK, and PLAY". The City's plan focuses on measures to create an "exceptional quality of life" with dynamic neighborhoods comprised of mixed-use, pedestrian-friendly places with strong connectivity and amenities.
- The 2025 plan identifies five strategic economic areas that should be the focus of targeted growth and development. These include Downtown, Lakefront, University Hill, Erie Boulevard East, and Interchange of I-81 with I-481.

No Build Strategy: The No Build alternative would maintain the status quo. As such, it would not contribute to the City and County visions, having a low consistency with them and does not meet the objective.

Rehabilitation*:* Low consistency with the City and County visions does not meet objective.

BUILD STRATEGIES

The build strategies each include some elements that would both conflict with and support the implementation of the City and County future development visions. All would enhance access to the Lakefront with the northern improvements, consistent with the 2025 Plan vision of that area as a strategic economic development target. Similarly, all would improve access from the highways to University Hill as well as Erie Boulevard East with the addition of a new exit on I-690 east of the viaduct. Property impacts there could offset those benefits. Finally, each of the build strategies has the potential to impact the area of the interchanges of I-81 with I-481. As such, they could somewhat inhibit access from the highways to local businesses near the interchange, and would conflict with the focus on this area for economic development. To the extent that each strategy overall would a) meet County sustainability and land use patterns goals and b) impact quality of life and specifically, the targeted economic development areas in the City of Syracuse, they would be rated as follows in terms of consistency with City and County visions:

- Reconstruction: Low consistency, does not meet objective.
- Boulevard: High consistency, meets objective.
- Tunnel: Moderate consistency, meets objective.
- Depressed Highway: Moderate consistency, meets objective.

4.3.2 Goal 7 – Share Burden and Benefit

Quality of Life Objective - Share Burden of Impacts during Construction and Long-Term Across Stakeholders (e.g. suburbs, adjacent neighborhoods, low income communities, Onondaga Nation)

The burden of adverse effects of the strategies may not be felt equally in terms of communities as a whole as compared to neighborhoods and disadvantaged populations (Environmental Justice). The high priority Environmental Justice populations in terms of concerns for the I-81 strategies have been identified as being located in the same TNTs of concern for access impacts including the Downtown, Northside, and Eastside TNTs. The South Valley TNT in the vicinity of the junction of I-81 with I-481 also has a high priority Environmental Justice population concentration. Burdens to neighborhoods and Environmental Justice populations could be experienced differently among these geographies and populations to the extent that the strategies:

- Create noise and added traffic congestion

- Degrade air quality
- Impact property values
- Displace businesses or homes

No Build Strategy: The No Build alternative would maintain the status quo. As such, the burden of challenges posed by the current configuration and operations on I-81 would continue to be shared across stakeholders over the long-term, as they are today. This strategy does not meet the objective.

Rehabilitation Strategy: The Rehabilitation strategy does not meet the objective as it would make limited changes to the current highway system however would include replacement of the viaduct and all the interchange bridges and would therefore create an unequal burden on neighborhoods or Environmental Justice populations during construction. The burden of challenges posed by the current configuration and operations on I-81 would continue. Most construction would occur within or close to the highway right-of-way and be comparable in scale with those for the build strategies.

BUILD STRATEGIES

The intent of the build strategies is to meet the objective, but would all impose greater burdens to neighborhoods in the central core of the City of Syracuse than to the City or County as a whole that will need to be further addressed in future phases. They would, thereby, have greater effects on EJ populations as well, than on the general population of the City. Beyond this, the build strategies would impose varying degrees of burden on City neighborhoods and EJ populations, particularly as it relates to construction period disruptions to traffic patterns, noise, and air quality. Differences in anticipated effects by strategy and neighborhood of concern include:

Reconstruction Strategy: The reconstruction strategy would have its most substantive impacts on the Lakefront, North Salina, and University Hill neighborhoods in terms of localized traffic congestion, noise, and business displacements. The northern side of University Hill includes an area of high priority EJ population concentration.

Boulevard Strategy: The Boulevard Strategy would have its most substantive long-term adverse impacts to the University Hill, Southside, and North Salina neighborhoods. Construction period impacts would affect all of the neighborhoods along the I-81 corridor from Erie Boulevard to Castle Street and the burden of those short-term impacts would be felt comparably in those areas.

Tunnel Strategy: Long-term adverse impacts of the Tunnel Strategy would have a substantial number of property impacts in the Downtown and University Hill neighborhoods. The Tunnel Strategy would also be the most complex to construct. Therefore, the construction period disruptions to traffic, noise, and air quality would be most extensive with this strategy. Those burdens would be felt most in the neighborhoods which abut the I-81 corridor from the Downtown to Brighton and University Hill to Outer Comstock. Additionally, the construction

period effects would be more disruptive to high priority Environmental Justice populations than to the remainder of the City population. Overall, this strategy has the potential to have the most disproportionate impacts to some neighborhoods and Environmental Justice populations of all of the strategies.

Depressed Highway Strategy: This strategy would impose the burden of impacts primarily to the University Hill, Downtown, Southside, and North Salina neighborhoods, similar to the Boulevard strategy. It would, however, have more potential business displacements with the property impacts due to the new interchange elements at the junction of I-81 at I-690 in the Downtown.

Quality of Life Objective - Share Benefits across Stakeholders (e.g. suburbs, adjacent neighborhoods, low income communities, Onondaga Nation)

The long-term benefits of the I-81 strategies include those to communities as a whole, neighborhoods and comparatively, to disadvantaged populations (Environmental Justice). Benefits could be accrued to the extent the strategies:

- Improve access to jobs.
- Reduce opportunity costs (time lost to produce work) due to travel delays and commute times.
- Improve connectivity among neighborhoods and strengthen neighborhood cohesion.

No Build Strategy: The No Build alternative would maintain the status quo. As such, there would be no long-term benefits across stakeholders.

Rehabilitation Strategy: The Rehabilitation strategy would make limited changes to the current highway system, and would not, therefore, create an unequal benefit to specific neighborhoods of the viaduct priority area.

BUILD STRATEGIES

The intent of the build strategies is to meet the objective as they would improve access to jobs with better highway connections for commuters from the City edges and the region. They would all reduce highway travel delays and improve commute times. The greatest benefit for access via the highway, particularly to the Downtown and University Hill neighborhoods, would be for workers traveling from the outlying areas, as the more distant commuters rely more on highway travel than those closer to the City center. The build strategies would offer varying degrees of benefit to City neighborhoods and EJ populations. Nonetheless, EJ populations generally tend to be more dependent on transit and other alternate modes of travel than the general population. Because the build strategies are not developed to a level of detail that reflects new opportunities to travel by other modes, the benefits to EJ populations is not yet well defined. The relative benefits anticipated by strategy include:

Reconstruction Strategy: The Reconstruction Strategy would offer fewer enhancements to the local roadway system as compared the three other strategies. As such, it would offer greater jobs access benefits to those commuters travelling on the highway than to the City's core neighborhoods, particularly those with high priority concentrations of EJ populations.

Boulevard Strategy: The Boulevard Strategy would offer the greatest overall enhancements to local access among the build strategies. Consequently, the benefits would be most equally shared among the City's neighborhoods and could benefit EJ populations equally as well.

Tunnel Strategy: The Tunnel Strategy would have benefits similar to that of the Boulevard Strategy, but with less improved connectivity between the Downtown and University Hill neighborhoods. The benefits of this strategy would not be shared equally among the City neighborhoods, with less benefit to those two neighborhoods and the associated EJ populations than to the remainder of the City.

Depressed Highway Strategy: The Depressed Highway Strategy would have benefits similar to that of the Tunnel Strategy, but with somewhat less improved connectivity in the corridor from East Genesee Street to Castle Street. The benefits of this strategy would, therefore, not be shared equally among the City neighborhoods, with less benefit to neighborhoods along the highway corridor and the associated EJ populations than to the remainder of the City.

4.4 ENVIRONMENTAL STEWARDSHIP

4.4.1 Goal 8 – Preserve and/or Enhance Environmental Health

Environmental Stewardship Objective - Support Local, Regional and State Environmental Initiatives

The NYSDOT Engineering Instruction EI 99-026 Environmental Initiative as well as NYSDOT Greenlites Program and NYSDEC's Beyond Waste Program were reviewed along with a series of local and regional community initiatives for this effort to assess support for environmental initiatives. Community initiatives reviewed include:

- ***Save the Rain*** program is a comprehensive stormwater management plan intended to reduce pollution to Onondaga Lake and its tributaries. During wet weather events, stormwater flows into the local sewer system, causing heavy flow periods that can overload the system. During times of overload, the system is designed to release combined sanitary flow and stormwater into local waterways (harbor Brook, Onondaga Creek). This event is known as a Combined Sewer Overflow (CSO). CSOs substantially reduce water quality in local tributary water bodies including Onondaga Lake. This program contains various sub programs: Project 50; Green Improvement Fund (GIF); Rain Barrel; and the Urban Forestry Program.
- ***South Side Innovation Center (SSIC) –*** provides services and facilities to current and emerging entrepreneurs, including office space and equipment, intensive hands-on training and counseling, roundtables, network, classroom courses, business plan

development, access to loans, marketing assistance, and help in opening markets – all in an energized environment of entrepreneurial activity. SSIC's mission is to increase the strength and size of the area economy by helping a diverse group of emerging and mature businesses reach their potential size and profitability.

- ***Syracuse COE (Center of Excellence) –*** the purpose of the Syracuse Center of Excellence in Environmental and Energy Systems is to create jobs and wealth in New York State through collaborations in research, development and education.
- ***Syracuse Tech Center–*** The center on the campus of SU is a partnership between JP Morgan Chase and academia that would involve the creation of several hundred jobs and provide a specialized curriculum to prepare students for careers in the finance and IT sectors with a specific focus on cyber security.
- ***Near Westside Initiative –*** SyracuseCOE and its collaborators are currently involved in the City's historically dis-invested Near Westside neighborhood that try to decrease energy use in homes and increase indoor air quality; help find environmentally – friendly solutions to storm water management; promote deconstruction practices; and create green collar jobs. SyracuseCOE is working with the Near West Side initiative to revitalize the Near Westside. The NWI is a not-for –profit led by Syracuse University and composed of partners from many different agencies and institutions.
- ***Northside Asset Development Initiative –*** is collaborative endeavor intent upon improving the economy of the Northside of Syracuse by cultivating and developing the assets of local residents and businesses. Philosophically, the initiative is unique in its approach in that it views community asset development (and the subsequent processes of education, training and mentoring) as a strategy for economic revitalization.
- ***SUNY Upstate Medical University –*** mission is to improve the health of the communities we serve through education, biomedical research and health care. It is the only academic medical university for one-third of our state. SUNY Upstate is in a unique position to offer both high quality health care and educational opportunities to Central New York's 1.8 million citizens. They also educate more than 1,500 students in their four colleges and host 500 graduate physicians in residency and fellowship training programs and provide continuing education to practitioners.
- ***Connective Corridor –*** is an emerging signature strip of cutting – edge cultural development connecting the University Hill with downtown Syracuse. The connective Corridor is making investments in key locations supporting historic landmarks, cultural institutions, and private development. These areas include the emerging arts districts along East Genesee Street and the Near Westside, as well as Forman Park, Firefighters Park, Columbus Circle, Armory Square, and the "Civic Strip" where the Oncenter complex and the Everson Museum tie into the center of downtown.
- ***Syracuse's Sustainability Plan –*** the Bureau of Planning and Sustainability is in the process of developing Syracuse's sustainability Plan. This plan would look into the needs and the current resources of the city and create goals and initiatives to meet these needs without jeopardizing the city's future. These goals and initiatives would not only take into consideration the city's environment and natural resources but also focus on the city's economic and community/societal development.

- ***The Alchemical Nursery –*** is a community benefits organization committed to the development of regenerative lifestyles and landscapes utilizing the principles and ethics of Permaculture, the Intentional Communities movement, Ecovillage living and Mutual Aid activity. By providing educational resources, dialogue space, networking tools, and project development we are growing together towards cultural transformation, right livelihood, and equilibrium between local human society and our global ecological community.

The overall effect on the community initiatives is very much parallel to "improve access to key Destinations" under Goal 2 – Enhance Region Wide Mobility. The sites which are the focus of the initiatives listed above are not expected to be directly affected by any of the strategies. Therefore, access to these sites by the identified strategies is a key factor in the assessment of the strategies. As described for Goal 2 above, the strategies would have the following access impacts:

The intent of the build strategies meet the objective as overall mobility would be improved, however, local access would be better under the Boulevard and Rehabilitation Strategies versus the other strategies that decrease some local access around the I-81/I-690 Interchange. Improving intermodal connectivity as noted under Goals 1, 2, and 3 would also serve to enhance local initiatives.

For the Near Westside Initiative concerns have been raised about plans for West Street. West Street is being considered to assist in better distributing traffic in and out of downtown in conjunction with various strategies. Neighborhood concerns have been voiced concerning increased traffic and a wider road section for West Street, which is already wide and in poor visual condition. The transportation and neighborhood objectives can work together to develop an appropriate context sensitive design that meets both objectives and substantially improves the area.

No Build Strategy: This strategy would have no impact to access and would thereby have no benefit in support of local environmental initiatives. This strategy does not meet the objective.

Rehabilitation Strategy: This strategy would have no impact to access and would thereby have no benefit in support of local environmental initiatives for either the outer segments or the viaduct priority area. This strategy does not meet the objective.

BUILD STRATEGIES

The build strategies all include greatly improved aesthetics of the viaduct area, which would be supportive of the Connective Corridor and many other initiatives, thus meet the objective. The degree to which they improve access and aesthetics, in brief, would be as follows:

Reconstruction Strategy: limited access enhancements; opportunity to improve aesthetics of the elevated viaduct and public space underneath it.

Boulevard Strategy: most access enhancements in the viaduct priority area among the build strategies; opportunities for improved aesthetics for the streetscape and other public spaces.

Tunnel and Depressed Highway Strategy: similar support for local environmental initiatives as the boulevard strategy with fewer enhancements to local access.

Environmental Stewardship Objective - Maintain or Improve Air Quality (Overall Emissions and Odor)

Refined studies of air and noise conditions would be developed as strategies are better defined in future project scoping and preliminary engineering/EIS phases. Air quality screenings herein have been reviewed on a regional basis to compare strategies and assess how they contribute to maintaining and / or improving the Syracuse MPA's status as a maintenance area. When an area transitions from non-attainment to an attainment designation as Syracuse has, it is subject to two 10 year maintenance plans that demonstrate the area would remain in attainment for the 10 year period. The air quality screening has been developed using the SMTC Regional Travel Demand Model outputs to approximate and compare the future no build scenario to each strategy. For a high level assessment as part of this corridor study, the data shown in the Table 14 provides a relative difference on how the feasible strategies could potentially affect current emission levels on a daily basis.

As indicated in Table 13, regional emissions of carbon monoxide (CO) and nitrogen oxides (NOx) are projected to increase compared to regional emissions of CO and NOx with all the identified strategies, while regional emissions of volatile organic compounds (a precursor of photochemical oxidants would decrease with the Boulevard and Rehabilitation strategies, and increase slightly with the Reconstruction and tunnel strategies. These estimates are based on the concept level of design completed to date for the proposed strategies. Projections of future emissions with the feasible strategies will be finalized in future project development phases after further refinement of the design of these strategies. The intent of the build strategies is to meet the objective.

Table 13 -

Air Quality Analysis for Onondaga County

No Build	VMT	CO Sum (g/day)	CO (Tons/day)	VOC Sum (g/day)	VOC (Tons/day)	NOx Sum (g/day)	NOx (Tons/day)
24 hour	13,763,573.00	150,083,453.68	**165.44**	2,862,158.62	**3.15**	2,185,659.20	**2.41**
Boulevard Strategy							
24 hour	13,731,614.00	150,111,265.12	**165.47**	2,859,722.75	**3.15**	2,200,830.33	**2.43**
Rehabilitation Strategy							
24 hour	13,761,679.00	150,212,039.69	**165.58**	2,861,993.32	**3.15**	2,192,703.96	**2.42**
Reconstruction Strategy							
24 hour	13,806,617.00	150,935,112.57	**166.38**	2,877,280.69	**3.17**	2,206,798.66	**2.43**
Tunnel Strategy							
24 hour	13,813,266.00	151,121,155.01	**166.58**	2,884,909.15	**3.18**	2,216,613.43	**2.44**

Please note that this analysis was completed for Onondaga County only and not for the entire SMTC Metroplitan Planning Area

Legend:

CO - Carbon Monoxide VOC - Volatile Organic Compounds SO2 - Sulfur Dioxide

Nox - Nitrogen Oxides PM - Fine Particulate Matter VMT - Vehicle Miles Travelled

Environmental Stewardship Objective - Minimize Air Quality and Noise Impacts on Adjacent Neighbors

Changes to existing noise levels experienced along a roadway would occur with changes in traffic volumes and speeds, changes to the mix of vehicles on the road, changes in the number of occasions when vehicles are braking and accelerating, changes in the distance between the roadway and nearby noise-sensitive land uses, and changes in the roadway design that may affect the degree of noise reduction between vehicles operating on the roadway and nearby noise-sensitive land uses. Due to the lack of detailed traffic data currently available for each identified strategy, the following is a qualitative assessment of relative changes in noise levels from existing conditions with each strategy. Existing noise levels estimated based on on-site noise measurements taken as part of this study.

No Build Strategy – Noise Levels: Noise levels along the I-81 corridor in the future without the identified strategies would be approximately the same as existing noise levels since there would be no major change to I-81 beyond necessary cleaning, painting, filling pavement cracks, patching holes in the bridge decks and maintenance of the roadway. No major capacity, geometric or safety improvements to the facility would be undertaken. The existing noise levels along the I-81 Viaduct ranged between 65.8 dBA and 79.5 dBA. These noise levels exceed exterior noise level criteria established by the Federal Highway Administration (FHWA) for the need to abate highway noise for new roadways for residential land uses, parks, and other noise sensitive land uses. This strategy does not meet the objective.

Rehabilitation Strategy- Noise Levels: The I-81 viaduct (elevation 425.5 feet) would be replaced over Almond Street (elevation 400.5 feet). Since this strategy is limited to the rehabilitation of the I-81 Viaduct, and does not include any major capacity, geometric or safety improvements; there would be no substantial changes in traffic volumes, speed, or number of trucks from No Build Conditions. As a consequence, there would be no substantial change in noise levels from No Build conditions, other than a potential decrease in noise levels that may occur as a consequence of the rehabilitated roadway deck providing a smoother surface. Therefore, noise levels are not expected to increase compared to No Build conditions as a result of the Rehabilitation Strategy and it does not meet the objective.

BUILD STRATEGIES

Reconstruction Strategy – Noise Levels: Although capacity, geometric and safety improvements are included as part of this strategy along the I-81 Viaduct, it would be unlikely that there would be any substantial changes in traffic volumes, speed, or number of trucks from No Build Conditions. As a consequence, there would be no change in noise levels from the No Build conditions, other than potential decrease in noise levels that may occur as a consequence of the reconstructed roadway deck providing a smoother surface and minor capacity/safety improvements. Therefore, noise levels are not expected to increase compared

to No Build conditions as a result of the Reconstruction Strategy, thus this strategy meets the objective.

Boulevard Strategy – Noise Levels:
Viaduct Priority Area: The Boulevard Strategy would result in the replacement of the I-81 Viaduct segment south of the I-81/I-690 interchange with a surface boulevard, and the re-designation of I-81 to the I-481 corridor. The I-81 viaduct and Almond Street would be removed and replaced with a surface boulevard (elevation 400.5 feet). There would be decreases in traffic volumes, speed and number of trucks from No Build conditions with the Boulevard Strategy along the boulevard. Under this strategy, regional truck traffic from the former I-81 corridor through downtown Syracuse would be diverted to the redesignated I-81. Traffic using the Boulevard would be limited to slower speeds. This would result in a decrease in community noise levels in the vicinity of the I-81 viaduct segment compared to No Build conditions.

Since the boulevard would be built at-grade, the shielding of nearby noise sensitive receptors provided by the existing elevated I-81 viaduct would be eliminated, and noise levels may increase from No Build conditions. In addition, the Boulevard Strategy would potentially result in an increase in community noise levels along other corridors, where truck traffic and other thru traffic would divert. The intent of this strategy would meet the objective.

I-81 Redesignation: Noise levels along the I-81 corridor in the redesignated segments would be somewhat greater than as existing noise levels since there would be a greater number of interchanges and under this strategy, regional truck traffic from the former I-81 corridor through downtown Syracuse would be diverted to the redesignated I-81. This will be further evaluated in the environmental review phase.

Tunnel Strategy – Noise Levels: The Tunnel Strategy would reroute I-81 to an underground structure between the general vicinity of Van Buren Street on the south along the present I-81 alignment and just north of Butternut Street. The I-81 viaduct would be replaced with a tunnel that would be approximately 40 feet below grade level (elevation 360.5 feet) and Almond Street would be replaced with a surface boulevard (elevation 400.5 feet). In addition, a surface boulevard would be created to provide local access and connectivity and would become the sole source of traffic noise along the existing I-81 corridor through downtown Syracuse. As a consequence, noise levels would be expected to decrease from No Build conditions at nearby sensitive receptors along the existing I-81 corridor. However, the Tunnel Strategy would be anticipated to increase noise levels near the tunnel portals due to reverberant noise generated at the portals.

Since the boulevard would be built at-grade, the shielding of nearby noise sensitive receptors provided by the existing elevated I-81 roadway deck would be eliminated, and noise levels may increase from No Build conditions. The intent of the strategy is to meet the objective.

Depressed Highway Strategy – Noise Levels: The Depressed Highway Strategy would consist of the replacement of the existing I-81 Viaduct and Almond Street with a depressed highway and adjacent surface boulevard. The I-81 Viaduct would be replaced with a depressed highway that would be approximately 25 feet below grade level (elevation 375.5 feet) and Almond Street would be replaced with a surface boulevard (elevation 400.5 feet) adjacent to the Depressed Highway. While there would not be substantial changes in traffic volumes or number of trucks from No Build conditions along the I-81 Viaduct, changes in speed would be expected with the Depressed Highway Strategy. However community noise levels would be expected to be higher than noise levels in the No Build condition due to noise reverberating between the walls of the depressed roadway.

Since the boulevard would be built at-grade, the shielding of nearby noise sensitive receptors provided by the existing elevated I-81 viaduct would be eliminated, and noise levels may increase from No Build conditions. This strategy does not meet the objective.

Environmental Stewardship Objective - Minimize Impacts of Designated Community Landmarks and Historic Resources

Community landmarks and historic resources are valued resources that contribute to the character and sense of history or cohesion and continuity of neighborhoods and the City and County as a whole. Roadway improvements can affect these resources both directly by requiring their displacement or acquisition and indirectly by altering their setting and access to them. The following qualitative assessment discusses the extent to which each strategy would disturb community landmarks, historic structures and sites, and disturb possible archeological resources.

No Build Strategy: The No Build strategy would continue existing conditions and would therefore have no effect on any community landmarks or historic or archeological resources. This strategy meets the objective.

Rehabilitation Strategy: Rehabilitation of the existing viaduct would minimize ground-disturbing activities and the potential adverse effects on archaeological deposits, including archaeological sites and features in the vicinity of the historic Erie Canal and urban archaeological deposits in the Downtown Tomorrow's Neighborhood Today (TNT). The widening of lanes and streets, lengthening of on/off ramps, the addition of auxiliary lanes, and shoulder widening on interchanges and the viaduct have the potential to impact previously unreported archaeological sites. However, these activities would generally occur within and adjacent to areas previously disturbed during construction of I-81 during the 1950s. Rehabilitation of the existing infrastructure would minimize direct impacts on designated community landmarks and historic buildings, structures, districts and other architectural resources listed in or eligible for inclusion in the *National Register of Historic Places* (*National Register*). Construction activities associated with the rehabilitation strategy have the potential to indirectly affect historic buildings, structures, and districts in the vicinity of I-81 due to the generation of ground borne vibration as a result of excavation, increased

construction traffic, and re-routed traffic flow patterns. These effects would be temporary and could be mitigated through on-site vibration monitoring at nearby historic structures. Overall, the impacts of the rehabilitation strategy on historic buildings, structures, districts, and other architectural resources are expected to be minimal, thus meets the objective.

BUILD STRATEGIES

Reconstruction Strategy: The reconstruction of I-81 interchange and viaduct, ramp improvements and modifications, and new/improved exits have the potential to impact previously unreported archaeological sites. However, these activities would most likely take place in areas previously disturbed during construction of I-81 and I-690. As such, reconstruction activities would have a minimal potential to result in adverse effects on archaeological deposits, including archaeological sites and features in the vicinity of the historic Erie Canal and urban archaeological deposits in the Downtown TNT. The reconstruction strategy would not be expected to have direct impacts on designated community landmarks and historic buildings, structures, districts and other architectural resources listed in or eligible for inclusion in the *National Register*. Construction activities associated with reconstruction have the potential to indirectly affect historic buildings, structures, and districts in the vicinity of I-81 due to the generation of ground borne vibration as a result of excavation, increased construction traffic, and re-routed traffic flow patterns. However, these effects would be temporary and could be mitigated through on-site vibration monitoring at nearby historic structures. Overall, the impacts of the reconstruction strategy on historic buildings, structures, districts, and other architectural resources are expected to be minimal, thus meets the objective.

Boulevard Strategy: The boulevard strategy involves reconfiguration of the I-81/I-690 interchange, new I-690 interchanges, and improvements to the street grid (e.g., minor widening and realignment of surface streets, new roadway connections). Construction activities associated with interchange reconfiguration are unlikely to have a substantial impact on archaeological or historic resources, as construction would occur in areas that were substantially disturbed by previous activities during construction of the existing I-481 and I-690. However, improvements to the street grid could require excavation and ground disturbance in archaeologically sensitive areas in the Downtown, Eastside, and Southside TNTs, including the *National Register*-listed Hanover Square Historic District, Armory Square Historic District, and the Walnut Park Historic District. As such, street grid improvements have a high potential to impact reported and previously unreported archaeological sites and deposits.

The boulevard strategy could also require construction activities with the potential to directly or indirectly impact the *National Register*-listed historic districts discussed above, as well as individually listed historic buildings and structures. Grid improvements in the Downtown TNT would require construction and excavation in the historic center of Syracuse, near the former alignment of the Erie Canal. These activities have the potential to impact previously unevaluated historic buildings and structures associated with early commerce and the growth of the city. Adverse impacts may occur as a result of ground borne vibration generated as a

result of excavation, increased construction traffic, the use of heavy machinery, visual intrusions in historic districts, and re-routed traffic patterns. However, these effects could be mitigated through on-site vibration monitoring at nearby historic structures. The intent of the strategy meets the objective.

Tunnel Strategy: The widening of lanes and streets, ramp improvements, and new/improved exits, and the construction of a tunnel has the potential to impact previously unreported archaeological resources. However, these activities would take place in areas previously disturbed by construction of I-81 and I-690. As such, the tunnel strategy would be unlikely to result in ground-disturbing activities that could have potential adverse effects on archaeological deposits, including archaeological sites and features in the vicinity of the historic Erie Canal and urban archaeological deposits in the Downtown TNT. The tunnel strategy would minimize direct potential impacts on designated community landmarks and historic buildings, structures, districts and other architectural resources listed in or eligible for inclusion in the *National Register.* Construction activities associated with the tunnel strategy have the potential to indirectly affect historic buildings, structures, and districts in the vicinity of I-81 and I-690 due to ground borne vibration as a result of excavation, increased construction traffic, and re-routed traffic patterns. However, these indirect effects would be temporary and could be mitigated through on-site vibration monitoring at nearby historic structures. Overall, the impacts of the tunnel strategy on historic buildings, structures, districts, and other architectural resources are expected to be minimal, thus meets the objective.

Depressed Highway Strategy: The widening of lanes and streets, ramp improvements, new/improved exits, and the construction of a depressed highway have the potential to impact previously unreported archaeological sites. These activities would take place in areas previously disturbed by construction of I-81 and I-690. The depressed highway strategy would therefore minimize ground-disturbing activities that could have potential adverse effects on archaeological deposits, including archaeological sites and features in the vicinity of the historic Erie Canal and urban archaeological deposits in the Downtown TNT. The depressed highway strategy would minimize direct potential impacts on designated community landmarks and historic buildings, structures, districts and other architectural resources listed in or eligible for inclusion in the *National Register*. Construction activities associated with the depressed highway strategy have the potential to indirectly affect historic buildings, structures, and districts in the vicinity of I-81 and I-690 due to ground borne vibration generated by excavation activities, increased construction traffic, and re-routed traffic flow patterns. However, these indirect effects would be temporary could be mitigated through on-site vibration monitoring at nearby historic structures. Overall, the impacts of the depressed highway strategy on historic buildings, structures, districts, and other architectural resources are expected to be minimal, thus meets the objective.

Environmental Stewardship Objective - Minimize Storm Water Impacts and Improve Water Quality

Impacts to surface water quality can result from a wide variety of actions, including:

- dredging and/or filling of surface water resources
- land clearing, grading, and other development activities
- addition of impervious surface areas
- direct stream channel and stream bank modifications
- erosion and sedimentation of exposed earth surfaces
- point and non-point source discharges

Direct impacts to surface water resources would be quantified as part of preliminary design. An early qualitative assessment of potential effects is provided here in terms of changes to stormwater flows and impacts to surface water quality for each of the strategies.

Increases in the amount of impervious surfaces are a long term concern for the I-81 strategies as they can result in permanent impacts to stormwater flows and water quality. Such surfaces do not allow infiltration of stormwater, so conversion of pervious to impervious surfaces causes increased runoff volumes to surface waters and less direct recharge of aquifers. Paved roadways accumulate contaminants associated with motor vehicles, such as leaked fuel, oil, brake fluid, and tire dust (including lead and other metals), and other potentially toxic materials. During storm events, these contaminants can be conveyed via sheet flow or drainage systems to downstream waters. In addition, paved surfaces retain heat, especially during the summer months, and can result in higher water temperatures of stormwater runoff reaching adjacent surface waters – this is referred to as thermal impacts. Runoff velocities are also affected by changes in site surfaces. Impervious surfaces convey runoff faster than pervious soils and vegetated lands, resulting in faster-moving, more erosive stormwater flows. Therefore, whenever a vegetated site is converted to paved surfaces, adjacent receiving surface waters are at risk of potential erosion and sedimentation, in addition to increased water temperatures and degradation by polluted stormwater.

Most of the elements of each of the I-81 strategies strategy would occur within a developed urban area with extensive areas of existing impervious surfaces, thus limiting potential stormwater and water quality impacts somewhat. Each of the strategies, except the No Build would include enhanced stormwater management systems design as part of any construction. Best management Practices (BMPs) and implementation of green infrastructure would also be employed during construction to minimize impacts due to erosion and sedimentation and stormwater scouring and transport of toxic substances. Each strategy would include implementing or retrofitting water quality and water quantify features to offset any potential adverse impacts; this can further assist in efforts to clean up Onondaga Lake and its tributaries. Each strategy would vary in level of impact and level of mitigation. The specific treatment would be defined in subsequent project development phases. The differences in terms of potential impacts of each strategy are summarized as follows.

No Build Strategy: The No Build Strategy maintains the status quo through 2040. No improvements would be made to allow for enhanced stormwater management or support for improved surface water quality, thus not meeting the objective.

Rehabilitation Strategy: Minor highway improvements would be incorporated to the rehabilitation strategy to enhance current facilities. As a consequence, there would be the potential for improvement to stormwater management facilities on the roadway. There would be no substantive increase in impervious surfaces with this strategy. This strategy meets the objective.

BUILD STRATEGIES

Reconstruction Strategy: Improved highway design with contemporary stormwater management facilities would be incorporated with this strategy to enhance current facilities. With this, some improvement to stormwater management would be realized. It is anticipated that this strategy would increase impervious surfaces by about 23%. This strategy meets the objective.

Boulevard Strategy: The new boulevard would provide a north-south at-grade corridor and is estimated to create more area of impervious surface than is associated with the existing viaduct. Combined with the improvements for the I-81 Redesignation, it is anticipated this strategy will increase the impervious surface area by approximately 29%. All of the improvements would, however, have contemporary stormwater management design including streetscapes with green design; low impact techniques such as pocket parks, vegetated swales, and the installation of infiltration strips. This strategy meets the objective.

Tunnel Strategy: The tunnel strategy is estimated to decrease the impervious surface by 2% as the I-81 expressway would be buried this strategy. Design to maintain a dry tunnel and discharge stormwater flowing both directly into the tunnel and from groundwater infiltration above would require a more complex system and higher costs for construction that the Boulevard or Reconstruction strategies. Pumping stations would be needed to handle the stormwater. Additionally, as the tunnel strategy would have the longest construction period, a rigorous construction period stormwater plan and erosion and sedimentation control plan would need to be in place and maintained for the duration. This strategy meets the objective.

Depressed Highway Strategy: the Depressed Highway would create areas of new impervious surfaces and changes to existing stormwater flows. It is estimated that an increase in impervious areas of 11% maybe realized. As with the tunnel strategy, a more complex and costly stormwater management system would need to be incorporated into the depressed highway design and rigorous construction period stormwater plan and erosion and sedimentation control plan would need to be in place and maintained for the duration. This strategy meets the objective.

4.5 SUMMARY FINDINGS

In summary, each of the strategies has been evaluated against the corridor needs and study goals and objectives that were developed in cooperation with the community and stakeholders. Some of the assessments completed were highly quantitative such as the geometric, bridge and traffic assessments, while others were more qualitative. Additional environmental studies and analyses will be performed during subsequent project phases; specifically the environmental review phase of the NYSDOT project development process. During the planning-level evaluation process, the strategies were compared to the No Build conditions and at times to each other. More detailed evaluation of the strategies will be completed as they are further refined.

The following summarizes the findings of the corridor level evaluation for each of the alternative strategies relative to the corridor goals and objectives.

4.5.1 Transportation Goals Assessment – Summary Conclusions

The transportation goals focus on meeting the structural and safety needs for the project as well as providing the lowest life cycle maintenance costs and restoring bridge conditions for at least 30 years. They also focus on improving existing geometric design and safety, as well as identifying opportunities for alternative mode improvements in the vicinity of I-81. As each of the strategies is at a concept level to determine feasibility, detailed recommendations have not been identified for the various alternative modes of transportation. All of the build strategies would, however, include opportunities to integrate access for pedestrians, bicyclists and transit. A summary of how the strategies in the viaduct priority area meet these goals follows.

No Build Strategy: The No Build Strategy does not address the following needs:

- Current design or geometric deficiencies,
- Deteriorating highway and bridge infrastructure conditions
- Existing and future traffic congestion levels
- Access issues or public safety issues

The No Build Strategy would maintain the current highway and local road design such that no new opportunities for access by alternate modes would be created. It does not, overall, meet the transportation goals for this project.

Rehabilitation Strategy (viaduct priority area): The Rehabilitation Strategy in the viaduct priority area does not meet the transportation goals. Due to the substantial deterioration of the bridge conditions in the viaduct priority area, 38 of the 39 bridges would need to be replaced rather than rehabilitated and capacity/congestion needs would still not be addressed. In addition, this strategy would not address the existing geometric deficiencies in the viaduct priority area. The Rehabilitation Strategy would maintain the current highway and local road design such that no new opportunities for access by alternate modes would be created.

The Rehabilitation Strategy would slightly improve highway operations compared to the No Build Strategy. For access to key destinations, including access by emergency services vehicles, the Rehabilitation strategy would have the least amount of long-term benefits and the least amount of construction impacts during the construction phase among all of the build strategies. Under the Rehabilitation Strategy, not all of the areas with safety concerns would be addressed, as some would require a higher level of geometric improvements requiring reconstruction.

Reconstruction Strategy: The Reconstruction Strategy in the viaduct priority area would strongly meet the transportation goals. All structural deficiencies would be addressed, all new bridges would conform to current design standards and aesthetic treatments would be applied where appropriate to improve the visual quality of the area. The Reconstruction Strategy would correct about 85% of geometric design deficiencies and would provide opportunities to incorporate enhanced access by other transportation modes.

The Reconstruction Strategy would improve highway operations slightly over conditions in the No Build Strategy. An additional mainline expressway lane may be required, however, on I-81 and I-690 to address expressway capacity issues at various locations. Capacity improvements would reduce travel times, enhance highway connectivity to the local road system, and improve access to key destinations. However, removal of local access ramps may impact emergency service access. The Reconstruction Strategy would completely rebuild the bridges and pavement, and introduce capacity improvements such that the potential for accidents would be substantially reduced in the viaduct priority area.

Boulevard Strategy: The Boulevard Strategy in the viaduct priority area would meet the transportation goals. All structural and geometric deficiencies would be addressed, all new bridges would conform to current design standards and aesthetic treatments would be applied where appropriate to improve visual quality. The Boulevard Strategy would correct about 90% of all non-standard design features. The Boulevard Strategy would result in the lowest life cycle maintenance costs, and would offer opportunities to incorporate enhanced access by other transportation modes.

The Boulevard Strategy would result in some improved regional mobility; however, traffic may be diverted to other streets and highway segments, which may increase congestion at local intersections. Capacity improvements would reduce travel times, enhance highway connectivity to the local road system, and improve access to key destinations. Removal of local access ramps may impact emergency service access. The Boulevard Strategy would include geometric and capacity improvements that would reduce congestion; safety would be enhanced thereby potentially improving emergency access and service delivery. The Boulevard strategy is distinct from the other strategies in that it would maintain through streets for enhanced connectivity for more ease of access to key destinations and ease of routing for emergency service vehicles. The Boulevard Strategy would completely rebuild the

bridges and pavement, and introduce capacity improvements such that the potential for accidents would be reduced in the viaduct priority.

Tunnel Strategy: The Tunnel Strategy in the viaduct priority area would meet the transportation goals. All structural and geometric deficiencies would be addressed, all new bridges would conform to current design standards and aesthetic treatments would be applied where appropriate to enhance the visual quality of the area. The Tunnel Strategy would correct about 90% of all non-standard design features and provide opportunities to incorporate enhanced access by other transportation modes. However, it would create some barriers to east-west connections via other transportation modes.

The Tunnel Strategy would result in some improvements in regional mobility. Capacity improvements would reduce travel times, enhance highway connectivity to the local road system, and improve access to key destinations. However, removal of local access ramps may adversely affect emergency service access. The Tunnel Strategy would include various geometric and capacity improvements that would decrease congestion. Safety would be enhanced thereby potentially improving emergency access and service delivery. The Tunnel would truncate numerous streets, providing less east-west connectivity and thereby less ease of access to key destinations. The Tunnel Strategy would completely rebuild the bridges and pavement, and would introduce capacity improvements such that the potential for accidents would be reduced in the viaduct priority area.

Depressed Highway Strategy: The Depressed Highway Strategy in the viaduct priority area would partially meet the transportation goals. All structural and geometric deficiencies would be addressed, all new bridges would conform to current design standards and aesthetic treatments would be applied where appropriate to enhance visual quality. The Depressed Highway Strategy would correct about 90% of all non-standard design features, and offer opportunities to incorporate enhanced access by other modes and also creates some barriers to east-west connections via other transportation modes.

The Depressed Highway Strategy would result in some improvement in regional mobility. Capacity improvements would reduce travel times, enhance highway connectivity to the local road system, and improve access to key destinations. Removal of local access ramps may adversely affect emergency service access. The Depressed Highway Strategy would include various geometric and capacity improvements such that congestion would decrease; safety would be enhanced thereby potentially improving emergency access and service delivery. The Depressed Highway would truncate numerous streets, providing less east-west connectivity and thereby less ease of access to key destinations. The Depressed Highway Strategy would completely rebuild the bridges and pavement, and introduce capacity improvements that would have the potential to decrease accidents in the viaduct priority area.

4.5.2 Economic Competitiveness Goals Assessment – Summary Conclusions

A “high level” qualitative assessment was completed of the economic competitiveness assessment of the competing strategies. It constitutes the first step in analyzing the

economic opportunities facilitated by the five strategies for I-81. This set of qualitative assessments identified the range of effects that each strategy would have on transportation access and economic growth. Table 14 highlights the key findings for each strategy based on immediately available information. Each strategy would result in short-term economic impacts during to construction and long-term impacts from changes in transportation connectivity and efficiencies as well as property displacements and development or redevelopment opportunities.

The net short-term economic impacts can be two fold. There would be positive job and income impacts due to the construction spending, but there would be the potential negative impacts due to interrupted access to local businesses or property impacts. Businesses may see changes to revenues, decide to relocate, or choose to close during construction due to these effects.

The net long-term economic impacts of the strategies would be largely influenced by permanent property acquisitions or displacements that would be required to construct each strategy and the changes in transportation efficiencies that would result from each strategy. For example, a neighborhood anchor business might lose its parking due to the ROW needed by a strategy or a strategy may result in increased travel time to businesses reducing their economic competitiveness against other businesses in the region. Conversely, a strategy may result in a reduction in accidents, thereby generating a positive economic benefit. Provided in this assessment is an evaluation of the net benefits of each strategy. It is the net benefits, which consider both the pros and the cons of each strategy that would be important to understand as each alternative is further evaluated.

No Build Strategy: The No Build Strategy would maintain existing conditions and would have no positive or negative effects on economic competitiveness. As such, it would not meet the economic competiveness goals.

Rehabilitation Strategy: The Rehabilitation Strategy would have shorter-term construction impact as compared to all of the competing strategies except the No Build strategy. It is expected to have comparatively less disruption to existing traffic patterns and flow and would not require any property acquisitions. While this strategy would improve safety and provide some limited additional capacity, it would not provide substantial enhancements to encourage additional long term economic growth and development. In addition, it would not alter or create new opportunities for non-motorized transportation or access between University Hill and Downtown. As such, the Rehabilitation Strategy in the viaduct priority area would not meet the economic competiveness goals.

Reconstruction Strategy: The effects of the Reconstruction Strategy on economic competitiveness would be similar to that of the Rehabilitation Strategy. The notable difference would be that the Reconstruction Strategy would include more opportunities to enhance the aesthetics and sense of safety and place under and surrounding viaduct. In addition, it would offer more opportunities to enhance the non-motorized transportation

network than the Rehabilitation Strategy. These two aspects of the strategy would, together, be more supportive of redevelopment and infill in this area than the Rehabilitation Strategy. As such, the Reconstruction Strategy would have more potential to meet the economic competiveness goals.

Boulevard Strategy: The Boulevard Strategy would remove sections of the I-81 viaduct and would have longer and more disruptive construction phases than with the Rehabilitation or Reconstruction Strategies. It would also impact adjacent properties and may require some property acquisition for the new boulevard ROW. However, the Boulevard Strategy would result in less property and business access impacts than the Tunnel or Depressed Highway Strategies. The Boulevard Strategy would likely improve access overall with new at-grade connections among Downtown, west-side neighborhoods, University Hill, and other east-side neighborhoods. It would also provide the greatest potential for incorporation of non-motorized and multi-modal opportunities among all of the strategies. Additionally, the Boulevard strategy may have a positive impact on economic development over the longer term due to more direct local access to existing businesses and creation of redevelopment and infill opportunities for properties adjacent to the new boulevard. Overall, the Boulevard Strategy would, meet the economic competitiveness goals.

Tunnel and Depressed Highway Strategies: The Tunnel and Depressed Highway Strategies would remove sections of the I-81 viaduct and, as a consequence, would have longer construction period, and would result in more impacts than with the Rehabilitation, Reconstruction, or Boulevard Strategies. The Tunnel and Depressed Highway Strategies would reduce access to local businesses and sever up to seven east-west roadway connections. However, it would provide some opportunities to enhance non-motorized and transit. Overall, the Tunnel and Depressed Highway Strategies would partially meet the economic competitiveness goals.

Table 14 - Qualitative Economic Assessment by Strategy – Viaduct Priority Area

Strategy	Cost(millions) Plus $250-$500M in other costs	Qualitative Assessment
Rehabilitation	$500-$600	Lower-range costs. Improves safety and minimal congestion relief. Low impacts to properties. Minimal long-term transportation and economic impacts.
Reconstruction	$800-$900	Medium-range costs and construction impacts. Improved interstate access to University Hill.
Boulevard	$700-$800	Medium-range costs and substantial construction impacts. Improved access between Downtown and University Hill. Opportunities for expanding non-motorized traffic and economic development.
Tunnel	$1,600 - $1,800	Higher–range costs and substantial construction impacts to properties. Opportunities for expanding non-motorized traffic, reducing congestion, and economic development.
Depressed Highway	$1,200 - $1,500	Higher-costs and substantial construction impacts to properties. Access and safety improvements.

4.5.3 Social Equity/Quality of Life Goals Assessment – Summary Conclusions

The overall long-term vision for the City of Syracuse is to create a sustainable and livable place with a vibrant downtown and neighborhoods that are well-connected by a range of motorized and non-motorized transportation modes that offer equal opportunities for all to live, work, and find leisure in Syracuse. The strategies were evaluated to assess the relative degree to which they would have the potential to support this vision, and to assess the short-term (construction-related) and long term (operation-related) effects of each strategy on social equity and the quality of life of Syracuse. The results of this assessment are summarized below.

No Build Strategy: The No Build Strategy would act as a disincentive to smart growth in the City and County. Existing inducements to the continuation of sprawl would remain. The No Build Strategy would not support the overall vision for the City as a sustainable and vibrant City with a supportive range of motorized and non-motorized transportation modes. The No Build Strategy would maintain the existing visual environment along the existing viaduct that creates a visual barrier among adjoining neighborhoods. As such, this strategy does not serve the quality of life goals for the project. The No Build Strategy would not result in disproportionate beneficial or adverse effects on social equity.

Rehabilitation Strategy: The Rehabilitation Strategy would retain the existing I-81 configuration and connectivity as it currently exists including the visual barrier created by the viaduct. Consequently, it would have the same effects on social equity and quality of life as the No Build Strategy. As such, this strategy would not serve the quality of life goals for the project while also having no net effect on social equity.

Reconstruction Strategy: The Reconstruction Strategy would retain most of the current alignment and connectivity of the existing I-81, particularly within the viaduct priority area where the visual and neighborhood cohesion barrier of the viaduct would remain. It would offer some enhanced access in the outer segments of I-81, reinforcing the ease of commuting from the City edges to jobs in the City core, thus supporting downtown employment but furthering residential sprawl. The notable difference between the Reconstruction Strategy from the Rehabilitation Strategy is that the Reconstruction Strategy would include more opportunities to enhance the aesthetics and sense of safety and place in the area immediately under and surrounding the viaduct. In addition, it would offer more opportunities to enhance the non-motorized transportation network than with the Rehabilitation Strategy. These two aspects of the Reconstruction Strategy would, together, be more supportive of enhanced neighborhood sense of cohesion along with more opportunities for redevelopment and infill consistent with the City of Syracuse goals for the future of the downtown and surrounding neighborhoods. As such, this strategy would support the quality of life goals and have no net effect on social equity.

Boulevard Strategy: The Boulevard Strategy offers the strongest support for smart growth, sustainability, and achievement of the vision for the City among all the strategies for the viaduct priority area. It would offer some enhanced access in the outer segments of the corridor. This could benefit both existing edge communities and support the continuation of sprawl in the region. The effects of the Boulevard Strategy in the viaduct priority area would be mixed. The Boulevard Strategy would offer the most improvements to connectivity among neighborhoods of all the strategies while also severing some east-west roadway connections and requiring a potentially substantive number of property acquisitions for the Boulevard ROW. The Boulevard Strategy would remove the viaduct and its visual barrier. At the same time, the at-grade boulevard would offer the greatest opportunity among all the strategies to improve the streetscape, add access for bicyclists and pedestrians, and strengthen cohesion of neighborhoods within the corridor. Overall, the Boulevard Strategy would be consistent with the City's long-term vision and would have a beneficial effect on social equity and quality of life in the viaduct priority area.

Both the short-term (construction-related) and long-term (operation-related) effects on local traffic and noise would disproportionately higher on disadvantaged and minority populations under this strategy than would be imposed on the City or region as a whole. This would include localized property impacts to the northern edges of the University Hill neighborhood, North Salina neighborhood business district, and edges of the Downtown neighborhood. For the viaduct priority area, however, the Boulevard Strategy would also have comparable benefits to all neighborhoods adjacent to the corridor, including enhanced connectivity, opportunities for infill and redevelopment, and sense of cohesion. As such, the Boulevard Strategy would result in both somewhat higher burdens as well as greater benefits on minority and disadvantaged populations in the viaduct priority area than the remainder of the City.

Tunnel Strategy: The Tunnel Strategy would have many of the same effects on social equity and quality of life as the Boulevard Strategy. It would result in greater property impacts and alter connectivity than with the Boulevard Strategy. With the closure of the Harrison and Adams Street interchange, access to the Downtown and the University Hill area would become more indirect. This strategy would sever up to seven east-west connecting roadways and create a physical separation between neighborhoods on the west and east sides of the tunnel as a consequence of the development of the surface boulevard. This strategy would have the potential to result in the most disproportionate adverse impact to some neighborhoods and EJ populations of all of the strategies due to property displacements and losses and reduced east-west connectivity.

Depressed Highway Strategy: The Depressed Highway Strategy would generally have the same effects on quality of life and social equity as the Tunnel Strategy. However, it would not have the benefit of a surface boulevard. As such, the long-term negative effects on connectivity both physically and visually among neighborhoods on the east and west sides of the highway would be greater than with the Tunnel or Boulevard Strategies. The Depressed Highway Strategy would offer the least support for sustainable land use patterns, fewer benefits to disadvantaged populations, and least benefit to quality of life among the build strategies and does not meet the quality of life and social equity goal.

4.5.4 Environmental Stewardship Goals Assessment – Summary Conclusions

The goals for environmental stewardship focus on support for local and regional environmental improvement initiatives and minimizing negative effects of the project on key environmental resources important to quality of life in the region; including the effects on air quality, noise, stormwater/water quality, and historic and archeological resources.

The proposed strategies would have the potential to effect air quality due to changes in traffic and associated motor vehicle emissions. Similarly, the strategies would have the potential to effect noise levels as a consequence of changes in volume of traffic, proximity of traffic to sensitive noise receptors such as hospitals, schools, and homes, and the mix of vehicles in traffic (trucks and other large vehicles generate higher noise levels than the automobile). Existing highway noise levels along I-81 exceed criteria established by the Federal Highway Administration (FHWA) that mandate consideration of noise abatement. Consequently, abatement of highway noise would be considered regardless of which build strategy is selected for final design and implementation. In brief, the extent to which the strategies would support the goals for environmental stewardship are summarized as follows.

No Build Strategy: The No Build Strategy would maintain existing conditions and consequently, would not result in change to the effect of I-81 on environmental resources. The No-Build Strategy would require any ground disturbance that would have impact any cultural, historic, archeological, or other community resources. It would also maintain the existing and outdated systems currently used to manage stormwater from the roadway. Overall, the No Build would not meet the goals for environmental stewardship.

Rehabilitation Strategy: The effects of the Rehabilitation Strategy on environmental resources and stewardship would be comparable to those of the No Build Strategy. Highway-related effects on air quality and noise would remain unchanged. Some limited work outside the existing highway right-of-way would result in a minor potential to disturb archeological or historic resources. Access to key destinations in the corridor would also remain unchanged. As such, the Rehabilitation Strategy would have no beneficial effect onto environmental stewardship in the City or region and is neutral in meeting the environmental stewardship goals.

Reconstruction Strategy: The Reconstruction Strategy would maintain the existing highway with some modifications to highway access and a new viaduct. Consequently, the effects on highway-related air quality and noise would be substantially unchanged. The Reconstruction Strategy would result in some potential to impact previously unreported archaeological sites and disturb the setting of some historic sites or structures. However, construction of the Reconstruction Strategy would predominantly take place in areas previously disturbed during construction of I-81 and I-690 or for urban development. As such, the impact of construction activities would not be expected to be significant. The Reconstruction Strategy would increase the amount of impervious surfaces by about 25% in the study corridor. However, it would also include redesigned and enhanced stormwater management systems to address any issues of increased stormwater flows or other changes in stormwater quality. Access to the key destinations that are also sites of local environmental initiatives would remain substantially unchanged. As such, this strategy would have an overall neutral in meeting the environmental stewardship goals.

Boulevard Strategy: The effects of the Boulevard Strategy on air quality and noise are uncertain since it would bring the existing highway to grade closer to nearby sensitive land uses, but would result in lower traffic volumes and a lesser percentage of heavy duty trucks. The Boulevard Strategy would have the potential to impact previously unreported archaeological sites and disturb the setting of some historic sites or structures. However, construction of the Boulevard Strategy would predominantly take place in areas previously disturbed during construction of I-81 and I-690 or for urban development. As such, the impact of construction activities on cultural resources would not be expected to be significant. The Boulevard Strategy would increase the area of impervious surfaces by approximately 30% in the study corridor but the design of the Boulevard Strategy would incorporate contemporary, low-impact stormwater management systems that would improve water quality over existing conditions. Access to the key destinations that are also sites of local environmental initiatives would be somewhat improved with this strategy. As such, the Boulevard Strategy would have an overall beneficial effect on environmental stewardship goals.

Tunnel Strategy: The Tunnel Strategy would meet the goals for environmental stewardship to substantially the same degree as the Boulevard Strategy. It is estimated that the Tunnel Strategy would decrease the impervious surfaces by approximately 2%, thereby decreasing stormwater runoff. In addition, the Tunnel Strategy would require substantial excavation for its construction and would have a greater potential to disturb archeological remains than with

the Boulevard and Reconstruction Strategies. Design to maintain a dry tunnel and discharge stormwater would require a more complex system at higher costs for construction and ongoing maintenance than that for the Boulevard or Reconstruction Strategies. Noise levels in the vicinity of the tunnel portals would be higher than with any of the competing strategies.

Depressed Highway Strategy: The Depressed Highway Strategy would meet the goals for environmental stewardship to substantially the same degree as the Tunnel Strategy with the exception that it is estimated that it would result in an increase in impervious areas of 10% beyond existing conditions. As a consequence, the Depressed Highway Strategy would require a complex stormwater management system to keep the highway dry with attendant higher construction and ongoing maintenance costs. Noise levels in the viaduct priority area with the Depressed Highway Strategy would be potentially higher than existing noise levels due to reverberation of noise between the walls of the depressed roadway. Similarly, air pollutant levels at street level locations along the viaduct priority area would potentially be higher with the Depressed Highway Strategy since emissions from the highway sections would be closer to nearby sensitive land uses. In addition, the Depressed Highway Strategy would require substantial excavation for is construction and would have a greater potential to disturb archeological remains than with the Boulevard and Rehabilitation Strategies.

The four build strategies in the viaduct priority area include reconstruction of the viaduct, viaduct removal with at-grade/boulevard, viaduct removal with tunnel, and viaduct removal with depressed highway. Viaduct and interchange improvements for the build strategies will include the northern improvements, West Street interchange improvements and a new I-690 exit east of I-81; as such, these improvements are grouped into the “viaduct priority area” and these elements are included in the strategies assessments and cost estimates. Each of the strategies in the viaduct priority area was evaluated against the corridor needs and study goals and objectives.

Summary Findings

The Reconstruction and Boulevard strategies would strongly meet the transportation goals to enhance the transportation network, enhance region-wide mobility, and improve public safety; the Tunnel and Depressed Highway strategies meet the transportation goals to a lesser extent.

The Reconstruction and Boulevard strategies would strongly meet the economic competitiveness goals to maintain or improve economic opportunities and exercise fiscal responsibility. The Tunnel and Depressed Highway strategies moderately meet the economic competitiveness goals.

The Reconstruction and Boulevard strategies would strongly meet the social equity/quality of life goals to support community quality of life and share burdens and benefits. The Tunnel and Depressed Highway strategies do not meet the social equity/quality of life goals.

The intent of the four build strategies is to meet the environmental stewardship goal to preserve or enhance environmental health. Further studies will be conducted in the subsequent environmental review process to determine the strategies ability to meet this goal. An Environmental Impact Statement (EIS) will be prepared for the priority project(s) in the viaduct priority area to identify and describe the affected environment, analyze and document the construction-related and operational environmental consequences of the project alternatives, and identify opportunities and measures that mitigate any identified adverse impacts.

Based on the evaluation of the priority area strategies against the transportation, economic competitiveness, social equity/quality of life, and environmental stewardship goals and objectives, as well as consideration of cost, the Reconstruction and Boulevard strategies are considered feasible. The Tunnel and Depressed Highway strategies are considered to not be feasible. More in-depth evaluation of the strategies will continue as strategies are refined.

4.6 NEXT STEPS

The I-81 corridor study and associated technical memorandums assess current highway infrastructure conditions and evaluate potential strategies for addressing existing deficiencies. This corridor study identifies problems and issues, transportation needs and possible strategies to address the future of the 12-mile I-81 corridor in the Syracuse metropolitan area. This planning study takes into account the community context and the environment in which I-81 exists. It is recommended that work associated with the viaduct priority area be progressed as the first priority.

The results of this corridor study will be carried forward into the next phase of the development, NEPA scoping, which will continue to build upon the findings of this planning study. Based on this initial evaluation, potential strategies were identified, which include rehabilitation, reconstruction, conversion of the highway to an urban boulevard, a highway tunnel, and a depressed highway. The NEPA documentation will consider the list of alternatives and evaluations conducted to date as well as any other reasonable and prudent alternatives identified during scoping.

Throughout the environmental review process, the lead agencies, FHWA and NYSDOT, will coordinate and work cooperatively with other federal, state and local agencies. Public participation will be conducted throughout the NEPA process, and public input will be considered thoroughly in the project development and decision-making process. There will be early opportunities for public input during project scoping meetings and during public hearings and meetings. Public outreach will be central in identifying and communicating social, economic, and environmental impacts, property relocations concerning individuals, groups, or institutions; reasonable notice will be provided to the public about public information meetings and public hearings.