SECTION 2: PURPOSE AND NEED

- Why is the project needed?
- What does the project intend to accomplish?
- What are the goals and objectives of the project?

2-1 INTRODUCTION

This chapter discusses the deficiencies and limitations of Interstate 81 (I-81) and Interstate 690 (I-690) in the City of Syracuse that initiated the I-81 Viaduct Project (i.e., the "need" for the project) and how those needs would be addressed by the project (i.e., its “purpose”). In addition, this chapter discusses goals that have been established to guide project development, and the objectives that have been established to address the needs and meet the purpose of the project.

2-2 IDENTIFYING THE NEED FOR THE PROJECT

The future of the I-81 corridor is important to the efficient movement of people and goods in and around greater Syracuse and is also important to the integrity of the national transportation network. Within greater Syracuse, I-81 is a principal north-south transportation route for commuters, travelers, and commercial vehicles and provides direct access to Downtown. Nationally, I-81 is a major north-south transportation corridor that extends from Tennessee to Canada, providing links to major cities, such as Washington, D.C., Philadelphia, and New York City, via east-west connections. I-690 is a principal east-west arterial in Syracuse that also provides direct access to Downtown.

As evidenced by the *I-81 Corridor Study* (NYSDOT, July 2013) that preceded this project (discussed further in the section titled *The Need to Correct Nonstandard and Nonconforming Design Features*), the I-81 viaduct and I-81/I-690 interchange have been the subject of community and agency concern because of ongoing congestion and safety issues, as well as aging infrastructure. The *I-81 Corridor Study* identified a section of I-81 and I-690 in and near Downtown Syracuse as a priority area for improvements due to a concentration of structural and geometric deficiencies, as well as frequent congestion and high accident rates. As such, the “I-81 Viaduct priority area” (described in *Section 1, Overview and Background*, and shown in *Figure 1-2*) was established and is the focus of the I-81 Viaduct Project. In many instances, highway design features (such as shoulder widths, median widths, interchange spacing, etc.) pre-date current design standards and, coupled with heavy traffic volumes, have led to recurring congestion and high accident rates.
In addition, highway infrastructure is nearing the end of its intended design life, and the
viaduct and other highway bridges have deteriorated due to age, wear, and harsh winter
weather conditions. The I-81 Viaduct priority area exhibits a high concentration of traffic
incidents and nonstandard and nonconforming features. Although highway infrastructure is
maintained in a state-of-good repair to ensure its structural integrity remains safe for the
traveling public, continued deterioration could lead to increased maintenance costs, weight
and speed restrictions on bridges, and potentially, eventual closure of bridges.

I-81 and I-690 are not only vital to the movement of people and goods in greater Syracuse
but as major highways passing through a dense urban center, they also have a considerable
influence on the character and economic vitality of the city and region. Syracuse is the
region’s largest economic center and the presence of I-81 and I-690 in Downtown Syracuse
and adjacent neighborhoods can influence development, vehicular and pedestrian
connectivity between neighborhoods, and community character. Therefore, an important
consideration of the project is the effect of the transportation infrastructure on social and
economic aspects in the community.

To ensure safety and conformity throughout the national highway system, the American
Association of State Highway and Transportation Officials (AASHTO) has established
interstate highway design standards, which are implemented by the Federal Highway
Administration (FHWA) and NYSDOT. Infrastructure that pre-dates current design standards
is considered “nonstandard” or “nonconforming.” Nonstandard design features include
geometrical aspects that are considered critical design elements, such as lane and shoulder
widths, sight-line distances, grades (i.e., slopes or steepness), etc. Nonconforming design
features include design elements that do not conform to accepted engineering practice but
are not considered critical design elements, such as the spacing between interchanges and
the lengths of acceleration and deceleration lanes.

The limitations and deficiencies of the transportation infrastructure, as well as the project’s
relevance to long-term planning visions, are discussed in the sections below.

THE NEED TO IMPROVE TRAFFIC FLOW AND SAFETY

Important indicators of the functionality of a highway network are levels of congestion and
accidents rates. Level of service (LOS) is a measurement of congestion and travel delays,
based on a scale from LOS A (free flowing) to LOS F (highly congested). The I-81 Viaduct
priority area is prone to congestion and high accident rates, largely due to high traffic
volumes combined with nonstandard and nonconforming design features (discussed further
below).

1 The information presented in this Draft Scoping Report is based on analysis prepared for the I-81 Corridor Study
(NYSDOT, July 2013). There will be additional data collection and analysis prepared for the EIS, and the EIS will present
the updated information.
According to the New York State Department of Transportation (NYSDOT) *Highway Design Manual* (HDM) design criteria, interstate highways should function at LOS C or better. During peak periods (i.e., AM and PM rush hours), traffic congestion is a frequent occurrence in certain sections of the I-81 Viaduct priority area where traffic conditions typically operate below LOS C. As shown on Figures 2-1 and 2-2, many roadway and ramp segments in these areas often approach capacity (LOS D to E) or are over capacity (LOS F), as indicated by orange and red, respectively. This often results in reduced travel speeds that average about 20 mph (well below the posted 45 MPH speed limit), indicating notable travel delays.

Frequent peak hour congestion is a result of heavy traffic volumes combined with numerous highway design features that do not meet current standards, largely due to the viaduct’s age and physical constraints. The I-81 and I-690 corridors accommodate heavy traffic volumes, with up to nearly 100,000 vehicles per day in some downtown sections near the I-81/I-690 interchange.

Nonstandard features, such as narrow (or non-existent) shoulders, poor sight-line distances, and others, contribute to traffic congestion and high accident rates. Accident rates near the I-81/I-690 interchange are four to five times higher than statewide averages for similar facilities and about three times higher than the statewide average along the viaduct segment. In addition to creating safety hazards, nonstandard features compound the problem by diminishing the ability to manage or respond to incidents resulting from these same hazards. As a result, disabled vehicles have limited space to move from general traffic lanes, and emergency response vehicles have limited access during incidents. Another important consideration is that Syracuse is located in an area subject to heavy snowfall each winter. Limited space for snow storage and removal can further contribute to space constraints created by nonstandard design features.

THE NEED TO CORRECT NONSTANDARD AND NONCONFORMING DESIGN FEATURES

In New York State, AASHTO design standards are supplemented by NYSDOT’s *Highway Design Manual*. These standards vary based on design speed and include criteria for grades and roadway curvatures, lane widths, shoulder dimensions, median design, and interchange spacing, among many others. Design standards have evolved over time as engineering and safety practices have improved. As such, highway infrastructure that was constructed in the 1950s and 1960s, including portions of the I-81 corridor, does not always meet current standards.

A survey of the I-81 and I-690 corridors identified over 100 nonstandard and nonconforming features along the I-81 viaduct and I-81/I-690 interchange, as shown in Table 2-1. While not all features are equally critical to safe operations, this tally indicates the extent of potential design-related safety issues in this area.
Figure 2-1
Existing Level of Service - Morning Peak Hour


Legend

Level of Service

- Over Capacity
- Approaching Capacity
- Good
- Waterways

Northside
Downtown
University Hill
Figure 2-2

Existing Level of Service - Evening Peak Hour

Legend
Level of Service
- Over Capacity
- Approaching Capacity
- Good
- Waterways

I-81 Viaduct Project
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Table 2-1
Summary of Existing Nonstandard and Nonconforming Features

<table>
<thead>
<tr>
<th>Nonstandard Features</th>
<th>Nonconforming Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder Width</td>
<td>Grade</td>
</tr>
<tr>
<td>Horizontal Curve</td>
<td>Sight Distance</td>
</tr>
<tr>
<td>Super Elevation (Banking)</td>
<td>Lane Width</td>
</tr>
<tr>
<td>Viaduct</td>
<td>2 0 0 8 0 0 2 0 1 13</td>
</tr>
<tr>
<td>I-81/I-690 Interchange</td>
<td>5 5 6 16 2 2 10 4 52</td>
</tr>
<tr>
<td>North Approach</td>
<td>0 0 2 6 4 0 0 1 3 16</td>
</tr>
<tr>
<td>I-690/West Street</td>
<td>0 0 4 6 2 0 2 0 16</td>
</tr>
<tr>
<td>I-690/East Side</td>
<td>0 0 0 2 0 0 0 0 3 5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7 5 12 38 8 2 6 13 11 102</td>
</tr>
</tbody>
</table>


Within the relatively short viaduct and I-81/I-690 intersection segment, there are a host of nonstandard features, including inadequate sight-distances, shoulder widths, lane widths, median widths, grades, curve radii, and super elevations (see Figures 2-3 and 2-4). In some areas, shoulders are non-existent and medians are simply narrow Jersey barriers that separate opposing traffic lanes. In addition, spacing between ramps in the viaduct segment varies from just 1,200 feet to 3,100 feet, failing to conform to AASHTO’s recommended design standard of one mile (5,280 feet). As discussed above, these conditions reduce safety and impede emergency response, thereby contributing to potential traffic incidents and traffic congestion.

The I-81/I-690 interchange is a complex intersection of two elevated highways with multiple lane merges and on- and off-ramps. The level of intricacies through which drivers must navigate combined with the abundance of nonstandard and nonconforming features, which create limited margins of error, further contribute to the diminished safety of this corridor. Moreover, this interchange is missing connections from I-690 eastbound to I-81 northbound, and I-81 southbound to I-690 westbound and therefore does not provide complete and seamless transitions between the two highways.

An additional consideration in Syracuse is snowfall, which can amplify the effects of nonstandard and nonconforming features, particularly the lack of adequate shoulders and medians. Like much of western and central New York, Syracuse is subject to lake effect snow due to its proximity to the Great Lakes, resulting in heavy yearly snowfall accumulations.
Existing Nonstandard Highway Features of I-81 Viaduct Segment

Figure 2-3

Figure 2-4

Existing Nonstandard Highway Features of I-81/I-690 Interchange

Legend

Shoulder Width

- Less Than Standard

Grade

- Less Than Standard

Horizontal Curve Radius

- Less Than Standard

Sight Distance

- Less Than Standard

Superelevation

- Less Than Standard

Lane Width

- Less Than Standard

Median Width

- Less Than Standard
  - Exit Number

Syracuse is routinely rated as one of the snowiest cities in the U.S. based on average yearly snowfall, which typically exceeds 100 inches.\(^1\) Lack of adequate shoulders and medians reduces the available space to store or remove snow, in turn reducing space for traffic and emergency access.

THE NEED TO IMPROVE HIGHWAY BRIDGE INFRASTRUCTURE

I-81 and I-690 are elevated through Downtown Syracuse. The I-81/I-690 interchange and viaduct comprise 33 highway bridges, with 17 additional bridges along the I-81/I-690 interchange approaches. These bridge structures were constructed primarily in the 1960s and many of their components are nearing the end of their design service life. Over time, these structures have experienced varying levels of deterioration from exposure to weather, de-icing salts, and heavy vehicle use. Bridges are particularly susceptible to wear and tear because many of the structural elements are directly exposed to weather conditions (i.e., ice in winter and heat in summer).

Interstate highways and their bridges are regulated by FHWA, and are owned and maintained by the state departments of transportation (NYSDOT, in this case). To monitor the structural adequacy of highway bridges, FHWA has established a National Bridge Inventory (NBI) condition rating system. A bridge that is considered “structurally deficient” has a condition rating of 4 or less (based on a scale from 0 [failing condition] to 9 [excellent condition]) for the deck, superstructure, or substructure; or an appraisal rating of 2 or less (based on a scale from 0 [closure] to 9 [superior]) for structural condition or waterway adequacy. Similarly, NYSDOT uses a bridge inspection program to rate structural conditions of bridges on a scale of 1 (failing condition) to 7 (new condition). Based on its system, NYSDOT considers bridges with a condition rating of less than 5.000 to be “deficient.” NYSDOT inspects highway bridges at least every two years to assess their structural conditions, which informs the FHWA NBI ratings and NYSDOT condition ratings. Condition ratings that are deficient do not necessarily indicate unsafe traveling conditions in the near term, but are used to prioritize areas of repair and maintenance and identify areas that may need more extensive measures to address future deterioration.

FHWA uses an additional classification system to identify bridges as “functionally obsolete” based on dimensional aspects—such as deck geometry (e.g., lane widths), vertical clearances, etc.—that do not meet current design standards. The functionality of a bridge is a measure of its effectiveness to carry traffic on or under the structure. Bridges that are functionally obsolete are not necessarily in poor structural condition but may not operate with optimal safety and efficiency.

Of the nearly 50 bridges within the I-81 Viaduct priority area, seven bridges are classified as structurally deficient and approximately 20 bridges are classified as functionally obsolete per

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FHWA standards. Over 25 bridges meet NYSDOT “deficient” condition ratings of less than 5.000.

Considering the level of capital investment needed where more long-term solutions are deemed necessary to correct structural deficiencies, NYSDOT determines whether bridges can achieve desirable lifespans through rehabilitation or whether replacement is required. Based on its evaluation of the bridges in the project limits, NYSDOT recommended replacement of all bridges in the viaduct and I-81/I-690 interchange (except for one recently constructed bridge) and replacement of six bridges in the approach sections. All others were recommended for rehabilitation, with the exception of several recently constructed bridges.¹

Table 2-2 summarizes the structural conditions of the “significant” bridges within the project limits, which for the purposes of this study are those bridges that are at least 1,000 feet long, or have NYSDOT condition ratings of less than 5.000, or that meet FHWA criteria for being structurally deficient or functionally obsolete.

NYSDOT predicts future conditions of bridges using its Bridge Needs Tool. As shown in Table 2-3, the condition ratings of the “significant” bridges in the project area are expected to continue to decline by 2020 and 2050, many to poor conditions (NYSDOT condition rating of less than 4.4). This demonstrates a pressing need to implement corrective measures in the near term to maintain safe traveling conditions.

THE NEED FOR TRANSPORTATION INFRASTRUCTURE TO SUPPORT LONG-RANGE PLANNING EFFORTS

Several local and regional long-range plans have established goals for the regional transportation network, and/or have identified I-81, particularly the I-81 viaduct, as an influential feature within Downtown Syracuse and adjacent neighborhoods. The I-81 viaduct and I-81/I-690 interchange are prominent elevated features in Downtown Syracuse that can affect adjacent land uses and connectivity between land uses, thereby influencing the livability, sustainability, and economic vitality of the city. As such, in addition to the structural and design needs previously described, project development has and will continue to be mindful of regional and community planning initiatives.

The I-81 Viaduct Project itself stems from a three-year planning study (the “I-81 Corridor Study”) and public involvement effort (“I-81 Opportunities”) prepared by NYSDOT in cooperation with the region’s metropolitan planning organization (MPO), the Syracuse Metropolitan Transportation Council (SMTC). The I-81 Corridor Study evaluated the 12-mile section of I-81 through greater Syracuse between its interchanges with I-481, and identified the I-81 Viaduct priority area as an area with substantial structural and geometric

### Table 2-2
**Bridge Condition Summary—Significant Bridges**

<table>
<thead>
<tr>
<th>Bridge</th>
<th>Length (ft.)</th>
<th>NYSDOT Rating*</th>
<th>- FHWA – Structurally Deficient</th>
<th>- FHWA – Functionally Obsolete</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I-81 Corridor Bridges</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-81 NB &amp; SB over North Salina Street</td>
<td>163</td>
<td>5.097</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ramp from I-81 SB to Route 11 over Route 11</td>
<td>950</td>
<td>4.219</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-81 over East Adams Street (Viaduct)</td>
<td>4,097</td>
<td>3.931</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-81 SB over Route 11</td>
<td>1,780</td>
<td>5.016</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-81 NB over Route 11</td>
<td>1,787</td>
<td>4.887</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-81 NB over Erie Boulevard (I-81/I-690 Interchange)</td>
<td>1,169</td>
<td>3.944</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-81 SB over North Townsend Street (I-81/I-690 Interchange)</td>
<td>1,425</td>
<td>4.319</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ramp from I-690 WB to I-81 SB (I-81/I-690 Interchange)</td>
<td>1,723</td>
<td>4.708</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>I-690 Corridor Bridges</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp from West Street to I-690 over I-690</td>
<td>269</td>
<td>3.594</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ramp from I-690 WB to West Street over I-690</td>
<td>360</td>
<td>3.754</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ramp from N. Franklin Street to West Street over Onondaga Creek</td>
<td>200</td>
<td>3.861</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ramp from West Street to I-690 EB over Onondaga Creek</td>
<td>172</td>
<td>6.067</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Ramp from I-690 WB to West Street over Onondaga Creek</td>
<td>116</td>
<td>4.125</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-690 over I-81 (I-81/I-690 Interchange)</td>
<td>3,147</td>
<td>3.972</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I-690 over Beech Street</td>
<td>1,522</td>
<td>3.828</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** NYSDOT, April 2014.
deficiencies, thereby prompting the I-81 Viaduct Project. The I-81 Corridor Study included extensive engineering evaluation of highway infrastructure conditions, and also included robust public outreach initiatives. The engineering studies, along with the extensive public input, provided the initial basis for developing a reasonable range of alternatives for the I-81 Viaduct Project to address these deficiencies (alternatives development is described further in Section 3, Project Alternatives).

Several regional and local long-range planning and policy documents establish visions that involve transportation infrastructure, including I-81 through Downtown Syracuse. SMTC is responsible for transportation planning in the Syracuse metropolitan area and develops a Long-Range Transportation Plan (LRTP) to guide development and evolution of the region’s transportation system. The LRTP 2011 Update identifies several goals for the region’s transportation system, both in terms of how it operates and how it affects the surrounding communities. The goals in the LRTP are:

- To enhance the safety of the people using the transportation system;
To improve the mobility options for people within the Syracuse Metropolitan Planning Area (MPA);

To provide a clean and environmentally sound transportation system for current and future residents;

To enhance the area’s economic competitiveness, thereby increasing opportunities for employment;

To promote the development of an efficient urban area and a sense of community through transportation planning; and

To provide safe, clean, well-maintained and efficient transportation infrastructure.

The City of Syracuse prepared its Comprehensive Plan 2040 to establish policies to meet its vision for the future, some of which involve transportation infrastructure. The role of transportation in Downtown Syracuse is identified as an important consideration in the Comprehensive Plan. NYSDOT is considering the recommendations in the City of Syracuse Comprehensive Plan 2040, which include:

- Improve connections between Downtown and the surrounding neighborhoods, focusing on circulation for pedestrians and bicyclists; and
- Coordinate transportation options Downtown to be compatible with its function as the regional urban core.

Several initiatives have been underway in the City of Syracuse to enhance bicycle and pedestrian connectivity. As shown in Figure 1-3, designated bicycle infrastructure has been established (or is planned) throughout the City. Some of these routes are part of local bicycle and pedestrian initiatives, such as the City/SMTC Bikeway and Creekwalk, while others are part of larger regional routes, such as the New York State Bicycle Route 11 and the Erie Canalway Trail. Syracuse University has also worked to enhance bicycle and pedestrian infrastructure by developing the Connective Corridor between University Hill and Downtown with designated bike lanes on local streets, including Genesee Street, which passes under the I-81 viaduct.

Despite these initial efforts to enhance pedestrian and bicycle infrastructure, NYSDOT has identified specific needs with respect to enhanced connectivity and safety:

- Address incomplete routes, missing or inadequate crosswalks, and pedestrian signals under and near the I-81 viaduct;
- Address the lack of connectivity between pedestrian and bicycle generators and their destinations; and
- Address inadequate lighting and pedestrian refuge locations under and near the I-81 viaduct.
2-3 **PROJECT GOALS**

Because of the needs described in the preceding sections, NYSDOT is pursuing the I-81 Viaduct Project. While it is important that the highway fulfill its primary charge of moving people and goods safely and efficiently, it is also important for the project to consider the extent to which the transportation infrastructure can enhance economic growth and vitality in the city.

With the project needs and local plans in mind, NYSDOT has developed the following goals for the I-81 Viaduct Project:

- Improve safety and create an efficient regional and local transportation system within and through greater Syracuse; and
- Provide transportation solutions that enhance the livability, visual quality, sustainability, and economic vitality of greater Syracuse.

2-4 **PROJECT PURPOSE AND OBJECTIVES**

The purpose of the I-81 Viaduct Project is to address the structural deficiencies and nonstandard highway features in the I-81 corridor while creating an improved corridor through the City of Syracuse that meets transportation needs and provides the transportation infrastructure to support long-range planning efforts (i.e., SMTC LRTP, and Syracuse Comprehensive Plan).

The project’s purpose statement is intended to address the needs identified throughout this section. To meet the project’s purpose, five project objectives have been established. The first two objectives would address the need to improve traffic flow and safety, and the need to correct nonstandard and nonconforming design features. The third objective would address the need to improve highway bridge infrastructure. The fourth and fifth objectives would address the need for transportation infrastructure to support long-range planning efforts. More specifically, the I-81 Viaduct Project’s objectives are to:

- Address identified geometric and operational deficiencies in the I-81 Viaduct priority area;
- Maintain or enhance vehicle access to the interstate highway network and key destinations (i.e., central business district, hospitals, and institutions) within the I-81 Viaduct priority area;
- Address structural deficiencies and improve bridge ratings in the I-81 Viaduct priority area;
- Maintain the connections within the local street network within or adjacent to the I-81 Viaduct priority area; and
- Provide enhanced bicycle and pedestrian surface connections on streets across and along the I-81 viaduct.
The purpose, need, and objectives are the basis to determine the range of alternatives that have been developed for the I-81 Viaduct Project (see Section 3, Project Alternatives).