



I-80 Reconstruction SR 0080 Section 17M Conceptual Point of Access Study

Agreement E02656

MPMS 76357

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Prepared by

AECOM

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A. EXECUTIVE SUMMARY, INTRODUCTION & REQUIREMENTS

1. Executive Summary

The Interstate 80 (I-80) Section 17M project area is 3.5 miles and includes interchanges 303, 304, 305, 306, and 307 in Stroud Township, Borough of Stroudsburg and Borough of East Stroudsburg in Monroe County, PA. The requested change of access is to improve roadway safety, reduce congestion, maintain mobility and improve operations of I-80 mainline, interchange ramps, and ramp termini. The interchanges will be reconstructed in conjunction with the I-80 Mainline reconstruction.

The following deficiencies define the need for the facility improvements:

- safety and operation concerns on the mainline of I-80 due to minimal width shoulders, and ramp acceleration and deceleration lane lengths that do not meet current design criteria;
- congestion issues as a result of high volume of traffic with substantial truck percentages and insufficient acceleration/deceleration lanes;
- mobility issues are created by deficient bridges and substandard vertical clearances; and,
- safety and mobility issues due to lack of system continuity with three of the five study area interchanges only providing partial access.

Proposed Alternatives

The following alternatives were prepared and evaluated for the project as part of on-going alternatives analyses:

- No Build Alternative
- Transportation System Management and Transit Alternatives
- Build Alternative 2A
- Build Alternative 2B
- Build Alternative 2D

No Build Alternative

The No-Build Alternative would maintain the existing roadway, bridge and interchange configurations. The I-80 mainline would remain with insufficient median and shoulder widths, substandard ramp acceleration and deceleration lane lengths. In addition, the substandard overhead clearance for the structures would result in continued risk of being impacted by vehicles with high vertical clearance requirements and would not meet requirements for STRAHNET. This alternative does not meet the project needs.

TSM and Transit

TSM strategies evaluated include ramp metering, high occupancy vehicle (HOV) facilities, park and ride facilities, Intelligent Transportation Systems (ITS) Facilities, and transit investment alternatives. The TSM alternative alone does not satisfy any of the project needs and, therefore, would not be considered a viable alternative. The existing ITS features in the project area will remain. The build alternatives

provide opportunities to expand the existing ITS, and implement improved incident management strategies to minimize diversions through the local road network during incidents.

Monroe County Transit Authority (MCTA) bus service and regional charter bus services are currently provided for in the project area. The MCTA Strategic Plan is being updated and is expected to include a 250-car Park and Ride and Bus Transfer Center, a Ride Share/ Vanpool program, and converting the bus fleet to natural gas. The Monroe County Comprehensive Plan includes passenger rail service proposed from Scranton to Hoboken, NJ. In order for the current no-build condition to meet the future traffic projections, mass transit would need to divert over 2,500 motorists away from I-80 in the project area and onto mass transit. Therefore, a transit investment alternative is not considered a viable alternative to meet the project needs.

Build Alternatives

Multiple build alternatives were conceptualized and presented for consideration for the project. Several workshops and meetings with PennDOT and FHWA reviewed these mainline and interchange concepts which led to the development of more detailed alternatives. Five detailed preliminary alternatives were developed in detail and presented at a public meeting as Alternatives A, B, C, D, and E. Following the public meeting, a workshop was held with PennDOT and FHWA where results of the public input were discussed and the five alternatives were further screened. As an outcome of the workshops and public input, three build alternatives were retained for further detailed alternatives analysis. The three build alternatives retained for further detailed analysis are Build Alternatives, A, B, and D.

Based upon the future 2045 design year traffic analyses a six-lane section with auxiliary lanes is warranted. Therefore, each of the proposed highway improvement alternatives provides six travel lanes with auxiliary lanes, full median (26 feet) and shoulders (12 feet).

Alternative Evaluation

A design evaluation was conducted for the proposed roadway and interchange build alternatives based on the current AASHTO and PennDOT design criteria for an Urban Interstate. The design evaluation indicates the proposed roadway and interchange improvements can be designed to meet design criteria with no design exceptions.

Safety

Each alternative was developed with the intent to eliminate or minimize the following substandard features that currently exist in this area:

- Insufficient acceleration and deceleration lane lengths along I-80 at the interchanges
- Improper ramp terminal spacing along I-80 which creates a short weave section
- Insufficient median and shoulder widths along I-80
- Deteriorated roadway and bridge components

For the I-80 project, the HSM Enhanced Interchange Safety Analysis Tool (ISATe) was used for the mainline and ramps, and the Predictive Method for Urban and Suburban Arterials for the ramp termini

intersections. Specific geometry and traffic volume data were input for each alternative and output results indicate that each build alternative provides improved safety compared to the no build alternative (approximately 44% fewer predicted crashes per year).

Congestion

Freeway LOS:

Design year (2045) operating conditions are projected to be undesirable LOS F along I-80 mainline and LOS E or F for the I-80 on and off ramps during peak periods under the No Build Alternative conditions.

Using 2045 design year volumes, all freeway segments, weave segments, ramp merge/diverge, and ramp termini operate at Level of Service D or better during the AM peak period, and Level of Service E or better during the PM peak period for each build alternative. The segment located at the west limit of the project (between Interchange 302 and 303) experiences Level of Service F during the PM peak period due to the bottleneck condition created at the project limits (3 lanes to existing 2 lanes).

Mobility

The No Build Alternative does not provide an improvement to the mobility of the corridor since it does not improve minimum vertical clearances for bridges and does not provide full movement interchanges. The 2045 no-build conditions are expected to operate at unacceptable levels of service. With a higher level of congestion on I-80, the local trips that currently use I-80 for one or two interchanges may instead avoid I-80 and stay on the local roadways. During incidents in the corridor, traffic will continue to divert to the local roadway network.

Operational improvements to the deficient bridges and substandard vertical clearances are addressed in all of the build alternatives and provide for improved mobility.

Alternative 2A proposes changing Interchange 303 to full movement and elimination of partial movement Interchange 306. The partial movement Interchange 304 and full movement Interchanges 305 and 307 are proposed to remain. There is minimal improvement to mobility for this alternative.

Alternative 2B and 2D propose full movement interchanges at Exit 303, 304, 305 and 307. Due to the proximity of Exit 304 and 305 they function as a single full movement interchange. Additional mobility benefits from full movement interchanges, eliminating Interchange 306, and eliminating/combining ramp movements are provided by these two build alternatives.

The local road impacts caused by the removal of various mainline ramps is offset by the new Dreher Avenue Connector road, new ramps at West Main Street and US 209, as well as the new ramps that provide full interchange movements at Interchange 303 and 304.

Safety/Congestion/Mobility Summary

The no build alternative does not meet the project needs to improve safety, congestion and mobility.

TSM strategies evaluated include ramp metering, high occupancy vehicle (HOV) facilities, park and ride facilities, Intelligent Transportation Systems (ITS) Facilities, and transit investment alternatives. The TSM

alternative alone does not satisfy any of the project needs and, therefore, would not be considered a viable alternative. The existing ITS features in the project area will remain.

Based on the evaluation of the remaining alternatives studied in detail, Alternative 2D provides the best combination of improvements to meet the project needs of improving safety and congestion, maintaining future mobility by providing roadway and bridge operational improvements and system continuity. Alternative 2D provides fewer direct ramp merge/diverge locations to I-80, more ramps that connect to auxiliary lanes, and increased spacing between Interchange 303 and 304 compared to Alternative 2B. Alternative 2D also provides opportunities to implement improved incident management strategies and minimize diversions through the local road network during incidents. Therefore, Alternative 2D is recommended to be progressed through the design process and implemented for this project.

Environmental

There are various natural, socioeconomic and cultural resources identified in the project area. These include natural resources such as floodplains, waterways, wild trout streams, and wetland systems located within the project area and are impacted by the build alternatives. Given the close proximity of the residences and businesses surrounding I-80 and the interchanges, each of the build alternatives has impacts to residential and commercial properties including right of way, Environmental Justice, and noise impacts. The project area encompasses many individual cultural resources as well as Historic Districts within Stroudsburg and East Stroudsburg Boroughs and includes several sites with potential contamination concerns.

Of the build alternatives, Alternative 2D appears to have the least overall environmental impact and the least impact on ROW to the surrounding residential and commercial properties within the project limits. This is a critical factor identified by the local municipalities and Monroe County. In addition, the stormwater basins present a large part of the impacts. During the design process, efforts will be made to minimize environmental impacts.

2. Introduction

The I-80 Reconstruction project (SR 80 Section 17M) under Agreement No. E02656 includes 3.5 miles of full roadway reconstruction, widening, and interchange reconfiguration within eastern Monroe County, Pennsylvania. The general limits of the project extend along I-80 beginning west of the SR 611 Interchange (Exit 303) to east of the PA 191 /PA 611 Interchange (Exit 307).

A number of alternatives have been prepared for the Federal Highway Administration (FHWA) and Pennsylvania Department of Transportation (PennDOT) District 5-0 to identify potential options to address the needs and purpose of the I-80 Reconstruction project, including both system management and construction schemes. These alternatives have been evaluated for their abilities to meet the purpose and needs of the project. In addition, a “fatal flaw” environmental impact assessment has been made for each, using available secondary source data regarding natural, socioeconomic, and cultural resources.

Project Description and Location

The Interstate 80 (I-80) Section 17M project includes 3.5 miles of roadway within eastern Monroe County, Pennsylvania. Interstate 80 in this region serves as a major carrier of local and regional commuter traffic; local, regional, and national freight; and local and regional tourism. The project corridor serves as a gateway to the Pocono resort areas as well as the Delaware Water Gap National Recreational Area. Originally constructed in the 1960s, the roadway has suffered substantial deterioration in recent years, and no longer meets current design criteria. Heavy traffic volumes, especially commercial vehicle traffic contribute to frequent congestion and crashes.

This segment of I-80 is currently designated as a highway safety corridor, and as a result is targeted for the application of signs, increased levels of enforcement, and increased penalties for the purpose of reducing unsafe driver behaviors.

Roadway Network

The project corridor passes through three municipalities within Monroe County: Stroud Township to the west, the Borough of Stroudsburg and the Borough of East Stroudsburg to the east. The project limits run from just west of the 303 interchange to west of the Lincoln Avenue bridge in East Stroudsburg. The project area includes the 303, 304, 305, 306 and 307 interchanges. (See Figure 1)

I-80 is classified as an urban interstate and serves as a major east/west limited-access highway running through northern Pennsylvania, including Monroe County, as part of its 2,900 mile route from Teaneck, New Jersey to San Francisco, California (See Figures 2 and 3). Through the project area, I-80 cross-section includes two lanes in each direction with a median barrier, with variable inside and outside shoulder widths. Within the project limits I-80, is serviced by several intersecting routes which are important arterials and collectors in the area. They are, from west to east:

- US Route 209 (US 209, urban other principal arterial) running north to south and connecting with I-80 at Exit 304 in Stroud Township. From this merge, US 209 and I-80 share roadway and signage east to Exit 309, where US 209 separates from I-80 and continues northward as an urban minor arterial.
- Business 209/SR 2012 (West Main Street) runs generally east/west through the project area south of I-80, from its start with US 209 in Hamilton Township south of the project area to its terminus in Marshalls Creek in Smithfield Township in the northeast. Business 209/SR 2012 is classified as an urban principal arterial in the project area, and serves as a major local connection and “main street”.
- SR 611 (North 9th Street) is an urban minor arterial, running east from the western limits of the project area to its connection with Business 209 (West Main Street) in the Borough of Stroudsburg. From here, SR 611 shares Business 209 to South 7th Street. At this point, SR 611 runs south as Park Avenue making an eastbound-only on/off connection with I-80 at Exit 307 and continues until it intersects with SR 191.
- SR 191 (urban minor arterial) is a major north/south route which starts with its connection at SR 447 in Stroud Township in the north and runs through downtown Stroudsburg to its intersection with Business 209 (Main Street). This segment is signed as North 5th Street. From here, SR 191 is re-signed as Broad Street, crosses the Pocono Creek and proceeds southwards through southern Stroud Township. Exit 307 off of I-80 makes a westbound-only on/off connection with SR 191 (Broad Street) just south of McMichael Creek and just north of the I-80.
- Other smaller, but locally important routes include Bridge Street (SR 2009) a rural major collector

running north/south from SR 611 to Business 209/SR 2012, and Dreher Avenue (SR 2004) an urban minor arterial running north to south from Business 209/SR 2012 to the intersection of Glenbrook Road just over the municipal line in Stroud Township. I-80 makes a connection with Dreher Avenue at Exit 306 between these two termini.

Land Use

Existing land use/land cover can be classified as mostly urban in the eastern portion of the project area, especially in the two boroughs of Stroudsburg and East Stroudsburg. The project area becomes more rural heading westward along I-80. Land use is a mix of residential and commercial/industrial areas, open space parks, a water/wastewater treatment facility and flood protection areas around Brodhead Creek, Pocono Creek and its floodplain, a township maintenance yard and a portion of the Kirkwood Camp and Conference Center.

Project History

Conditions along the I-80 corridor in the project area have slowly been deteriorating as local and regional growth has added to congestion and safety concerns. As a result of these changes, the Safe 80 Task Force was created in 2001 as a coalition of local government and business representatives to identify issues and develop potential solutions to reduce congestion and enhance vehicle safety. Initiatives from the task force have included lowering the speed limit to 50 miles per hour and the introduction of signage to help avert congestion-related incidents. Most recently, the task force has been focusing on enforcement of the existing reduced speed limits, as numerous crashes involving excessive speed are a major factor in congestion throughout the project area.

Correspondingly, PennDOT District 5-0 has worked closely with the Task Force recognizing that systemic issues may be contributing to the problems identified in the 2009 I-80 Corridor Study of 18 miles of I-80 in Monroe County running from Exit 298 (I-380) east to Exit 310, where I-80 crosses into New Jersey. The I-80 Section 17M project constitutes much of the eastern end of the original study where interchanges are most densely concentrated. The 2009 study recommended several interchange modifications and mainline concepts, which served as the starting point for the alternatives developed for the project.

The Northeastern Pennsylvania Alliance (NEPA) is a Metropolitan Planning Organization (MPO). The MPO consists of four counties including Monroe County. Currently, a long range transportation plan is being developed by the MPO with completion anticipated in 2016. The NEPA MPO is not considered to be located within a Transportation Management Area (TMA).

The following map and aerials illustrate the project area.

I-80 RECONSTRUCTION

FIGURE 1: PROJECT STUDY AREA

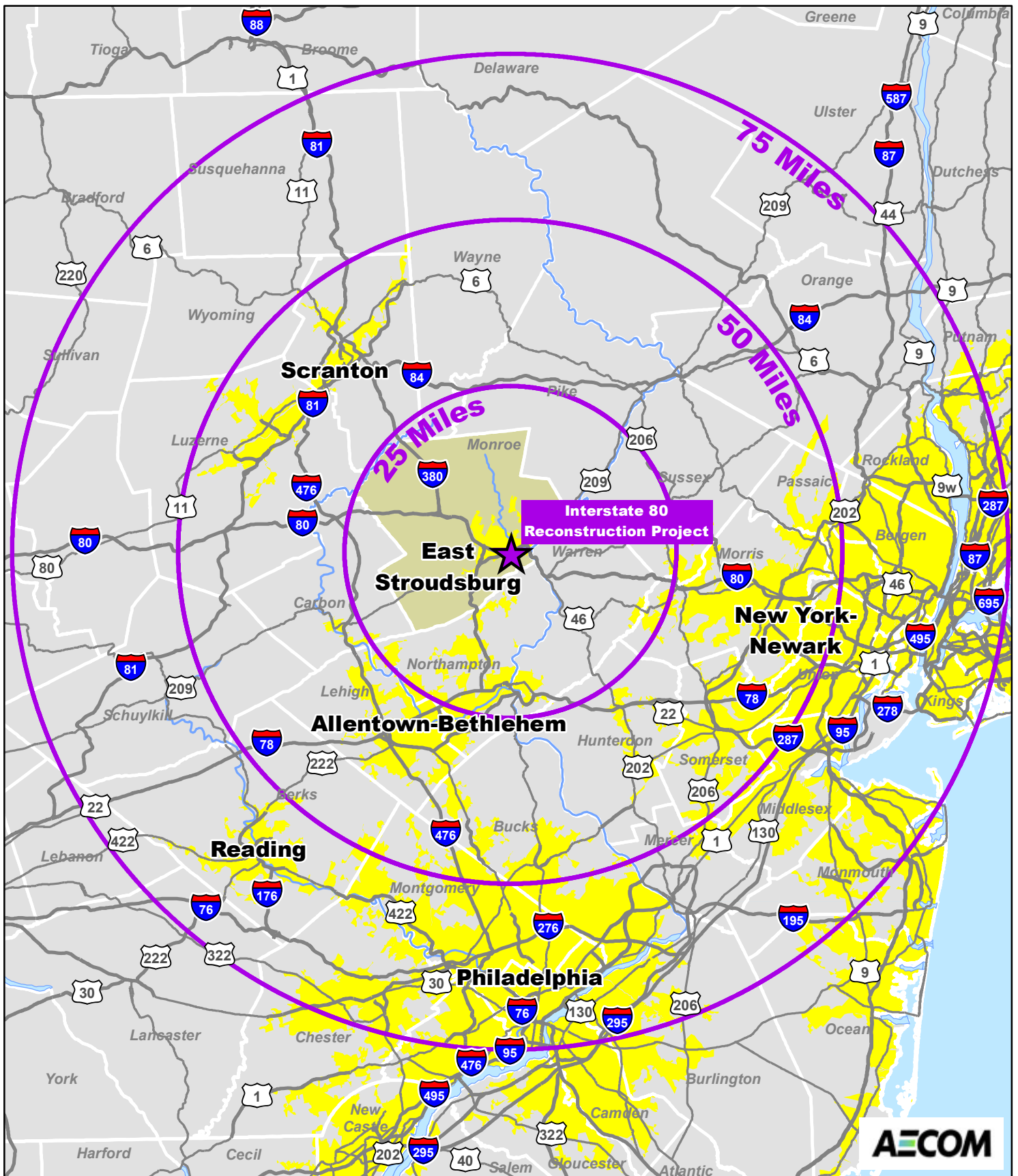


Project Location



0 0.25 0.5

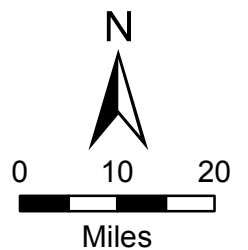
Miles

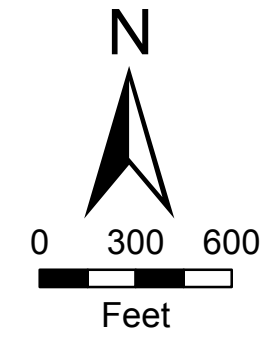


I-80 RECONSTRUCTION
FIGURE 2:
REGIONAL CONTEXT

- ★ Project Location
- Distance from Project

- Urban Area
- Monroe County





I-80 RECONSTRUCTION
FIGURE 3:
AERIAL FEATURES
Sheet 2 of 2

Source: PAMAP, 2008.

Purpose and Need

The Interstate 80 Section 17M project extends from west of Exit 303 in Stroud Township to east of Exit 307 and the Brodhead Creek bridge in East Stroudsburg Borough. The purpose of this project is to provide a safe and efficient transportation system on this National Highway System component for both local and regional connections in the area by reducing future congestion on I-80 in the 2045 design year to Level of Service (LOS) E or better, improving safety, and bringing the I-80 roadway and structures up to current design standards with no or minimal design exceptions.

The following Project Needs have been identified:

Safety

Recent crash data showing rates above the statewide average indicates a high percentage of rear-end, side swipe, and hit fixed object crashes which can be attributed to the congestion (see below) and geometric deficiencies within this Safety Corridor. Geometric deficiencies include:

- The acceleration and deceleration lane lengths for 9 of the 14 existing movements within the project limits are below PennDOT/AASHTO design criteria. See Table 1 for existing versus criteria lengths. Lack of sufficient length contributes to safety issues throughout the corridor, as indicated by the collision types and numbers shown in the Crash Analysis Map in the Crash Summary.
- The Westbound I-80 to SR 209 ramp at Exit 304 and the Main Street to Westbound I-80 ramp at Exit 305 also have an entrance / exit weave which requires a total of 2000 feet based on PennDOT/AASHTO criteria. The available length is 1000 feet. This contributes to the high number of rear-end and hit fixed object collisions in this roadway section.
- I-80 has varying inside and outside shoulder widths below minimum design criteria. Existing inside shoulders range from 1 foot to 4 feet, with 10 feet to 12 feet minimum required. Outside shoulders are 10 feet, where 12 feet is required. This results in reduced access for emergency vehicles during incidents, as well as the potential for disabled vehicles to impact the travel lanes.
- Deteriorated roadway and bridge components cause hazardous conditions under normal use as well requiring frequent lane closures for ongoing maintenance issues. The I-80 corridor in the project area was constructed in the 1950s and early 1960s. The roadway pavement has reached the end of its useful life and is in poor condition. In addition, the I-80 bridge over SR 2009 (Bridge Street) is structurally deficient, with a sufficiency rating of 30.7 and a substructure condition rating of 3.

Congestion

Existing and projected future high traffic volumes, as well as the geometric deficiencies detailed above, contribute to congestion in the project area.

- Current volumes on I-80 average approximately 47,300-70,500 vehicles per day (2013) with 12% heavy vehicles (trucks). Both overall and truck volumes increase from approximately Exit 305 eastward; overall, truck volumes tend to be heavier eastbound. Design year projections (2045) show volumes of approximately 89,200-132,800 vehicles per day. The additional future traffic will increase congestion, with the entire mainline from Exit 304 to Exit 307 and most ramps operating at LOS F in the No-Build scenario. This will also then increase the potential for conflicts at the interchange acceleration and deceleration ramps, as congested conditions make movements more difficult. See Tables 4-7 and the future no-build in Tables 8-11.

- Lack of sufficient length for acceleration and deceleration lanes also contributes to the congestion throughout the corridor. This is reflected in the LOS shown in Tables 4-7 and the future no-build in Tables 8-11.

Mobility

- System continuity is lacking. PennDOT and AASHTO design requirements for interstate systems call for all traffic movements to be available at each interchange. In addition, drivers generally expect full movement availability. Exits 303, 304, and 306 provide only some of the connections available (see Table 2), which contributes to congestion and safety issues in the region, such as the illegal left hand turns made on SR 611 at Exit 303 by exiting eastbound traffic.
- The project corridor services both local and through traffic, creating conflicts between the types of traffic and deviating from the intent of the Interstate system to facilitate long range travel. A significant portion of the project area traffic is local use that both enters and exits I-80 within the project area. For example, 48% of the traffic entering at the 307 interchange westbound exits at either the 306, 305, or 304 interchanges.
- Four lanes of traffic, two in each direction, must be maintained on I-80 at all times during construction, except for short term closures necessary for safe execution of specific construction activities.
- The Strategic Highway Network (STRAHNET) system is the system of roads deemed necessary to support the Department of Defense's operations. As a component of this system, I-80 should include minimum vertical clearances of 16'0", particularly to facilitate freight mobility. PennDOT requires an additional 6 inches of vertical clearance to accommodate future pavement overlay. The existing Exit 303 ramp bridge over I-80 provides 16'0" vertical clearance, the existing Exit 304 ramp bridge over I-80 provides 16'4", and the existing SR 0191 structure over I-80 provides only 15'0" vertical clearance.

Table 1: Criteria Lengths

Exit	Movement	Existing Length (feet)	Posted Speed (mph)	Required Length (feet)*
303	EB to 611	715	35	342
303	611 to WB	930	35	490
304	209 to EB	700	40	130
304	WB to 209	500	35	285
305	WB to Main St.	150	25	355
305	Main St. to WB	500	25	550
305	EB to Main St.	180	25	355
305	Main St. to EB	195	25	550
306	Dreher Ave. to EB	280	35	350
306	WB to Dreher Ave.	170	35	285
307	EB to Park Ave.	180	35	285
307	Park Ave. to EB	260	15	660
307	WB to Main St.	500	35	285
307	Main St. to WB	225	35	350

*Based on 50MPH for Existing Posted Speed. Higher actual travel speeds would increase required lengths.

Movements which provide less than required length are shaded.

Table 2: Movements

Exit	Available Movement			
	EB On	EB Off	WB On	WB Off
303		X	X	
304	X			X
305	X	X	X	X
306	X			X
*307	X	X	X	X

*Exit 307 movements are split: eastbound connect to SR 611, westbound to SR 191.

3. Requirements for Approval of Access

PennDOT identifies eight (8) requirements necessary for approval of access. These are consistent with the FHWA's policy on Interstate access. Below are the eight requirements and a description of how the proposed action is consistent with each of the policy requirements.

- a. The need being addressed by the request cannot be adequately satisfied by existing interchanges to the limited access facility, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands.

Design year (2045) operating conditions are projected to be undesirable LOS F along I-80 mainline and LOS E or F for the I-80 on and off ramps during peak periods under the No Build Alternative conditions. The project is being undertaken in order to improve safety, congestion and mobility. If no improvements were proposed for the I-80 mainline, then access control, traffic signals and turning lane improvements at the interchange ramp termini and adjacent intersections alone do not adequately address the project needs.

- b. The need being addressed by the request cannot be adequately satisfied using reasonable Transportation System Management strategies (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the limited access facility without the proposed change(s) in access.

TSM alternatives were evaluated and it was determined that these improvements alone will not satisfy the project needs of improving safety and operations. The required improvements to improve safety and operations cannot be addressed by TSM improvements alone.

- c. An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access. The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall

be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network. Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the limited access facility, ramps, intersection of ramps with crossroad, and local street network. Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative.

For the recommended Alternative 2D, the proposed access changes eliminate the partial interchange at Exit 306, provide full access at Exit 303 (full movement interchange upgraded from existing partial movements). Exits 304 and 305 due to their proximity, provide a single full movement interchange. Interchange 307 remains a full movement interchange. A new interchange is included at US 209 and Main Street to facilitate traffic movement in the project area with the removal of the Exit 305 EB movement and the removal of Exit 306 movements. The proposed changes improve the roadway geometry bringing the roadway up to current design standards for acceleration/deceleration lane lengths, shoulder widths, and horizontal and vertical criteria. The mainline I-80 operates at LOS F for the 2045 No Build condition. For the recommended alternative, Alternative 2D the LOS improves to E in 2045. The ramp merges/diverges are shown to operate at LOS D or better during the peak hours. The intersections at the ramp termini are shown to operate at LOS D or better during peak hours for the recommended Alternative 2D in the design year 2045.

The nearest interchange to the west is the Exit 302. This interchange provides access to and from SR611 and SR33. The proposed I-80 reconstruction limits are approximately ½ mile east of this interchange. Improvements to this interchange are not required due to the proposed I-80 Section 17M improvements as the proposed improvements for full interchanges at Exits 303 and 304 are expected to help alleviate some of the traffic congestion at the Exit 302 interchange.

The nearest interchange to the east of the project is Exit 308 which provides access to and from the Borough of East Stroudsburg. This interchange is currently in design and proposed improvements include a consistent mainline section that is three (3) through lanes in each direction between the two projects. An auxiliary lane is proposed on I-80 in each direction between Exit 307 and 308. The POA for this project was approved and is available for review. There are no changes to Exit 308 volumes for any of the project alternatives including volume reassignments due to closure of the Exit 306 ramps.

The proposed improvements will alleviate the traffic congestion that occurs in the corridor during peak commuting periods, enhance safety by upgrading I-80 in the project area to meet current highway design and safety standards, and improve mobility on this segment of I-80 to provide for interstate commerce and to accommodate movement of people and goods within Pennsylvania. The proposed improvements for the recommended Alternative 2D are anticipated to provide safer and better operational roadways and interchanges through the best combination of direct ramp merge/diverge locations to I-80, connections to auxiliary lanes, spacing between interchanges, local road impacts, ROW impacts and cost. The proposed improvements will benefit the overall transportation system along I-80.

The improvements are also anticipated to benefit the corridor's incident management activities during crashes due to the 12 foot wide shoulders as well as the existing and proposed ITS devices which will allow for faster emergency response and clearance, and informing motorists in advance of this area to seek alternate interstate routes. Several of the current incident detour routes can be redone to avoid diverting traffic to SR 611, or to allow diversions along a shorter section of SR 611.

- d. The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.

The proposed project improvements for the recommended Alternative 2D change partial movement interchanges to full movement interchanges at Exit 303 and 304; maintains full access at Exit 307; and, eliminates a partial interchange at Exit 306. Exit 304 and 305 provide a single full movement interchange due to their proximity. The interchanges connect only to state roadways (SR 611, PA 209, PA 191).

The proposed project will be designed to meet or exceed current standards. Design exceptions are not anticipated.

- e. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within Transportation Management Areas, as appropriate.

The proposed project improvements for the recommended Alternative 2D are consistent with a number of the transportation goals and policies of the Multi- Municipal Comprehensive Plan (2005) which includes improvements to I-80 and the interchanges. The project will promote traffic safety and allow for continued movement of people and goods through the I-80 corridor and the region. While the County and municipalities general support improvements to I-80, they have expressed concerns for a bypass option and improvements to major arterials including PA 611, PA 191, and Business 209. The off alignment (bypass) option was reviewed and dismissed due to its substantial cost and environmental impacts.

The project is included on the 2015 TIP for the NEPA MPO as MPMS 76357.

- f. In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan.

No new interchange additions are anticipated in the project area in the long-term. Existing adjacent interchange 308 is to the east and interchange 302 is to the west. Existing adjacent interchange 308 is under design and will provide a consistent mainline cross-section with this project.

- g. When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements. The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and limited access facility access point.

The proposed project improvements are not due to a substantial change in current or planned developments or land use due to the densely developed characteristics in and around the project area. No developer agreements or commitments are necessary.

- h. The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing.

The recommended improvements will be included in the Environmental Assessment (EA) as the proposed action. A discussion on the environmental aspects is included in Section E of this report.

B. ENGINEERING STUDY

1. Existing Conditions

The project corridor passes through three municipalities within Monroe County: Stroud Township to the west, the Borough of Stroudsburg and the Borough of East Stroudsburg to the east. The project limits run from just west of the 303 interchange to west of the Lincoln Avenue bridge in East Stroudsburg. The project area includes the 303, 304, 305, 306 and 307 interchanges.

I-80 is classified as an urban interstate and serves as a major east/west limited-access highway running through northern Pennsylvania, including Monroe County, as part of its 2,900 mile route from Teaneck, New Jersey to San Francisco, California. Through the project area, I-80 includes two lanes in each direction with a median barrier, with variable inside and outside shoulder widths.

In addition to I-80, the area is serviced by several routes which are important arterials and collectors in the area. They are, from west to east:

- US Route 209 (US 209, urban other principal arterial) running north to south and connecting with I-80 at Exit 304 in Stroud Township. From this merge, US 209 and I-80 share roadway and signage east to Exit 309, where US 209 separates from I-80 and continues northward as an urban minor arterial.
- Business 209/SR 2012 (West Main Street) runs generally east/west through the project area south of I-80, from its start with US 209 in Hamilton Township south of the project area to its terminus in Marshalls Creek in Smithfield Township in the northeast. Business 209/SR 2012 is classified as an urban principal arterial in the project area, and serves as a major local connection and “main street”.

- SR 611 (North 9th Street) is an urban minor arterial, running east from the western limits of the project area to its connection with Business 209 (West Main Street) in the Borough of Stroudsburg. From here, SR 611 shares Business 209 to South 7th Street. At this point, SR 611 runs south as Park Avenue making an eastbound-only on/off connection with I-80 at Exit 307 and continues until it intersects with SR 191.
- SR 191 (urban minor arterial) is a major north/south route which starts with its connection at SR 447 in Stroud Township in the north and runs through downtown Stroudsburg to its intersection with Business 209 (Main Street). This segment is signed as North 5th Street. From here, SR 191 is re-signed as Broad Street, crosses the Pocono Creek and proceeds southwards through southern Stroud Township. Exit 307 off of I-80 makes a westbound-only on/off connection with SR 191 (Broad Street) just south of McMichael Creek and just north of the I-80.
- Other smaller, but locally important routes include Bridge Street (SR 2009) a rural major collector running north/south from SR 611 to Business 209/SR 2012, and Dreher Avenue (SR 2004) an urban minor arterial running north to south from Business 209/SR 2012 to the intersection of Glenbrook Road just over the municipal line in Stroud Township. I-80 makes a connection with Dreher Avenue at Exit 306 approximately between these two termini.

The terrain in the corridor is rolling. The posted speed limit on Interstate 80 is 50 miles per hour. In the project area, Interstate 80 is also designated as U.S. Route 209 from Exit 304 through the east end of the project.

2013 Traffic Volumes

Traffic data collection for the project area was performed in April 2013 for I-80 mainline at each end of the project area, for all on and off ramps, and for ramp termini intersections. To obtain average daily traffic (ADT) and peak hour data, the raw data was adjusted using a seasonal adjustment factor for the applicable Traffic Pattern Group (TPG) shown in PennDOT Publication 601 (August 2012 edition). From the data collection, AM and PM peak traffic hours for the project area were determined to be 8:00-9:00AM, 4:00-5:00PM, respectively.

Daily and peak hour traffic volumes are summarized in Table 3 and a schematic diagram is included in Appendix A.

Table 3 –Existing 2013 Traffic Volumes

Location	ADT	A.M. Peak Hour	P.M. Peak Hour
<i>MAINLINE I-80 SEGMENTS</i>			
I-80 EB between Int. 303 and 304	22,940	1351	1704
I-80 EB between Int. 304 and 305	33,490	2185	2471
I-80 EB between Int. 305 and 306	33,287	2148	2417
I-80 EB between Int. 306 and 307	34,766	2264	2517
I-80 WB between Int. 303 and 304	24,404	1128	2371
I-80 WB between Int. 304 and 305	35,181	1671	3422
I-80 WB between Int. 305 and 306	34,185	1648	3421
I-80 WB between Int. 306 and 307	35,689	1719	3582
<i>I-80 RAMP MERGES</i>			
I-80 EB Int. 304 from Rt. 209	10,550	834	767
I-80 EB Int. 305 from W. Main St.	2,862	172	196
I-80 EB Int. 306 from Dreher Ave.	1,479	116	100
I-80 EB Int. 307 from Park Ave.	1,843	116	140
I-80 WB Int. 303 from Rt. 611	2,138	92	171
I-80 WB Int. 305 from Main St.	3,558	174	320
I-80 WB Int. 307 from Broad St.	4,402	251	419
<i>I-80 RAMP DIVERGES</i>			
I-80 EB Int. 303 to Rt. 611	2,459	165	218
I-80 EB Int. 305 to W. Main St.	3,065	209	250
I-80 EB Int. 307 to Park Ave.	4,452	381	344
I-80 WB Int. 304 to Rt. 209	10,777	543	1062
I-80 WB Int. 305 to W. Main St.	2,562	151	308
I-80 WB Int. 306 to Dreher Ave.	1,504	71	161
I-80 WB Int. 307 to Broad St.	3,808	191	297

Mainline Volumes

Existing I-80 ADT volumes in the project study area range from 47,300 east of interchange 303 to 70,500 west of interchange 307, with 12% heavy vehicle traffic. Traffic volumes west of Interchange 304 (US209) are the higher volume sections due to volumes accessing I-80 from US209 ramps that only serve areas to/from the east. The mainline section between Interchange 306 and 307 was observed to be the highest volume segment, with PM peak hour volumes reaching 6,099 (bi-directional).

Ramp Volumes

Current ramp ADT volumes within the project area vary from 1,480 to 4,450, with the exception of Interchange 304, the US209 ramps, which currently carry 10,550 vehicles for the eastbound on-ramp

and 10,780 vehicles for the westbound off-ramp. The eastbound on-ramp carries 834 vehicles per hour in the AM peak, and the westbound off-ramp carries 1,062 vehicles per hour in the PM peak.

Existing Capacity Analyses

The peak hour traffic volumes were analyzed to determine the existing operating conditions in accordance with the standard techniques contained in the current Highway Capacity Manual (2010). Synchro was utilized to analyze the signalized intersections with HCM results reported in accordance with PennDOT guidelines. The Level-of-Service (LOS) analyses were performed for the mainline, ramps, ramp terminus intersections, and weave sections along I-80 from Interchange 303 to Interchange 307. Tables 4 through 7 summarize the LOS analysis results. For existing 2013 analysis, I-80 mainline operates at LOS C or better except westbound between Interchange 307 on-ramp and 304 off ramp which operates at LOS E during the PM peak. The weave segment westbound between Interchange 305 and 304 operates at LOS D or better.

All ramp merges onto I-80 operate at LOS D or better except Interchange 307 westbound on ramp which operate at LOS E during the PM peak. All ramp diverges Exiting I-80 operate at LOS D or better except the westbound off-ramps to Interchanges 307, 306, and 305 which operate at LOS E during the PM peak. All ramp terminus intersections are currently unsignalized and operate at acceptable LOS C or better. The Interchange 303 eastbound off-ramp as it merges onto SR 611 experiences delays due to the congestion and queuing along the SR 611 corridor. Field observations indicate that a small number of vehicles make illegal left-turns from this ramp onto westbound SR 611, and also eastbound SR 611 to the westbound I-80 on-ramp.

Summary tables and the detailed capacity/level-of-service analysis worksheets for the existing conditions are contained in Appendix B.

Table 4 - Existing Peak Hour Levels Of Service Freeway Segments

Location	Existing Year 2013 A.M. Peak Hour LOS/Density (pc/mi/ln)	Existing Year 2013 P.M. Peak Hour LOS/Density (pc/mi/ln)
I-80 EB between Int. 303 and 304	B (12.5)	B (16.2)
I-80 EB between Int. 304 and 305	C (21.2)	C (24.0)
I-80 EB between Int. 305 and 306	C (21.9)	C (23.1)
I-80 EB between Int. 306 and 307	C (23.9)	C (23.2)
I-80 WB between Int. 303 and 304	A (10.4)	C (22.6)
I-80 WB between Int. 304 and 305	B (15.7)	E (39.2)
I-80 WB between Int. 305 and 306	B (15.9)	E (39.7)
I-80 WB between Int. 306 and 307	B (16.9)	E (42.5)

Table 5 - Existing Peak Hour Levels Of Service Weaving Segment

Location	Existing Year 2013 A.M. Peak Hour LOS/Density (pc/mi/ln)	Existing Year 2013 P.M. Peak Hour LOS/Density (pc/mi/ln)
I-80 WB Int. 305 to 304	B (12.1)	D (28.2)

Table 6 - Existing Peak Hour Levels Of Service Ramp Merges

Location	Existing Year 2013 A.M. Peak Hour LOS/Density (pc/mi/ln)	Existing Year 2013 P.M. Peak Hour LOS/Density (pc/mi/ln)
I-80 EB Int. 304 from Rt. 209	C (21.6)	C (24.7)
I-80 EB Int. 305 from W. Main St.	C (26.9)	D (28.8)
I-80 EB Int. 306 from Dreher Ave.	D (28.3)	D (29.0)
I-80 EB Int. 307 from Park Ave.	C (26.1)	C (27.0)
I-80 WB Int. 303 from Rt. 611	B (11.1)	C (24.4)
I-80 WB Int. 307 from Broad St.	C (22.4)	E (40.2)

Table 7 - Existing Peak Hour Levels Of Service Ramp Diverges

Location	Existing Year 2013 A.M. Peak Hour LOS/Density (pc/mi/ln)	Existing Year 2013 P.M. Peak Hour LOS/Density (pc/mi/ln)
I-80 EB Int. 303 to Rt. 611	B (14.9)	B (20.0)
I-80 EB Int. 305 to W. Main St.	D (28.0)	D (30.8)
I-80 EB Int. 307 to Park Ave.	D (30.8)	D (30.1)
I-80 WB Int. 305 to W. Main St.	C (22.3)	E (42.0)
I-80 WB Int. 306 to Dreher Ave.	C (23.3)	E (43.2)
I-80 WB Int. 307 to Broad St.	C (22.5)	E (41.7)

Crash Summary

Five-year crash data records (2008-2012) were obtained from the Pennsylvania Department of Transportation for the I-80 main line sections within the project area. Crash reports in the identified sections have been evaluated and presented in graphic form following this summary. The following is a summarization of information taken from the crash data records.

A total of 239 crashes were reported over the 3.45 mile reconstruction segment during the five year period (2008-2012), including 43% Hit Fixed Object and 31% Rear-End collisions. These types of crashes on an interstate are typical where congestion and geometry deficiencies exist.

Individual crash rates for seven (7) separate segments were calculated for each direction (see tables and crash schematics attached in Appendix C) so as to compare the calculated average crash rates with

the current Statewide Accident Average for similar road type, which was obtained from PennDOT Accident Records Systems Homogeneous Report.

The majority of segments display average crash rates that exceed the current statewide average for urban interstates (0.56). The highest average crash rate for crashes grouped by segment within the project area (obtained from PennDOT crash data) occurred in segment 3050/3051 (US 209 ramps at Exit 304), where the crash rates reached 0.84 (westbound) and 1.09 (eastbound).

I-80 between Interchange 303 to Interchange 304: Immediately west of Interchange 303 (PA Route 611) approaching the eastbound exit and westbound entrance ramps, no crash clusters are observed at the acceleration and deceleration areas to the interchange. Some rear-end collisions were reported on the mainline section, suggesting at least some drivers in this area are reacting to speed variation in traffic flow created by accelerating or decelerating traffic. One fatality accident occurred in the eastbound direction just past the ramp exit gore area.

Within the I-80 segment from Interchange 303 (PA Route 611) to Interchange 304 (US209), the number of crashes increases with the majority reported as fixed object collisions (motorists hitting median barrier or guiderail). A number of small accident crash clusters (3 accidents or less) are shown in this area. Some rear-end collisions are evident in this section, suggesting possible driver reaction to the reduced speed limit signage heading eastbound.

I-80 between Interchange 304 to Interchange 305: The area immediately east of Interchange 304 shows the highest number of crashes within the project area on I-80. The majority of eastbound crashes within this segment are fixed object collisions with motorists hitting median barrier or guiderail in the curve section. Some rear end collisions are shown within the eastbound deceleration ramp area to exit at Interchange 305, suggesting the possibility of insufficient deceleration lengths affecting mainline free flow in this area. Crash cluster data from PennDOT also indicates a "Hit Barrier" cluster in this area.

A substantial number of westbound crashes are rear-end collisions, suggesting driver reaction to the weave section involving traffic merging from the Interchange 305 entrance ramp and traffic exiting for the Interchange 304 westbound exit to US209.

I-80 between Interchange 305 to Interchange 306: The area between Interchange 305 (W. Main Street) and Interchange 306 (Dreher Ave) contains no noticeable crash clusters. No operational issues are evident from crash data in this section.

I-80 between Interchange 306 to Interchange 307: Within the I-80 segment between Interchange 306 (Dreher Ave) and Interchange 307 (Park Ave), the majority of crashes reported are fixed object collisions involving motorists hitting median barrier or guiderail.

Some westbound crashes are same direction sideswipe collisions approaching the Interchange 306 westbound exit ramp, suggesting a possible driver reaction to combination of the roadway curve section and exiting vehicles at Interchange 306.

A small cluster of rear-end collision crashes is noted within the Interchange 307 (Park Avenue) eastbound section, suggesting driver reaction to oncoming traffic from the eastbound entrance ramp at

this interchange. A sideswipe accident was also reported within this section. A small cluster of rear-end and side-swipe collision crashes is also evident at Interchange 307 (Broad Street) in the westbound section, suggesting driver reaction to decelerating (diverging) or accelerating (merging) vehicles in the westbound direction.

Within this section, one fatality accident occurred in the eastbound direction within the curve approaching Exit 307 (Park Avenue), and one fatality accident occurred in the eastbound direction at the Park Avenue overpass location.

Existing Land Use and Demographics

As previously described in the project area description, the land uses around the interchange vary. Existing land use/land cover can be classified as mostly urban in the eastern portion of the project area, especially in the two boroughs of Stroudsburg and East Stroudsburg. The project area becomes more rural heading westward along I-80.

Starting from the eastern terminus of the project area the land use immediately adjacent to the roadway corridor includes a water/wastewater treatment facility and flood protection areas around Brodhead Creek. Crossing the creek and heading westward there is a mixed use of commercial/industrial and residential land uses as the interstate winds its way through the urban areas of Stroudsburg Borough. This includes open space at Exit 307 taking the form of Ann Street Park and Rotary Creek Park. Continuing westbound between SR 611 and Exit 306, the interstate is bordered to the north by McMichael Creek and its floodplain and by residential neighborhoods to the south made up of mostly single family homes. At this point I-80 is bordered by the Stroudsburg Cemetery to the north and a private scrap yard and the Labar Village Senior Community Association to the south.

Approaching Exit 305 there is single family residential housing to the south and residential multi-family housing consisting of the Garden Street Housing Development to the north. The interchange here is commercial to the north and mostly residential to the south. After this point, the northern side of I-80 includes Pocono Creek and its floodplain which eventually runs underneath I-80 and continues on the south side of I-80 after Bridge Street (SR 2009).

At Exit 304 there is another large private scrap yard in the southeast quadrant and a residential multi-family complex in the southwest quadrant of the I-80/US 209 interchange. Continuing towards the project area's western end there are residential single family homes south of the I-80 overpass at Bridge Street/SR 2009 and commercial development on the northern side of Pocono Creek.

After this, the area includes a township maintenance yard at Exit 303 as well as the gateway to the large shopping areas along SR 611 including the Stroud Mall and the northern portion of the Kirkwood Camp and Conference Center to the south of I-80.

Alternative Travel Modes

Monroe County Transit Authority (MCTA) bus service (red route and yellow route) runs adjacent to the I-80 corridor along SR 611 and Business PA209, offering mass transit access for commuters within the

Stroudsburg area. Service is provided five times per day in each direction on weekdays and Saturdays. The region is also served by regional charter bus services.

Bicycle facilities are not present along the various arterials in the project area. Pedestrian sidewalk facilities exist at several locations where I-80 ramps connect to arterials including Main Street (Exit 305), Dreher Avenue (Exit 306) and Park avenue/Broad Street (Exit 307).

Environmental Constraints

Environmental impacts have been identified and considered, as indicated in Section E and will be further detailed in the EA.

2. Description of Alternatives Considered

A number of alternatives were conceptualized and presented for consideration. The following design alternatives were developed for the project:

- No-Build Alternative
- Transportation System Management Alternatives
- Transit Investment Alternatives
- Build Alternatives Involving New or Modified Access – including dismissed alternatives

Each of the above listed alternatives is described in detail below.

No-Build Alternative

The No-Build Alternative is an essential part of the evaluation process. Without this aspect, it is difficult to comprehensively define the significance of any improvements proposed with the other alternatives. It also provides an opportunity to determine if the proposed improvements are effective and cost appropriate. In some cases, maintaining the existing condition or No-Build Alternative is the most appropriate alternative based upon the project needs.

Transportation Systems Management (TSM) Alternatives

Transportation Systems Management (TSM) initiatives are traffic operation improvement techniques targeted to increase vehicle occupancy and reduce the number of single-occupant vehicles on the roadway. TSM concepts are designed to improve system-wide efficiency, with some specific strategies targeting congestion, travel times, and driver safety.

TSM concepts include ramp metering, High-Occupancy Vehicle (HOV) facilities, park and ride facilities, Intelligent Transportation Systems (ITS) and Incident Management.

Ramp Metering

The ramp metering concept applied to I-80 within the Stroudsburg metropolitan area would offer the potential to improve peak period flow along the I-80 mainline by controlling the entering flow of traffic from the entrance ramps. The concept restricts platoons of traffic from entering the merge areas along

the corridor, where higher density often times causes drivers to force their way into mainline traffic causing reduced speeds. Ramp metering discourages local, short destination trips on the mainline which is prevalent in the project area and contributes to congestion on the mainline. The following seven existing freeway entrance ramps are included in the project area and can be considered for ramp metering:

- Interchange 303 - I-80 WB from SR 611
- I-80 Interchange 304 - I-80 EB from US209
- I-80 Interchange 305 - I-80 EB from West Main Street
- I-80 Interchange 305 I-80 WB from West Main Street
- I-80 Interchange 306 - I-80 EB from Dreher Avenue
- I-80 Interchange 307 - I-80 EB from Park Avenue
- I-80 Interchange 307 - I-80 WB from Broad Street

Park and Ride Facilities

Strategically located park and ride lots could provide motorists the opportunity to carpool reducing their commuting costs, and reducing the number of vehicles on portions of the roadway network.

Currently, the closest park and ride facility within the I-80 corridor is located at Delaware Water Gap Welcome Center adjacent to I-80 Exit 310. As noted previously, MCTA does have future park-and-ride facilities in the strategic planning stages (locations unknown at the time of this document). Ideally, a park and ride lot within the project area would be located adjacent to a full movement Interchange 305 or 307 to provide easy access from all directions along I-80.

Intelligent Transportation Systems (ITS) and Incident Management

From an interstate perspective, ITS/incident management focuses on managing events that could cause rapid system degradation such as crashes, construction activity, weather events, or planned special events (i.e. racing events at Pocono Raceway).

Currently, there is relatively minimal ITS deployment within the I-80 corridor. Typically, equipment includes:

- Dynamic Message Signs
- Closed Circuit Television Cameras (CCTV)
- Incident Detection System
- Highway Advisory Radio (HAR)
- Roadway Weather Information Systems (RWIS)
- Changeable Message Signs
- Communications Infrastructure (conduit/fiber optic cable)
- Freeway Service Patrols
- Incident Management Plan (IMP): The I-80 corridor IMP is managed from the PennDOT District 5 Traffic Management Center (TMC), and includes static detour signage used in major incidents.

Existing ITS equipment including CCTV cameras, Dynamic Message Signs and Highway Advisory Radio locations are within the I-80 corridor area west of the project limits near Tannersville. Additional ITS

equipment is currently in the construction stages for implementation adjacent/within the project area, including CCTV cameras at Interchange 304 and 307, Dynamic Message Signs (WB entering PA to the east, EB west of Exit 302, and NB PA 33), and Highway Advisory Radio locations. Additional signs and cameras could be added to supplement the existing coverage areas and facilitate incident management. For example, a DMS could be placed on US Route 209 NB approaching I-80.

The District TMC also provides information on travel conditions for I-80 for use through the statewide 511PA website. The website provides information on construction activities and incidents that affect travel conditions along these roadways. The District TMC is also actively involved in incident management and has planned diversion routes for implementation when incidents close a section of I-80.

Transit Investment Alternatives

Monroe County Transit Authority (MCTA) bus service (red route and yellow route) runs adjacent to the I-80 corridor along SR 611 and Business PA209, offering mass transit access for commuters within the Stroudsburg area. Service is provided five times per day in each direction on weekdays and Saturdays. The region is also served by regional charter bus services. Currently, MCTA is updating their Strategic Plan for the next 5-6 years and this document is currently in final draft form. Several items expected to be in the plan are a 250-car Park and Ride and a Bus Transfer Center, which locations are currently in strategic planning stages. A Ride Share/Vanpool program and potentially converting the fleet to natural gas are also mentioned to be part of this plan.

Highway Investment Alternatives

Multiple build alternatives were conceptualized and presented for consideration for the project. Several workshops and meetings with PennDOT and FHWA reviewed these mainline and interchange concepts which led to the development of more detailed alternatives. Five detailed preliminary alternatives were developed in detail and presented at a public meeting as Alternatives A, B, C, D, and E. Following the public meeting, a workshop was held with PennDOT and FHWA where results of the public input were discussed and the five alternatives were further screened. As an outcome of the workshops and public input, three build alternatives were retained for further detailed alternatives analysis. The three build alternatives retained for further detailed analysis are Build Alternatives, A, B, and D.

An off alignment (bypass) option has been suggested by several residents and the local municipalities during the public meetings. The off alignment option was mentioned but not evaluated in the 2009 I-80 Corridor Study as part of the Express/Local Lanes concept. The off alignment concept presents design challenges, environmental constraints, potential impacts and cost considerations that would far exceed the proposed alternatives. The environmental impacts would be substantial and obtaining an environmental approval would be difficult. In addition, the existing section of I-80 would still need to have basic upgrades associated with the maintenance of the corridor (pavement replacement). This would need to be done within the existing footprint and would require long term lane closures which may divert traffic to local roads during construction. The cost of the bypass option along with maintenance of the existing section would be substantially higher than the current build alternatives. This option was dismissed due to the high cost and the major environmental impacts.

Highway Build - Detailed Alternatives

The District's objective is to maintain two travel lanes in each direction during construction. A work zone delay analysis indicates that each build alternative needs to be four lanes of traffic, two in each direction, on I-80 at all times during construction, except for short term closures necessary for the safe execution of specific construction activities.

Based upon the future design year traffic analyses a six-lane section with auxiliary lanes is warranted (see Table 10). Therefore, each of the proposed highway improvement alternatives provides six travel lanes with auxiliary lanes, full median (26 feet) and shoulders (12 feet).

The preliminary build alternatives were further developed and these detailed alternatives are presented below as Alternatives 2A, 2B, and 2D.

Alternative 2A

The I-80 Mainline will generally follow the existing alignment and the proposed typical section consists of 3-12 foot through lanes in each direction with a 26-foot median (including 12-foot inside shoulders) with flanking 12-foot outside shoulders. Alternative 2A closely resembles the current interchange configurations while improving upon the existing movements. Minor alignment modifications were introduced to bring the corridor up to current design standards while minimizing the impacts to adjacent properties and environmentally sensitive areas. The interchange modifications illustrating this alternative are located in Appendix D and are as follows:

SR 611 Interchange (Exit 303): As compared to the existing interchange configuration this alternative incorporates improvements to Exit 303 from a partial interchange to a full movement interchange. This includes adding an EB entrance ramp and WB exit ramp. In Alternative 2A, Exit 303 proposes a tight diamond interchange concept, implementing a new stacking order on the mainline as well as a new grade separation on PA-611. This configuration provides a connector road that loops from PA-611 south to the mainline, with PA-611 and I-80 as overhead crossings. The new I-80 overhead crossing is east of the existing EB exit ramp overhead bridge. The interchange was shifted slightly to the east to accommodate, and improve, profile geometry of the entrance and exit ramps. All entrance and exit ramps are designed for a 40 MPH design speed. Ramp lengths were increased to accommodate the new grade separation, which requires retaining walls along the mainline. Additionally, the new PA-611 connector will require retaining walls as well as rock cuts to accommodate the new alignment and profile. The new PA-611 connector will provide additional queuing and capacity for exiting traffic to PA-611. The new full interchange is anticipated to alleviate traffic congestion along the PA-611 corridor by allowing additional points of access to I-80. Motorists destined to I-80 will not have to travel local roads such as Bridge Street and Main Street to access I-80 EB, and the reverse; or to travel PA-611 to interchange 302 to access I-80 east. Additional reconstruction and resurfacing work is anticipated along PA-611. Minor geometric improvements were made to accommodate the new PA-611 Connector; however profile geometry will match the existing conditions. Improvements are to tie into the existing section of PA-611 before the intersection at the Shoppes at Stroud. Driveway improvements and possible relocation of the township maintenance yard will be considered upon selection of the recommended alternative.

US 209/Business 209/Dreher Avenue Interchanges (Exits 304, 305, and 306): As compared to the existing interchange configuration this alternative improves the existing movements at Exit 304 by eliminating the safety issue of the weave movement WB between Exits 304 and 305; however, for this alternative Business 209 no longer has a connection with US 209 SB by way of I-80. With the anticipated closure of the Schafer's Schoolhouse Road intersection along SR 209, located 1-3/4 miles southward, this traffic would need to utilize Main Street (Business 209). Outside of this change, all other existing movements have been maintained and the ramp geometrics were improved to current design criteria standards.

A weave condition still exists on I-80 EB between the Route 209 NB on ramp (interchange 304) and the Main Street off-ramp (Interchange 305). The weave length is similar to the existing condition; however, the radius of the loop ramp exit to Main Street has been increased to meet current design criteria.

Exit 305 maintains all existing movements and incorporates a connector road to the south of I-80 to facilitate traffic between Business 209 and Dreher Avenue. Exit 306 ramps at Dreher Avenue have been removed and the existing movements have been consolidated with Exit 305. The existing EB on-ramp and WB off-ramp movements for Exit 306 will be provided at Exit 305 and no direct access from I-80 to Dreher Avenue is provided. The connector road to the south of I-80 is provided to facilitate traffic movement between Business 209 and Dreher Avenue due to the removal of Exit 306 ramps.

SR 191 Interchange (Exit 307): This alternative incorporates shifting I-80 approximately 36 feet to the north to accommodate the proposed I-80 mainline ultimate section below the recently reconstructed SR 611 overhead structure. A split diamond interchange is proposed maintaining the off-ramp from I-80 EB to SR 611 (Park Avenue). Ramps for the connection of SR 191 (Broad Street) to I-80 EB and I-80 WB will also be provided with some reconfiguration to meet design criteria. A cul-de-sac would be incorporated to terminate Colbert Street and replace the intersection at SR 191. The overhead structures carrying SR 191 over I-80 and McMichael Creek would be reconstructed and tie into the 5-point intersection with Ann Street and Main Street. Medical facility access is maintained with a reconstructed driveway tying to the new SR 191 profile. Mainline geometry will connect to the adjacent project at Exit 308 including auxiliary lanes in both directions.

The need to split the EB off ramp to SR 611 (Park Avenue) and EB on-ramp from SR 191 (Broad Street) is due to a shift to the assumed baseline used in design of the SR 611 bridge. As the current design has evolved to mitigate impacts to the west of the bridge, the skew of the shifted base line changed. With this change, additional width was required to tie Ramp R gore to the mainline without violating any horizontal and vertical geometric criteria. The effective width due to the skew of the new proposed baseline and the gore width does not allow for the EB acceleration lane to fit underneath span 1 of the new PA-611 bridge.

Alternative 2B

Alternative 2B has similarities to Alternative 2A at Interchange 303 but has differences at the 304/305/306 and 307 Interchange areas. The interchange modifications illustrating this alternative are located in Appendix D and are as follows:

SR 611 Interchange (Exit 303): Alternative 2B is similar to Alternative 2A at this interchange. Alternative 2B proposes the same tight diamond interchange concept, implementing a new stacking order on the mainline as well as a grade separation on PA-611. This configuration provides a connector road that loops from PA-611 south to the mainline, with PA-611 and I-80 as overhead crossings. The interchange was shifted slightly to the east to accommodate, and improve, profile geometry of the entrance and exit ramps. All entrance and exit ramps are designed for a 40 MPH design speed. Ramp lengths were increased to accommodate the new grade separation, which requires retaining walls along the mainline. Additionally, the new PA-611 connector will require retaining walls as well as rock cuts to accommodate the new alignment and profile. The new PA-611 connector will provide additional queuing and capacity for exiting traffic to PA-611.

This alternative provides an EB bypass for Exit 304 that begins at the same location as the EB interchange 303 exit ramp. The Exit 304 ramp ultimately separates from the Exit 303 exit ramp and continues to Exit 304. In the westbound direction, two ramps from the Interchange 304 area combine onto a short collector-distributor road which separate into an on-ramp to I-80 WB and an exit to Interchange 303. The new EB I-80 on-ramp from 611 does not connect to this collector-distributor road. This is further discussed below for Exits 304/305/306.

US 209/Business 209/Dreher Avenue Interchanges (Exits 304, 305, and 306): Due to the proximity of the exits 304 and 305, they function as a single interchange. A full interchange is proposed at Exit 304. Exit 305 is proposed to maintain the WB on and off-ramps, but eliminate the EB on and off-ramps. A full diamond interchange is proposed to connect US 209 with Business 209 (Main Street) allowing for the elimination of the I-80 EB on-ramps and off-ramps at Exit 305. At Exit 306, the on-ramp from Dreher Avenue to I-80 EB, and the off-ramp from I-80 WB to Dreher Avenue are eliminated. This alternative maintains the existing alignment for the I-80 mainline. All entrance and exit ramps are designed for a 40 MPH design speed, except the US 209 NB off-ramp to West Main Street which meets 35 MPH.

The proposed new NB US 209 to I-80 WB ramp is a fly-over ramp over I-80. The I-80 WB to US 209 SB ramp is a viaduct flyover which minimizes impacts to Pocono Creek. A ramp connects the Exit 305 on-ramp to I-80 WB while allowing a bypass ramp to connect I-80 WB traffic to SR 611 (to Exit 303).

As noted for Exit 303, the I-80 EB to US209 SB/ Business 209 off-ramp begins coincident with the I-80 EB to SR 611 off-ramp to eliminate weaving between the new EB on-ramp at Exit 303 and the new EB off-ramp at Exit 304. Exit 305 interchange has been revised to a half diamond interchange. I-80 EB on-ramp has been relocated 0.5 miles to the west with access from West Main Street near SR 209 in order to eliminate weaving at the interchange. In addition, the off-ramp from I-80 EB to US 209 Business is relocated to west of Exit 304 to eliminate weaving at the interchange.

The US 209 NB on-ramp to I-80 EB and the proposed I-80 EB on-ramp from Main Street run adjacent to each other but remain separated. The US 209 ramp merges to I-80, and the West Main Street on-ramp becomes an auxiliary lane that continues to Exit 307.

A proposed collector-distributor road is included along I-80 WB which eliminates the current weaving between the on-ramp from Exit 305 and the off-ramp for US 209 SB. The I-80 WB off-ramp to Exit 303 and 304 is the beginning of this collector-distributor roadway. The new US209 NB ramp connects to the left side of the collector-distributor roadway. The collector-distributor road accesses the Exit 303 off-

ramp to the right, and I-80 WB to the left. The ramps and collector-distributor road will require a multi-span structure to avoid severe impacts to Pocono Creek.

Anticipated wall locations in the area of the cemetery do not encroach beyond the toe of slope of the existing I-80 section. Bridge Street will be connected to Business 209 at a T-intersection. Minor improvements are anticipated for Arlington Avenue immediately adjacent to the proposed US 209 NB off-ramp to West Main Street.

With the elimination of the Exit 306 ramps to Dreher Avenue, the connector road proposed as part of Alternative 2A is included in Alternative 2B. However, with the elimination of the Exit 305 EB on and off ramps, the connector road is realigned to follow closer to the I-80 mainline and substantially reduce environmental impacts.

SR 191 Interchange (Exit 307): In Alternative 2B, the EB on and off ramps to I-80 have been relocated to tie in adjacent to the new PA-611 Bridge. The new locations of these ramps reduce overall impacts. The WB ramps remain at the same location and incorporate the same improvements as Alternate 2A. All ramp geometry meets a 40 MPH design speed in the vicinity of I-80. In this configuration the EB on-ramp passes under SR-191 and will require a rock cut and bench along its entire length to reduce impacts to the adjacent neighborhood.

As noted in Alternative 2A, as the current design has evolved to mitigate impacts to the west of the bridge, the skew of the shifted base line used in design of the SR 611 bridge changed. With this change, additional width was required to tie Ramp R gore to the mainline without violating any horizontal and vertical geometric criteria. The effective width due to the skew of the new proposed baseline and the gore width does not allow for the EB acceleration lane to fit underneath span 1 of the new PA-611 bridge. While the eastbound and westbound ramps still form a split interchange, the ramps in each direction are located at the same roadway (eastbound at SR 611 and westbound at SR 191) similar to the current ramp configuration.

Alternative 2D

In comparison to Alternative 2B, there are similarities at Interchanges 304/305/306 and 307 with differences at Interchange 303. The interchange modifications illustrating this alternative are located in Appendix D and are as follows:

SR 611 Interchange (Exit 303): A diamond configuration is proposed with a direct access to PA 611 at the main signalized intersection with the Shops at Stroud driveway. This interchange is located further west than Alternative 2A and 2B due primarily to the need to increase the ramp lengths to tie into the adjusted mainline geometry. The mainline profile was lowered in this area to minimize the elevation difference between PA-611 and the PA-611 Connector over I-80. All ramps meet a 35 MPH design speed. Improvements on PA-611 will extend east and tie into the existing section. Driveway relocations or improvements will be developed with the recommended alternative.

US 209/Business 209/Dreher Avenue Interchanges (Exits 304, 305, and 306): This alternative is similar to Alternative 2B and provides the same ramp movements. However, since the Exit 303 ramp is moved further west, there is now adequate spacing for ramps and eliminates the WB collector-distributor and

EB Exit 304 bypass exit. The I-80 WB off-ramp to PA611 (Exit 303) does not need to begin near Exit 304. This also allows the I-80 WB on-ramp from Main Street (Exit 305) to enter I-80 sooner. With elimination of the collector-distributor and bypass exit, the on and off ramps in each direction between Exits 303 and 304 connect to auxiliary lanes. All ramps meet a minimum of 35 MPH design speed.

This configuration also reduces the amount of impacts to Pocono Creek for both temporary and permanent conditions.

SR 191 Interchange (Exit 307): Alternative 2D is the same as Alternative 2B at this interchange.

Roundabout Concepts

Roundabouts were conceptually laid out at each signalized intersection of each alternative to evaluate their feasibility. All alternatives have shown major environmental and/or right-of-way impacts at each interchange with the inclusion of roundabouts.

At Exit 303, the shopping center entrance at the eastern end would be converted to a roundabout intersection. The overall terrain at this exit is unsuitable for a roundabout, including increased costs associated with right-of-way acquisition and environmental impacts. Alternative B would require additional structures to accommodate the roundabouts.

At Exits 304, 305 and 306, roundabouts would result in extensive impacts to properties, mostly businesses. Additional structures would be needed to accommodate the roundabout placement at each interchange.

At Exit 307, extensive environmental and property impacts would occur with the incorporation of a roundabout. The necessary horizontal and vertical geometry would require multiple property acquisitions at the 5-point intersection in Stroudsburg, along with major impacts to McMichael Creek. Additional structures and potential design exceptions would be necessary at these locations to accommodate this option.

3. Point of Access Evaluation

This study has presented design alternatives for the I-80 interchange, including the No Build, TSM, and three Highway Build alternatives. The following describes the operational characteristics of each alternative.

Future Traffic Volume and Analysis Methodology

The analysis evaluates both the no-build scenario and the proposed Interstate I-80 improvement alternatives for the year 2045. Completion of construction is anticipated in 2025 (opening year), with a design year 20 years beyond (2045). The interchanges serve not only local traffic from Stroud Township, Stroudsburg Borough, and East Stroudsburg Borough, but also other areas of Monroe County, and intrastate and interstate traffic as well. In order to account for traffic growth in the area, a regional background growth rate was applied to existing study area traffic volumes.

The existing I-80 mainline and ramp traffic volumes were increased by 2.0 percent per year compounded for 32 years to estimate 2045 traffic volumes. These traffic growth rates are consistent with the latest information provided by PennDOT's Bureau of Planning & Research. Additional information on growth rates are provided in Appendix F.

The resultant 2045 future no-build traffic volumes are presented in Appendix G. These volumes were redistributed according to the proposed new ramp designs for each alternative to give 2045 build traffic volumes. These are also presented in Appendix H.

4. Evaluation of Alternatives

The project purpose and need is to improve safety by improving geometric design to meet current standards (lane and shoulder widths, acceleration and deceleration lanes), alleviate congestion, providing for acceptable mobility for future traffic; and meet operational requirements on I-80. Each of the alternatives is evaluated below for its ability to meet the project purpose and need.

No-Build Alternative

The No-Build Alternative is an essential part of the alternative comparison, serving as the baseline for comparison of alternatives and meeting the project Purpose and Needs. This alternative assumes no improvements are made to the existing system. I-80 remains four lanes with substandard shoulders and under-clearances. Deteriorated pavement and structures continue to be repaired through maintenance activities only.

As the corridor was built in the 1950's and 1960's, the existing geometry does not meet today's standard criteria. Shoulder widths and median width are substantially narrower than that required. This may hinder emergency management services from using the shoulders to access a site while the thru lanes are backed up. Similarly, maintenance crews are forced to shut down lanes while working on the shoulders since there is not enough room for the crew and equipment. The narrow shoulders prevent their use as a temporary travel lane during incident response or maintenance activities.

Acceleration and deceleration lanes are also substandard resulting in traffic backing up onto thru lanes. This is a hazard as distracted drivers may not realize that traffic is backing up on the thru lanes and might end up rear ending stopped vehicles. Vertical clearance and horizontal clearance under three bridges are substandard according to the STRAHNET system requirements. The superelevations along three curves are substandard and are a safety concern. These curves include, from west to east, the two curves comprising the S curve at the 304/305 Exits which superelevate at 6.25%. This rate was derived from as-built plans and corresponds with a 50 MPH design speed according to curvature and urban roadway classification. The other curve is between 306 and 307 and is a 1909-foot radius and a 4.6875% superelevation rate, which corresponds with a 45 MPH design speed under rural roadway classification. Roadside safety measures such as guide rails and concrete barriers do not meet today's standards and do not account for today's commonly used vehicles. The lack of system continuity is causing traffic within the corridor to travel further distances along the local roadway network along SR 611. Drivers expect to be able to exit a system and then enter while this is not possible on all interchanges. This will require drivers to drive much further on local routes to access entry to the system again.

Design year daily traffic volumes (2045) were developed for the No-Build Alternative utilizing a two percent yearly growth rate, increasing the mainline volume to approximately 89,200 to 132,800. Corresponding design year ramp volumes vary from 2,790 to 8,400 vehicles per day. The Interchange 304, US209 ramps, are projected to be 19,882 vehicles for the eastbound on-ramp and 20,310 vehicles for the westbound off-ramp. Detailed information on the traffic volumes for the No Build Alternative is provided in Appendix G.

Using 2045 design year volumes, a substantial portion of the eastbound and westbound freeway segments, mainly between Interchanges 304 and 307 operate at Level of Service F during AM and PM peak periods. The corresponding ramp merge and diverge analyses within these sections also operate at Level of Service E.

In addition, ramp movements at Interchange 305 and 307 ramp terminus intersections experience deteriorating Level of Service under design year volumes, particularly during PM peak period. The Interchange 305 westbound off-ramps at West Main Street and the Interchange 307 westbound off-ramps at Broad Street operate at Level of Service F during PM peak period.

Under design year volumes, the No-Build weave section westbound between Interchange 305 and 304 (ramp to US209 southbound) operates at Level of Service F during PM peak period.

The detailed capacity/level-of-service analysis worksheets for the No Build scenario are contained in Appendix G.

The No-Build Alternative does not adequately accommodate future traffic volumes and does not meet the project need to improve safety, alleviate congestion, and improve mobility and system continuity.

Transportation Systems Management (TSM) Alternatives

Transportation Systems Management (TSM) initiatives are traffic operation improvement techniques targeted to increase vehicle occupancy and reduce the number of single-occupant vehicles on the roadway. TSM concepts are designed to improve system-wide efficiency, with some specific strategies targeting congestion, travel times, and driver safety.

TSM initiatives were identified and reviewed for the I-80 reconstruction project area (Interchange 303 to Interchange 307) to determine whether the TSM alternative alone could meet project needs. The purpose and need for the reconstruction project is to improve overall roadway safety, access, and operations by providing adequate shoulders and improved ramp access (including acceleration/deceleration lengths, ramp auxiliary lanes) throughout the project area. In addition, vertical clearance for existing structures over I-80 is proposed to be improved to meet the minimum requirements.

The TSM concepts identified in this report include the following:

- Ramp Metering
- High-Occupancy Vehicle (HOV) facilities
- Park and Ride facilities

- Pedestrian and Bicycle facilities
- Intelligent Transportation Systems (ITS) and Incident Management

Ramp Metering

The ramp metering concept applied to I-80 within the Stroudsburg area would offer the potential to improve peak period flow along the I-80 mainline by controlling the entering flow of traffic from the entrance ramps. The concept restricts platoons of traffic from entering the merge areas along the corridor, where higher density often times causes drivers to force their way into mainline traffic causing reduced speeds. The following seven existing freeway entrance ramps are included in the project area:

Interchange 303 - I-80 WB from SR 611: In the 2045 No-Build condition, this ramp has approximately 173 and 322 vehicles in the design year AM and PM peak hours, respectively. It is noted that the closest upstream signal (platooning traffic) to the ramp is 1000 feet west of ramp entrance (Bridge Street and SR 611).

I-80 Interchange 304 - I-80 EB from US209: In the 2045 No-Build condition, this ramp has approximately 1572 and 1445 vehicles in the design year AM and PM peak hours, respectively

I-80 Interchange 305 - I-80 EB from West Main Street: In the 2045 No-Build condition, this ramp has approximately 324 and 369 vehicles in the design year AM and PM peak hours, respectively. The existing ramp intersection with West Main Street is unsignalized; however under No-Build volumes, it is anticipated a signal would be present creating conditions for platooning traffic.

I-80 Interchange 305 I-80 WB from West Main Street: In the 2045 No-Build condition, this ramp has approximately 328 and 603 vehicles in the design year AM and PM peak hours, respectively. The existing ramp intersection with West Main Street is unsignalized; however under No-Build volumes, it is anticipated a signal would be present creating conditions for platooning traffic.

I-80 Interchange 306 - I-80 EB from Dreher Avenue: In the 2045 No-Build condition, this ramp has approximately 219 and 188 vehicles in the design year AM and PM peak hours, respectively.

I-80 Interchange 307 - I-80 EB from Park Avenue: In the 2045 No-Build condition, this ramp has approximately 219 and 264 vehicles in the design year AM and PM peak hours, respectively.

I-80 Interchange 307 - I-80 WB from Broad Street: In the 2045 No-Build condition, this ramp has approximately 473 and 790 vehicles in the design year AM and PM peak hours, respectively.

The seven freeway entrance ramps were evaluated for ramp metering as part of the no build roadway configuration. Six of the ramps are not appropriate for ramp metering due to geometric constraints of the existing ramps, along with the design year ramp volumes that are lower than typically applies for ramp meters. For the US209 Eastbound entrance, ramp metering is not appropriate since the ramp serves as a highway to highway connection between limited access sections of US209 northbound and I-80 eastbound.

Therefore, a Ramp Meter system alone would not meet the project needs. Ramp metering will be further considered as part of the Build Alternatives.

High Occupancy Vehicle (HOV) Facilities

The project area covers approximately 3.5 miles along I-80 within Stroudsburg. HOV lanes alone would not meet the project needs. In addition, PennDOT does not have plans for HOV facilities on adjacent I-80 sections.

Park and Ride Facilities

Currently, the closest park and ride facility within the I-80 corridor is located at Delaware Water Gap Welcome Center adjacent to I-80 Exit 310. As noted, MCTA does have future park-and-ride facilities in the strategic planning stages (locations unknown at the time of this document). Ideal locations would be near the full movement interchanges 305 and 307 to provide easy access from all directions of I-80. These areas are fully developed and would require ROW acquisition. While a park and ride lot alone would not meet the project needs, it would be considered for implementation as part of the project. Depending upon the recommended alternative for the project, an opportunity may exist within or adjacent to the interchange areas to provide a park and ride facility.

Pedestrian and Bicycle Facilities

The improvements along I-80 present opportunities to enhance walking and biking connection in the project area. These improved connections are supported by the Stroud Greenway, a local organization supporting and actively pursuing these and other community initiatives. Pedestrian/bicycle access is being studied for inclusion in the proposed improvements along roadways that cross over and under I-80.

Crosswalks will be evaluated at the signalized intersections including crossings of the ramps at the interchange signalized ramp termini. Pedestrian accommodations will be considered as design continues and will be incorporated as appropriate, including the Bicycle & Pedestrian Checklist in accordance with PennDOT Design Manual 1, Appendix S.

Intelligent Transportation Systems (ITS) Facilities

PennDOT has ITS facilities in the project area that are monitored from the District 5-0 Traffic Management Center. This allows for proactively monitoring the interstate, detecting and managing events that could cause rapid system degradation such as crashes, construction activity, weather events, or planned special events (i.e. racing events at Pocono Raceway). The District TMC is also actively involved in incident management and has planned diversion routes for implementation when incidents close a section of I-80. ITS devices exist at critical points in the project area and could be expanded to increase coverage areas such as a DMS on NB US 209 to further facilitate incident management activities.

While all of these efforts help to better manage the roadway from a safety and capacity standpoint, they alone do not meet the project needs to improve geometric design to meet current standards, improving safety and congestion. It also does not improve the structurally deficient bridges within the project area.

TSM alternatives (when implemented individually or in combination with each other) do not satisfy the project needs and, therefore, would not be considered a viable standalone alternative. Intelligent Transportation Systems (ITS) and Incident Management strategies discussed for the corridor offer substantial improvements to roadway operations management and are beneficial from a safety and capacity standpoint, and should be considered for implementation as part of a recommended alternative.

The proposed roadway improvements are anticipated to benefit the corridors incident management activities during crashes due to the 12 foot wide shoulders as well as the existing ITS devices which will allow for faster emergency response and clearance, and informing motorists in advance of this area to seek alternate interstate routes. Additional ITS devices, freeway service patrols and a comprehensive Incident Management Program for this section of I-80 should be considered to help alleviate congestion along I-80 and the local roads during incidents.

Transit Investment Alternatives

Monroe County Transit Authority (MCTA) bus service and regional charter bus services are currently provided for in the project area. The MCTA Strategic Plan is being updated and is expected to include a 250-car Park and Ride and Bus Transfer Center, a Ride Share/ Vanpool program, and converting the bus fleet to natural gas.

The Monroe County Comprehensive Plan indicates the first section of the passenger rail service proposed from Scranton to Hoboken, NJ is under construction (Port Morris, NJ to Andover, NJ). The two remaining sections from NJ to Stroudsburg, PA, and from Stroudsburg to Scranton are unfunded at this time. Whether the line will be funded and constructed is unknown at this time.

In order for the current no-build condition to meet the future traffic projections, mass transit would need to divert over 2,500 motorists away from I-80 in the project area and onto mass transit.

Therefore, a transit investment alternative is not considered a viable alternative to meet the project needs.

Highway Investment Alternatives

The following details each build alternative (2A, 2B, and 2D) with respect to the safety, congestion and mobility needs of the project.

Safety

Each alternative was developed with the intent to eliminate or minimize the following substandard features that currently exist in this area:

- Insufficient Acceleration and Deceleration lane lengths along I-80 at the interchanges
- Improper ramp terminal spacing along I-80 which create short weave sections
- Insufficient Median and Shoulder Widths along I-80
- Deteriorated roadway and bridge components

The rear end, side-swipe, and angle collisions that were identified through the crash analyses are typical of congestion and where freeway drivers are reacting to accommodate entering vehicles currently using insufficient acceleration and deceleration lengths. Each of the proposed highway improvements are anticipated to improve safety with the auxiliary lanes, longer acceleration and deceleration lanes, wider shoulders, and adequate vertical clearance.

Alternative 2A eliminates the short weave section on I-80 WB between Exits 305 and 304 (Main Street on-ramp to US 209 off-ramp) by eliminating the Main Street to US 209 SB connection. Without this connection, motorists will need to use Main Street (Business 209) south to US 33 and US 209. I-80 EB has a weave section between Exit 304 and 305 (US 209 on-ramp to Main Street off-ramp). The Main Street exit loop ramp radius has been increased to meet design criteria. Currently this area is a merge followed quickly by a diverge.

Alternative 2A also has a weave section along I-80 WB between the new interchange 305 braided on-ramp (from Main Street and under WB off ramp to US 209) and the new Exit 303 WB off-ramp. Auxiliary lanes are also provided between Exit 305 and 307 in the EB direction, between Exit 304 and 307 in the WB direction and between Exit 307 and 308 in each direction.

Alternative 2B eliminates the weave sections between Exit 304 and 305 in both directions. A weave section exists between the new Exit 303 and 304 ramps in the WB direction. Auxiliary lanes are also provided between Exit 305 and 307 in the EB direction, between Exit 304 and 307 in the WB direction and between Exit 307 and 308 in each direction.

Alternative 2D eliminates the weave sections between Exit 304 and 305 in both directions. Weave sections exist between the new Exit 303 and 304 ramps in each direction. Similar to Alternative 2B, auxiliary lanes are also provided between Exit 305 and 307 in the EB direction, between Exit 304 and 307 in the WB direction and between Exit 307 and 308 in each direction.

Alternative 2A has 14 ramps with 4 merge /diverge points on I-80 and 10 associated with auxiliary lanes. Alternatives 2B has 12 ramps with 6 merge/ diverge points on I-80 and 6 associated with auxiliary lanes. In addition, there are new ramps to Main Street and US 209, and new ramps from US 209 that connect to collector distributor roads. Alternative 2D has 15 ramps with 5 merge/ diverge points on I-80 and 10 associated with auxiliary lanes. In addition, there are new ramps to Main Street and US 209. These compare to the no build condition which has 12 ramps with 10 merge/diverge points and two associated with an auxiliary lane.

Highway Safety Manual Crash Prediction

Currently, PennDOT is integrating the use of the Highway Safety Manual (HSM) into the design process. The HSM will be used to compare the no-build conditions to each of the build alternatives for the freeway and ramps, as well as the ramp termini. The HSM includes software to evaluate various scenarios for freeways, ramps, and intersection configurations and provides an output that predicts average crash frequency. For the I-80 project, the HSM Enhanced Interchange Safety Analysis Tool (ISATe) was used for the mainline and ramps, and the Predictive Method for Urban and Suburban Arterials for the ramp termini intersections. Specific geometry and traffic volume data were input for each alternative and output results are presented below.

The ISATe analysis tool gave an output summary detailing expected number of crashes per year, and to what severity. The results summary is presented in the table below and the detailed spreadsheets are included in Appendix Q. As expected, the number of crashes per year for the no-build alternative is higher than the proposed alternatives, due to its alignments, and inadequate ramp lengths. The results for the three build alternatives indicate a similar number of predicted crashes and therefore are similar from a safety aspect. Alternative 2A has 211.5 predicted crashes in the design year, Alternative 2B has 216.3 crashes, and Alternative 2D has 212.4 crashes. The build alternatives are predicted to have 44% fewer crashes than the no build alternative.

Table 8 – HSM ISATe Predicted Crashes.

Alternative	Total Crashes		Mainline Crashes		Ramp Crashes		Termini Crashes	
	2025	2045	2025	2045	2025	2045	2025	2045
No Build	203.7	378.0	183.3	340.1	11.4	21.1	9.0	16.7
2A	119.6	211.5	102.8	182.0	7.0	12.4	9.7	17.1
2B	124.4	216.3	102.2	177.8	13.5	23.4	8.7	15.1
2D	122.4	212.4	103.7	179.9	10.0	17.4	8.7	15.0

To analyze the ramp terminals, another spreadsheet developed by PennDOT using the HSM was used. The PennDOT HSM Tool uses information about the intersection, such as lane configurations, pedestrians, school, and alcohol sales establishments nearby, as well as existing crash data to calculate the predicted number of crashes and type at a particular intersection. This analysis was used for all of the ramp terminal intersections in the project limits. For this project the Urban and Suburban Arterials part of the tool was used.

From the analysis it is found that the existing condition is once again the least safe, with 10.14 crashes per year, while Alternative 2D has the least number of intersection crashes, with a predicted 6.64 crashes per year. Alternative 2A has the most predicted intersection crashes with 8.47 crashes per year.

Table 9 – HSM Ramp Termini Predicted Crashes

Ramp Termini	NO BUILD		2A		2B		2D	
	Crashes/Year	Inter-sections	Crashes/Year	Inter-sections	Crashes/Year	Inter-sections	Crashes/Year	Inter-sections
SR 611(N. 9 th St.)	4.48	2	1.59	1	1.67	1	1.46	1
Park Avenue	1.26	1	1.16	1	0.64	1	0.59	1
Broad Street	1.40	1	2.43	2	1.24	1	1.24	1
Main Street	2.29	2	2.59	1	3.36	3	3.35	3
Dreher Avenue	0.71	2	0.70	1	-	-	-	-
Total Crashes/Year	10.14	8.00	8.47	6.00	6.91	6.00	6.64	6.00
Crashes/Intersection		1.27		1.41		1.15		1.11

Congestion

Design year daily traffic volumes (2045) were developed for each alternative utilizing a two percent yearly growth rate. For each alternative, traffic re-assignments were developed for the removal of existing ramps, combining existing ramp entrances and exits, the new Dreher Avenue connector road, as well as proposed new ramps that currently are not provided. Traffic volume assignments for proposed new ramps were developed considering both the removal of ramps and regional traffic patterns and current congested areas. For example, congestion at Interchange 302 just west of the project area was considered when assigning volumes to the new Interchange 303 configuration which provides a full movement interchange and also provides for all movements at the interchange terminus at SR 611. New ramps at Interchange 303 consider traffic that utilizes Business 209 to/from the south and Bridge Street to SR 611 and the Stroud Mall area. Detailed information on the traffic assignments for each alternative is provided in Appendix H and I.

Traffic analysis was performed for the mainline I-80, ramp merges and diverges, and the ramp termini intersections. Each alternative was evaluated for its ability to adequately accommodate traffic with the modified ramp configurations. The analyses were completed for the design year (2045) for each alternative in accordance with the standard techniques contained in the current Highway Capacity Manual (2010). Synchro was utilized to analyze the signalized intersections with HCM results reported in accordance with PennDOT guidelines.

Tables 10, 11, and 12 present the analysis results for mainline I-80, ramp merges and diverges for the AM peak hour and PM peak hours. Table 13 presents the results of the ramp termini intersections. The supporting information is located in Appendix J including the HCS and Synchro analysis printouts.

Using 2045 design year volumes, all freeway segments operate at Level of Service D or better during the AM peak period, and Level of Service E or better during the PM peak period. The segment located at the west limit of the project (between Interchange 302 and 303) experiences Level of Service F during the PM peak period due to the bottleneck condition created at the project limits. Continuing the three lane widening further west would provide acceptable level of service for this section. Based on the 2009 I-80 Conceptual study, a three lane section is needed to the I-380 interchange to the west.

During AM and PM peak periods, the westbound segments between Interchanges 305 to 307 operate at Level of Service E due to high volumes in this section of I-80 carrying westbound vehicles bound for US209 southbound access. Under each alternative, this westbound section of I-80 (Interchange 305 to 307) contains an auxiliary travel lane between the Interchange 307 on-ramp and the Interchange 304 off-ramp.

Weave analyses indicate that all weaves within the reconstruction area will operate at Level of Service D or better, with the exception of I-80 WB between Interchange 308 to 307 which operates at Level of Service E in the PM peak for all build alternatives. The design criteria for an auxiliary lane where an on-ramp is followed by an off-ramp is 2000 feet. For the build alternatives the proposed lengths are considerably longer. For Alternative 2A, the auxiliary lanes for I-80 EB between Exit 305 and 307 in Alternative 2A is approximately 4600 feet, and between Exit 304 and 307 for Alternative 2B and 2D is approximately 4600 to 4800 feet. The auxiliary lanes for I-80 WB between Exit 305 and 307 in the three

build alternatives are approximately 5500 to 6400 feet in length. This maximizes the distance for motorists to maneuver along I-80 and the high volumes to/from US 209.

Ramp merge and diverge analyses indicate all merges and diverges will operate at Level of Service D or better for all build alternatives during the 2045 peak hours.

Compared to the No-Build alternative, each build alternative provides an improvement in Level of Service during peak periods under design year conditions. Each of the alternatives operates at similar Level of Services throughout the corridor.

Ramp terminus intersections were found to operate at acceptable Level of Service D or better for each build alternative during the 2045 peak hours. The analyses indicate signalization would be recommended for ramp terminus intersections at the following locations:

- Interchange 303, SR 611/Exit 303 Connector Road - all build alternatives
- Interchange 304, West Main Street (Bus. 209) / I-80 On and Off Ramps – Alternatives 2B and 2D
- Interchange 305, West Main Street/ I-80 Westbound Ramps - all build alternatives
- Interchange 307, US 611 /Westbound I-80 On/Off Ramps - all build alternatives
- Interchange 307, PA 191 /Eastbound I-80 On/Off Ramps – Alternatives 2B and 2D

Other ramp termini locations are unsignalized and operate at acceptable levels of service. The new Dreher Avenue Connector is anticipated to be signalized at its intersection with West Main Street.

For each alternative, the westbound Main Street on-ramp provides access to I-80 only and not to US 209 southbound in order to eliminate the existing short weave section. For Alternative 2A, additional traffic is expected to utilize Main Street (Business 209) south of I-80 to access US 209/ US 33 southbound. With the closure of the median opening and removal of the signalized intersection at US 209 /Schafer's Schoolhouse Road, this traffic will need travel Business 209 to access US 33 and US 209. For Alternatives 2B and 2D, traffic along Main Street destined to US 209 south can use the new ramps at Main Street /US 209. Overall Main Street traffic is anticipated to be reduced between the I-80 ramps and Bridge Street due to the new ramps at Interchange 303.

The proposed improvements for alternatives 2B and 2D include a new EB on-ramp from Interchange 303 and a new off-ramp to Interchange 304 (Route 209 South). For Alternative 2B, the new off-ramp to Interchange 304 (Route 209 South) begins at the Exit 303 EB off-ramp. The ramp then separates and provides a lane for traffic destined to Exit 303 and a lane for traffic destined to Exit 304. For Alternative 2D, the Exit 304 off-ramp begins after Exit 303 and includes a weave between the new Exit 303 EB on-ramp and the new Exit 304 off-ramp. For Alternative 2D, the weave analyses indicate it will operate at an acceptable LOS C or better.

The proposed improvements for Alternatives 2B and 2D include a new WB on-ramp from Interchange 304 (Route 209 north) and a new WB off-ramp to Interchange 303. For Alternative 2B, an I-80 WB collector-distributor road begins near Exit 304. At that point, WB traffic exits for Exit 304 and 303. The I-80 WB on-ramp from Main Street also connects to the collector-distributor road, followed by the new on-ramp from Interchange 304 (US 209 north). The collector-distributor provides an off-ramp to Exit 303 and on-ramp to I-80 WB near Interchange 303. The collector-distributor road weave section analysis indicates it will operate at LOS A.

For Alternative 2D, the Exit 304 WB on-ramp and the new Exit 303 WB off-ramp form an auxiliary lane. The weave analysis for this section indicates it will operate at an acceptable LOS C or better.

Table 10: 2045 Build Peak Hour Levels Of Service, Freeway Segments

Location	AM Peak Hour				PM Peak Hour			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
I-80 EB between Int. 302 and 303	D	D	D	D	E	E	E	E
I-80 EB between Int. 303 and 304	C	B	B	B	E	C	C	C
I-80 EB between Int. 304 and 305	F	C	C	C	F	C	D	D
I-80 EB between Int. 305 and 306	F	B	D	D	F	C	C	C
I-80 EB between Int. 306 and 307	F				F			
I-80 EB between Int. 307 and 308	F	C	C	C	F	C	C	C
I-80 WB between Int. 308 and Int. 307	E	B	B	B	F	E	E	E
I-80 WB between Int. 307 and 306	E	C	B	B	F	E	E	E
I-80 WB between Int. 306 and 305	D				F			
I-80 WB between Int. 305 Diverge and 304 Diverge	-	B	-	-	-	D	-	-
I-80 WB between Int. 305 and 304	D	B	B	B	F	D	C	D
I-80 WB between Int. 305 Merge and 304 Merge	-	-	B	B	-	-	D	D
I-80 WB Ramp/Auxiliary Int. 304 to Int. 303 Exit	-	-	A	-	-	-	A	-
I-80 WB between Int. 304 and 303 (Mainline)	C	B	B	C	F	D	D	C
I-80 WB between Int. 303 and 302	C	C	C	C	F	F	F	F
X – LOS (Freeway Segment) according to HCS+™								
X – LOS (Weave) according to HCS+™								

Table 11: 2045 Build Peak Hour Levels Of Service, Ramp Merges

Location	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
I-80 EB Int. 303 from Rt. 611	x	B	A	aux	x	C	B	aux
I-80 EB Int. 304 from US209	F	aux	C	C	F	aux	D	D
I-80 EB Int. 304 from Bus 209	x	x	aux	aux	x	x	aux	aux
I-80 EB Int. 305 from W. Main St.	F	aux	r	r	F	aux	r	r
I-80 EB Int. 306 from Dreher Ave.	F	r	r	r	F	r	r	r
I-80 EB Int. 307 from Park Ave.	F	aux	aux	aux	F	aux	aux	aux
I-80 WB Int. 303 from Rt. 611	B	B	B	B	D	D	D	D
I-80 WB Int. 304 from US209	x	x	aux	aux	x	x	aux	aux
I-80 WB Int. 305 from Main St	aux	B	A	A	aux	D	C	C
I-80 WB Int. 307 from Broad St.	E	aux	aux	aux	F	aux	aux	aux

aux—auxiliary lane provided

r – eliminated ramp

x – does not exist in this alternative

Table 12: 2045 Build Peak Hour Levels Of Service, Ramp Diverges

Location	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
I-80 EB Int. 303 to Rt. 611	D	A	B	B	F	B	C	C
I-80 EB Int. 305 to W. Main St.	F	aux	r	r	F	aux	r	r
I-80 EB Int. 307 to Park Avenue	F	aux	aux	aux	F	aux	aux	aux
I-80 WB Int. 303 to Rt. 611	x	B	c-d aux	aux	x	C	c-d aux	aux
I-80 WB Int. 304 to Rt. 209	aux	aux	aux	aux	aux	aux	aux	aux
I-80 WB Int. 305 to W. Main St.	E	B	B	B	F	D	D	D
I-80 WB Int. 306 to Dreher Ave.	E	r	r	r	F	r	r	r
I-80 WB Int. 307 to Broad St.	E	aux	aux	aux	F	aux	aux	aux

aux –auxiliary lane provided

r – eliminated ramp

x – does not exist in this alternative

Table 13: 2045 Build Peak Hour Levels Of Service, Ramp Terminus Intersections

Intersection	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
Int 303 Connector / I-80 EB Ramps (U)	x	C (15.3)	C (15.3)	C (15.3)	x	D (27.9)	D (27.9)	D (27.9)
Int 303 Connector / I-80 WB Ramps (U)	x	B (10.2)	B (10.2)	B (10.2)	x	B (12.0)	B (12.0)	B (12.0)
Int 303 Connector /PA611 /Shoppe Center Dr (S)	x	x	x	C (22.2)	x	x	x	D (38.2)
Loop Access Rd /PA611 (Alt A1, B1 Only) (S)	x	C (24.5)	C (24.5)	x	x	C (34.0)	C (34.0)	x
I-80 EB Int 304 Off Ramp/US209 SB On Ramp /W. Main St (S)	x	x	B (15.2)	B (15.2)	x	x	C (30.2)	C (30.2)
I-80 EB Int 304 On Ramp /US209 NB Off Ramp / W. Main St (S)	x	x	B (19.4)	B (19.4)	x	x	C (29.5)	C (29.5)
W. Main St. /I-80 EB Int. 305 Ramps (U)	D (29.0)	x	x	x	F (1206)	x	x	x
Dreher Connector Rd / I-80 EB Int. 305 Ramps (U)	x	D (25.2)	x	x	x	D (33.8)	x	x
W. Main St. / I-80 WB Int. 305 Ramps (S)	C (24.6)	C (23.6)	C (22.8)	C (22.8)	D (47.0)	C (20.5)	C (23.6)	C (23.6)
Dreher Ave. Connector/ W. Main St. (S)	x	B (11.9)	B (14.1)	B (14.1)	x	B (10.9)	B (12.5)	B (12.5)
Dreher Ave. Connector / Dreher Ave. (U)	x	C (15.6)	B (10.4)	B (10.4)	x	B (13.1)	B (12.2)	B (12.2)
Dreher Ave. / I-80 EB Int. 306 On Ramp	B (10.1)	x	x	x	A (9.8)	x	x	x
Dreher Ave. / I-80 WB Int. 306 Off Ramp	B (13.8)	x	x	x	A (12.9)	x	x	x
PA611 /I-80 EB Int. 307 Ramp ((U - No Build and Alt 2A, S - Alt 2B and 2D)	D (29.2)	D (29.2)	B (16.6)	B (16.6)	D (32.4)	D (32.4)	B (16.6)	B (16.6)
Broad St. /I-80 WB Int. 307 Ramps (S)	C (30.1)	C (27.8)	C (34.5)	C (34.5)	B (12.9)	D (42.5)	D (53.2)	D (53.2)
Broad St. /I-80 EB Int. 307 On Ramp (U)	x	A (9.7)	x	x		B (10.5)	x	x

(S) Signalized Intersection – Synchro LOS results reported are HCM 2010. LOS (average delay/vehicle)

(U) Unsignalized intersection LOS results reported are worst case stop-controlled approach (average delay/vehicle)

x – intersection does not exist for the alternative

Mobility

Currently, Exits 303, 304, and 306 provide only some of the connections available which contributes to congestion and safety issues in the region, such as the illegal left hand turns made on SR 611 at Exit 303 by exiting eastbound traffic. Overall, system continuity is lacking within the corridor. PennDOT and AASHTO design requirements for interstate systems call for all traffic movements to be available at each interchange. In addition, drivers generally expect full movement availability.

The project corridor services both local and through traffic, creating conflicts between the types of traffic and deviating from the intent of the Interstate system to facilitate long range travel. A substantial portion of the project area traffic is local use that both enters and exits I-80 within the project area. For example, 48% of the traffic entering at Interchange 307 westbound exits at either the 306, 305, or 304 interchanges.

The No Build Alternative does not provide an improvement to the mobility of the corridor. The 2045 no build conditions are expected to operate at unacceptable levels of service. With a higher level of congestion on I-80, the local trips that currently use I-80 for one or two interchanges may instead avoid I-80 and stay on the local roadways. During incidents in the corridor, traffic will continue to divert to the local roadway network.

Mobility during construction will be maintained. Each build alternative will be four lanes of traffic, two in each direction, on I-80 at all times during construction, except for short term closures necessary for the safe execution of specific construction activities.

Each build alternative will improve mobility by providing required minimum vertical clearances of 16'6", to facilitate freight mobility and the Strategic Highway Network (STRAHNET) system to support the Department of Defense's operations.

Alternative 2A proposes changing Interchange 303 to full movement and elimination of partial movement Interchange 306. The partial movement Interchange 304 and full movement Interchanges 305 and 307 are proposed to remain. There is minimal improvement to mobility for this alternative.

Alternative 2B and 2D propose full movement interchanges at Exit 303, 304, 305 and 307. Due to the proximity of Exit 304 and 305 they function as a single full movement interchange.

The mobility benefits of providing full movement interchanges, eliminating Interchange 306, and eliminating/combining ramp movements for the build alternatives are noted below:

For Alternative 2A, eliminating the I-80 EB on-ramp and WB off-ramp at Exit 306 improves mobility along the I-80 mainline due to fewer ramp merge/diverge points in the closely spaced area of Interchanges 304/305/306.

For Alternative 2B, eliminating the I-80 EB on-ramp and WB off ramp at Exit 306 improves mobility along the I-80 mainline due to fewer ramp merge/ diverge points in the closely spaced area of Interchanges 304/305/306.

For Alternative 2B and 2D, eliminating I-80 EB on and off ramp at Exit 305 and the EB on-ramp and WB off ramp at Exit 306 improves mobility along the I-80 mainline due to fewer ramp merge/ diverge points in the closely spaced area of Interchanges 304/305/306.

For Alternative 2B and 2D, the auxiliary lanes provided for between Exit 304 and 307 improve mobility in each direction along the I-80 mainline.

For Alternative 2B, a collector distributor road on I-80 WB from Exit 305 to 303 is included to minimize the number of merge/diverge points along I-80. Alternative 2D provides an auxiliary lane between the new Exit 303 and 304 ramps. The weave analysis for Alternative 2D shows acceptable LOS for this more traditional configuration.

Adjacent Interchanges

Interchanges 302 and 308 are located on each side of the project area. Interchange 308 is located approximately ½ mile east of Interchange 307. Interchange 308 provides access to East Stroudsburg Borough and East Stroudsburg University. Interchange 302 is approximately 1-1/2 miles west of Interchange 303 and provides access to US 33 and PA 611. The table below summarizes the total on and off ramp volumes at each of the interchanges from 302 to 308.

Table 14: 2045 Build Peak Hour Volumes, Total Ramp Volumes

Intersection	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
Interchange 302	-	-	-	-	6141	5750	5750	5750
Interchange 303	484	806	760	760	733	1243	1154	1154
Interchange 304	2595	2463	3449	3449	3446	3203	4449	4449
Interchange 305	1333	1574	475	475	2023	2278	962	962
Interchange 306	353	0	0	0	491	0	0	0
Interchange 307	1770	1770	1867	1867	2262	2262	2397	2397
Interchange 308* (EB off & WB on only)	916	916	916	916	1610	1610	1610	1610

Note: Interchange 302 volumes from I-80 Conceptual Study only included PM peak volumes. AM assumed same diversion volume.

In the No Build condition the ramps in this urban area are closely spaced. The total ramp volumes at each interchange range from 1333 to over 6000 vehicles per hour. The lowest total volume is Exit 306 which is proposed to be eliminated in each of the three build alternatives. The next lowest is Exit 303. This interchange is proposed to be changed from a partial movement interchange to a full movement interchange. As a full interchange, it will help alleviate traffic congestion at the Exit 302 in combination with the proposed full movement Interchange 304 in Alternative 2B and 2D. The Interchange 305 volume reduction is reduced in Alternatives 2A and 2D since the EB ramps are eliminated and are moved to the new ramps at US 209 and Main Street. Elimination of any other interchanges would require

diversion of a high volume of traffic to other interchanges which would be detrimental to the already congested Interchange 302, along PA 611, and through local roads within Stroudsburg Borough.

Interchange 308 to the east is currently in design and the I-80 mainline typical section will match with this project. The mainline section between Exit 308 and Exit 307 are proposed to include three through travel lanes and an auxiliary lane in each direction. Weave analyses indicates the WB section is anticipated to operate at Level of Service B and E in the AM and PM peak hours respectively for all alternatives. The EB weave section is anticipated to operate at Level of Service C in the AM and PM peak hours for all alternatives.

Close coordination will continue to ensure proper tie in at each project limit. The three mainline lanes in each direction will continue to the east of Interchange 308 to the project limits. A schematic of the interchange improvements are provided in Appendix K.

Interchange 302 to the west provides ramps to/from I-80, US 33, and PA 611. The PA 611 intersection with the ramps and the I-80 mainline are very closely spaced which complicate the traffic operations at the interchange. The interchange is characterized by inadequate ramp acceleration/deceleration lane lengths, short weave distances, and high ramp volumes (over 6,000 total estimated in 2045). Congestion often exists with backups on the exit ramps, and approaching the PA 611 traffic signal.

As noted, Alternative 2B and 2D propose full interchange movements at Exits 303 and 304 which are anticipated to help alleviate some of the congestion at the 302 interchange, and also facilitate incident management during accident events and allow for shorter traffic diversion routes.

The previous I-80 Corridor Study considered various alternatives for Interchange 302. Appendix L includes schematics of various improvement options for Interchange 302 along with volume data and LOS. As shown, the typical section of mainline I-80 is consistent with this projects proposed typical section.

Local Road Impacts

The proposed elimination of on and off-ramps at Exit 305 (EB) and Exit 306, along with the proposed new ramps for full movement interchanges at Exit 303 and 304 will divert traffic to different on and off-ramps as well as various local roads. The methodology for selecting local roads to evaluate was based on the signalized intersections adjacent to new ramp termination locations, and based on volume reassignments where local road traffic was either increasing or decreasing. The traffic reassignments and 2045 peak hour volumes are shown with the mainline and ramp volumes in Appendix I. The supporting information is located in Appendix M including a map illustrating the local road intersections and the Synchro analysis printouts for each alternative. Tables 15 and 16 illustrate the LOS comparison for various intersections within the project area.

As shown, Alternative 2B and 2D have the same ramps and therefore the diversions along local roads are the same. For all three alternatives, some intersection LOS's improve while others degrade. Within Stroud Township, all intersection LOS are acceptable, except at SR 611/Chipperfield Drive for the no build and build alternatives which is LOS F for no build and each build alternative. In order to provide

acceptable LOS at that intersection, modifying the side street to split phasing is needed and will provide the LOS indicated in the table below.

Table 15: 2045 Build Peak Hour Levels Of Service
Signalized Intersections – Stroud Township Systems 1 And 2

Intersection	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
SR 611 / Schafer's School House Road	A (6.9)	A (9.1)	B (11.7)	B (11.7)	A (6.9)	B (19.8)	C (21.5)	C (21.5)
SR 611 /Applegate Road / Terrace Dr.	A (8.0)	B (19.2)	B (17.6)	B (17.6)	A (9.1)	A (9.9)	A (8.7)	A (8.7)
SR 611 / Pocono Commons Dr.	B (11.3)	B (15.2)	B (15.3)	B (15.3)	B (19.5)	D (36.9)	D (40.9)	D (40.9)
SR 611 / Bridge Street	C (32.3)	C (27.5)	C (22.2)	C (21.3)	D (35.8)	D (35.6)	C (24.2)	C (24.9)
SR 611 / Stroud Mall Main Driveway	C (20.1)	C (21.5)	C (23.1)	C (23.6)	C (20.8)	B (18.9)	C (22.3)	C (21.5)
SR 611 / Stroud Mall East Driveway	B (19.9)	C (22.6)	B (19.6)	B (19.4)	C (20.3)	B (18.7)	B (19.8)	C (20.3)
SR 611 / Chipperfield Dr.	C (34.7)	C (21.7)	C (21.9)	C (22.0)	C (30.6)	C (27.7)	C (29.4)	C (31.4)

Within Stroudsburg Borough, several intersections are shown to degrade in LOS. The intersections within the Borough have coordinated signal systems that have programs for different periods of the day as well as with and without exclusive pedestrian phasing. The exclusive pedestrian phasing impacts the intersection operation as shown by the intersection LOS F at several locations. Analyses without the exclusive pedestrian phase show acceptable LOS. Actual peak period conditions operate with some cycles that include the exclusive pedestrian phase and some that do not. The actual anticipated peak hour LOS lies somewhere in between depending on the number of pedestrian actuations during the peak period (Synchro HCM results are unable to replicate this actual condition).

The Main Street/ Dreher Avenue intersection show a degraded LOS for Alternative 2B and 2D in 2045. Potential improvements that could be considered for this location to improve the LOS include shortening pedestrian crossing lengths thus reducing pedestrian phasing times.

Main Street /9th Street and Main Street/7th Street intersections also show a degraded LOS for Alternatives 2B and 2D in 2045. The future traffic volumes were not distributed through the network using a sophisticated model that accounts for congested, constrained roadways; rather a simple estimated distribution was used. Based on Stroudsburg Borough's grid street network near these intersections, it is reasonable to assume that traffic at the 9th and 7th Street intersections will find its way to less congested adjacent streets such as 6th Street and 8th Street that are shown to operate at LOS C or better, providing a balanced LOS that is an acceptable level throughout the network.

Table 16: 2045 Build Peak Hour Levels Of Service
Signalized Intersections – Stroudsburg Borough

Intersection	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
Main Street / Dreher Avenue	E (69.1)	D (53.5)	F (87.6)	F (87.6)	D (51.5)	E (62.7)	F (159.9)	F (159.9)
	<i>D (38.9)</i>	<i>E (56.1)</i>	<i>E (68.2)</i>	<i>E (68.2)</i>	<i>D (36.8)</i>	<i>D (36.4)</i>	<i>D (39.4)</i>	<i>D (39.4)</i>
Main Street / 9 th Street	C (28.5)	D (50.1)	D (50.3)	D (50.3)	E (79.0)	F (91.3)	F (100.6)	F (100.6)
	<i>C (26.0)</i>	<i>C (33.8)</i>	<i>C (32.9)</i>	<i>C (32.9)</i>	<i>D (44.0)</i>	<i>D (44.9)</i>	<i>D (44.2)</i>	<i>D (44.2)</i>
Main Street / 8 th Street	B (18.9)	C (21.5)	B (19.5)	B (19.5)	B (17.6)	C (20.4)	C (20.6)	C (20.6)
	<i>B (10.4)</i>	<i>B (12.6)</i>	<i>B (11.6)</i>	<i>B (11.6)</i>	<i>B (10.6)</i>	<i>B (12.7)</i>	<i>B (13.1)</i>	<i>B (13.1)</i>
Main Street / 7 th Street	E (57.4)	D (52.2)	E (75.3)	E (75.3)	E (76.4)	D (44.6)	F (88.9)	F (88.9)
	<i>E (79.2)</i>	<i>D (53.9)</i>	<i>E (76.5)</i>	<i>E (76.5)</i>	<i>E (71.2)</i>	<i>D (45.1)</i>	<i>E (72.0)</i>	<i>E (72.0)</i>
7 th Street/ Ann St	B (15.8)	C (28.0)	C (24.2)	C (24.2)	C (33.9)	C (29.8)	D (35.6)	D (35.6)
Main Street / 6 th Street	B (17.0)	B (17.0)	B (16.1)	B (16.1)	C (21.3)	C (20.9)	C (20.3)	C (20.3)
	<i>B (11.7)</i>	<i>B (12.1)</i>	<i>B (11.6)</i>	<i>B (11.6)</i>	<i>B (16.8)</i>	<i>B (16.1)</i>	<i>B (15.3)</i>	<i>B (15.3)</i>
Main Street / 5 th Street / Broad Street	D (41.7)	C (33.1)	D (40.9)	D (40.9)	E (60.6)	E (77.7)	E (77.2)	E (77.2)
	<i>C (20.6)</i>	<i>C (24.0)</i>	<i>C (22.1)</i>	<i>C (22.1)</i>	<i>C (30.8)</i>	<i>C (33.4)</i>	<i>C (32.9)</i>	<i>C (32.9)</i>
McConnell Street / 4 th Street	A (6.9)	B (18.7)	B (18.7)	B (18.7)	C (22.0)	D (47.1)	D (47.1)	D (47.1)
McConnell Street / 3 rd Street	A (7.4)	B (10.6)	B (10.6)	B (10.6)	B (10.5)	B (15.6)	B (15.6)	B (15.6)
5 th Street / Sarah Street	B (13.8)	B (11.9)	B (11.9)	B (11.9)	B (17.8)	B (17.8)	B (17.8)	B (17.8)

Note: Stroudsburg Borough LOS results reported for analysis with exclusive pedestrian phasing/coordination (unshaded) and without exclusive pedestrian phasing (shaded).

The Main Street/5th Street/Broad Street intersection, also known as Five-Points, is shown to operate at LOS C during the PM peak period without exclusive pedestrian phasing and LOS E with exclusive pedestrian phasing. Recent improvements have been implemented at this intersection and other Main Street intersections to bump out the curb lines on the intersection corners to allow for shorter pedestrian crossing lengths and pedestrian clearance times. Additional improvements were considered at this intersection including a second NB right turn lane from Broad Street to Main Street, or a second SB lane. Each of these improvements will improve those individual movements. Either one of the proposed improvements would require obtaining right-of-way, specifically, the commercial building on the southeast corner (Auto Parts Store). However, the PA 191 over Pocono Creek bridge reconstruction most likely will already impact that building, so these potential improvements will continue to be evaluated as part of the bridge reconstruction.

Table 17 below shows the traffic volumes along three sections of West Main Street (Business Route 209) and also Bridge Street. As shown, Alternative 2B and 2D compared to No Build and Alternative 2A, have slightly higher volumes northbound north of US 209, and lower volumes southbound. South of US 209, Alternative 2B and 2D volumes are substantially lower than No Build and Alternative 2A. Along Bridge Street, the volumes are lower for Alternative 2B and 2D compared to No Build and Alternative 2A.

For Alternative 2B and 2D, the traffic volumes and local road impacts along West Main Street and Bridge Street are offset by the new Dreher Avenue Connector road, new ramps at West Main Street and Route 209, as well as the new ramps that provide full interchange movements at Interchange 303 and 304.

Table 17: West Main Street (Business 209) and Bridge Street
2045 Volume Comparison

Roadway Segment	AM PEAK HOUR				PM PEAK HOUR			
	No Build	Build Option 2A	Build Option 2B	Build Option 2D	No Build	Build Option 2A	Build Option 2B	Build Option 2D
<i>North of I-80 Exit 305</i>								
Northbound	631	598	638	638	757	741	807	807
Southbound	537	537	442	442	999	999	803	803
Total	1168	1135	1080	1080	1756	1740	1610	1610
<i>Dreher Ave. Connector to US 209 Ramps</i>								
Northbound	542	542	582	582	639	639	669	669
Southbound	558	594	573	573	1084	1095	942	942
Total	1100	1136	1155	1155	1723	1734	1611	1611
<i>South of US 209 Ramps</i>								
Northbound	542	542	528	528	639	639	602	602
Southbound	558	594	350	350	1084	1095	634	634
Total	1100	1136	878	878	1723	1734	1236	1236
<i>Bridge Street</i>								
Northbound	309	309	234	234	507	501	349	349
Southbound	228	218	215	201	363	363	363	326
Total	537	527	449	435	870	864	712	625

Stakeholder and Environmental Concerns

Two sets of public meetings were conducted in February 2014 and December 2014. Public involvement for the project is continuing and will conform to the process outlined in the PennDOT Transportation Development Process, and requirements under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act.

Each of the build alternatives presents environmental impacts but no clear environmental “fatal flaws” are present for any of the alternatives. Impacts are discussed in Section E. One possible outcome that may emerge with additional studies is the potential for noise mitigation. Noise mitigation may be warranted given the residential and commercial land uses in the portions of the project area. Some interchange alternatives may better facilitate construction of noise walls, given the proximity of the

roadway and ramps to other constraints. These will be addressed in the project's environmental document.

Evaluation Matrix

An evaluation matrix is included below to provide additional comparison for traffic operations. The matrix includes Geometry, Mobility, Safety, and Cost.

Table 18: Comparison Matrix

	Highway Improvement Alternative			
	No-Build	2A	2B	2D
Meets Purpose and Needs	No	Yes	Yes	Yes
Meets Min Accel/Decel Lane Length	No	Yes	Yes	Yes
Meets Min Superelevation Required	No	Yes	Yes	Yes
Meets Vertical Clearance	No	Yes	Yes	Yes
Meets Horizontal Clearance	No	Yes	Yes	Yes
Geometric Curvature	Fair	Good	Good	Good
Requires Design Exception	-	No	No	No
Number of I-80 Interchanges	5	4	4	4
Full Movement Interchanges	2	3	3	3
System Continuity and Connections	Poor	Fair	Good	Good
Total Number of Ramps	12	14	12	15
Ramps with Direct Merge/Diverge to I-80	Poor (10)	Good (4)	Fair (6)	Good (5)
Ramps Connecting to Auxiliary Lanes	Poor (2)*	Good (10)**	Fair (6)**	Good (10)**
Mainline Weaving (locations)	Poor (2)*	Good (5)**	Good (3)**	Good (6)**
Bypass Ramp Design (locations)	Fair(0)	Fair (0)	Good (3)	Fair (0)
Safety	Poor	Good	Good	Good
Meets Traffic Criteria	No	Yes	Yes	Yes
LOS (2045)	Poor	Good	Good	Good
Local Road Impacts	Poor	Fair	Good	Good
Improved Incident Management Opportunities	Poor	Fair	Good	Good
Total Cost (Construction, ROW, Utility \$in thousands)	-	\$494,100,000	\$742,000,000	\$604,000,000
*Short weave segment operates at LOS F				
**Weaving via long auxiliary lanes – operating at LOS E or better				

Overall, Alternative 2D provides the best combination of traffic operations on mainline I-80 and the interchange ramps and ramp termini intersections compared to the no build alternative and other build alternatives.

Conformance with Transportation Plans

The proposed project improvements are consistent with the goals and policies of Monroe County and Multi-Municipal Comprehensive Plans, as the project will promote traffic safety and allow for continued movement of people and goods through the I-80 corridor and the region. Monroe County Planning Commission has provided a letter to PennDOT supporting Alternative 2D.

The project is on the 2015 TIP for the Northeastern Pennsylvania Alliance (NEPA) MPO as MPMS 76357.

Design Exceptions

All build alternatives are designed to meet current design standards. The preliminary design evaluation indicates the proposed roadway improvements can be designed to meet design criteria for all alternatives.

C. ESTIMATE, FUNDING AND SCHEDULE

The improvements proposed for the project are currently estimated between \$494 and \$742 million for the I-80 mainline and interchange improvements. The right-of-way costs are anticipated to be around \$9-10 million depending upon the alternative. The utility costs are anticipated to be around \$0.9 to 1 million each. These costs will be further evaluated and refined as design proceeds.

DESCRIPTION	ALTERNATIVE 2A	ALTERNATIVE 2B	ALTERNATIVE 2D
Construction	484,100,000	731,000,000	594,100,000
Right of Way Acquisition	9,000,000	10,000,000	9,000,000
Utilities	900,000	1,000,000	900,000
TOTAL ESTIMATED COST	494,000,000	742,000,000	604,000,000

The project is currently undergoing review in accordance with the National Environmental Policy Act (NEPA). The project schedule reflects completion of an Environmental Assessment (EA) by the Department of Transportation and Federal Highway Administration (FHWA) with NEPA clearance anticipated in 2017. The preliminary engineering and final design are planned to progress with completion in 2021. Once construction begins, it is anticipated that construction would occur over a three to four year period with completion in 2025.

D. LAND USE & ACCESS MANAGEMENT REPORT

1. Transportation System Benefits

The current conditions in the project area include traffic congestion and safety concerns at the mainline bridge and interchange on and off-ramps which have substandard or no acceleration and deceleration lanes. The proposed improvements will help alleviate the traffic congestion that occurs in the corridor during peak commuting periods, enhance safety by upgrading I-80 in the project area to meet current highway design and safety standards, and improve mobility on this section of I-80 to provide for interstate commerce and to accommodate movement of people and goods within Pennsylvania. The proposed improvements will benefit the transportation system.

2. Public Interest / Public Involvement

The public and agency coordination process for this project conforms to the process outlined in the PennDOT Transportation Development Process, and requirements under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. Two sets of public meetings have been held in February 2014 and December 2014. PennDOT also has regular coordination with the municipalities. Coordination is on-going and will include Section 106 Consulting Parties, Stakeholder Meetings, Public Open Houses and Township Meetings, Local Organization Meetings, and Local Media Relations.

3. Access Management

Sound access management and congestion management principals have been utilized for the project and developing proposed improvements. The Monroe County Comprehensive Plan as well as the Multi-Municipal Comprehensive Plan that includes Stroud Township and Stroudsburg Borough identifies coordinated land use and access management programs along state, County and municipal roads to minimize the number of access points to the road system as key components of the Plan.

4. Environmental Impacts

Environmental impacts have been identified and considered, as indicated in Section E and will be further detailed in the EA.

5. Consistency with Comprehensive Plans, Current Zoning, and Local Land Use Ordinances

The proposed improvements are consistent with comprehensive plans, current zoning, and local land use ordinances. The proposed action will change access (i.e., proposed elimination of ramps and new ramps are proposed), however, no changes in land use patterns are expected as a result of the project. Land use patterns in the vicinity of the interchange are well established, and the corridor is largely built up.

The proposed I-80 Improvement are consistent with the goals and policies of Monroe County Comprehensive Plan as well as the Multi-Municipal Comprehensive Plan that includes Stroud Township and Stroudsburg Borough as the project promotes traffic safety and allows for continued movement of people and goods through the I-80 corridor and the region.

6. Consistency with Local Access Management Plans and Ordinances

The proposed improvements consider local access management plans and ordinances. The improvements at ramp termini and impacted local roads will consider the County and local municipal access management programs to minimize the number of access points to the road system.

E. ENVIRONMENTAL COMPLIANCE

This project is currently scoped as an Environmental Assessment (EA). Environmental constraints were initially identified and mapped from secondary sources for the purpose of qualitatively comparing impacts related to the range of preliminary alternatives. Field investigations and agency coordination have since been completed for most natural resources and will advance for cultural resources. The EA will document the final impacts.

1. Environmental Overview

Environmental resources were first identified using secondary source material, primarily Geographic Information Systems (GIS) databases provided by the county and state. Field investigations to identify water resources, potential areas of contamination and other resources were then conducted and those resources were surveyed and mapped. Subsequent reports and agency correspondence were produced and submitted outlining the environmental features in the study area in accordance with the environmental process. See Appendix N for more information.

2. Potential Impacts for I-80 Improvement Alternatives

The No Build Alternative would not have any direct environmental impacts on the physical features within the project area. That is, there would be no wetland or stream encroachments, no effects to cultural resources, and no property acquisitions.

However, the No Build would not provide any opportunities for improving conditions for the natural or socioeconomic resources of the area. Currently many of the project area streams have heavy sediment loading from inadequately controlled runoff. Without implementing roadway improvements, opportunities to improve the stormwater management associated in the corridor would be minimal. Another detrimental effect of the No Build alternative would be the continued congestion throughout the project area with possible negative impacts to air quality.

With various environmental resources identified in the project area, the table below indicates the environmental and community impacts associated with each alternative.

Natural Resources

Potential acid producing sulfide materials and steep slopes occur in the project area. Floodplains, waterways, wild trout streams and wetland systems that are located within and adjacent to the project area are impacted by the alternatives. Efforts will be made during the design process to avoid or minimize impacts to the identified resources.

Hazardous and Residual Waste Areas

A Phase I Environmental Site Assessment identified several areas of potential contamination within the project area from gas stations and commercial/light industrial properties.

Socioeconomic Resources

Given the close proximity of the residences and businesses surrounding I-80 and the interchanges, the alternatives have considerable impacts to residential and commercial properties. Minority and low-incomes populations occur throughout much of the area.

Cultural Resources

The project area includes many listed, eligible, and likely eligible above ground historic properties and Historic Districts within Stroudsburg and East Stroudsburg Boroughs. An archaeological predictive model identified several area of high and medium probability for pre-contact and historic sites. Cultural resource identification and impact evaluations are on-going.

Public Parks

Several publicly owned parks occur in the project area. Section 4(f) uses will be avoided or minimized to the extent possible.

Table 19 provides information on the resources and preliminary impacts. Alternative 2D appears to have the least ROW impacts for residential and commercial properties. This is a large factor identified by the local municipalities and County. In addition, the stormwater basins present a large part of the impacts. During the design process, efforts will be made to minimize environmental impacts.

Table 19 - Preliminary Alternative Impacts

Resource	Alignments Only			Alignments and Basins [†]		
	2A	2B	2D	2A	2B	2D
Potential Acid Producing Sulfide Materials (acres)	124.9	127.8	108.6	166.4	172.4	153.3
Steep Slopes (15% and Greater) (acres)	6.2	7.2	5.1	10.8	11.9	9.4
All Watercourses (linear feet)	3660	4121	3483	3703	4132	3495
Wetlands (acres)	1.96	0.26	0.35	1.97	0.27	0.35
1-percent-annual-chance floodplains (acres)	10.01	12.12	8.11	16.46	18.69	15.26
Hazardous and Residual Waste Areas (sites)	6	5	5	10	9	9
Public Parks (acres)	0.27	0.12	0.12	0.27	0.12	0.12
Conversion of Undeveloped Land (acres)	11.96	13.01	7.30	28.75	28.14	22.58
Total Displacements (parcels)	70	60	50	130	119	115
Historic Structures (listed, eligible & likely eligible)	4	3	3	7	6	6
Archaeological Sites (acres medium/high probability)	0.06	0.03	0.04	0.21	0.17	0.18
Construction: Total Area of Disturbance (acres)	143.6	155.2	137.8	193.4	208.1	190.7
Public & Public Official's Preference (percent of votes for preferred alternative at Open House II)	13	26	38	13	26	38

[†]Minor overlaps between alignment and basin impacts occur in some areas

F. SUMMARY AND RECOMMENDATIONS

The requested change of access I-80 interchanges are to improve roadway safety, reduce congestion maintain mobility, and improve operations of I-80 mainline, interchange ramps, and ramp termini. The interchange ramps will be reconstructed in conjunction with I-80 mainline reconstruction.

The following deficiencies define the need for the facility improvements:

- safety and operation concerns on the mainline of I-80 due to minimal width shoulders, and ramp acceleration and deceleration lane lengths that do not meet current design criteria;
- congestion issues as a result of high volume of traffic with substantial truck percentages and insufficient acceleration/deceleration lanes;
- mobility issues are created by deficient bridges and substandard vertical clearances; and,
- safety and mobility issues due to lack of system continuity with three of the five study area interchanges only providing partial access.

1. Proposed Alternatives

A number of improvement alternatives were conceptualized and presented for consideration. Through a screening process, the following alternatives were prepared in detail and evaluated for the project.

- No Build
- Transportation System Management and Transit Alternatives
- Build Alternative 2A
- Build Alternative 2B
- Build Alternative 2D

No Build Alternative

The No-Build Alternative would maintain the existing roadway, bridge and interchange configurations. The I-80 mainline would remain with insufficient median and shoulder widths, substandard ramp acceleration and deceleration lane lengths. In addition, the substandard overhead clearance for the structures would result in continued risk of being impacted by vehicles with high vertical clearance requirements and would not meet requirements for STRAHNET. This alternative does not meet the project needs.

TSM and Transit

TSM strategies evaluated include ramp metering, high occupancy vehicle (HOV) facilities, park and ride facilities, Intelligent Transportation Systems (ITS) Facilities, and transit investment alternatives. The TSM alternative alone does not satisfy any of the project needs and, therefore, would not be considered a viable alternative. Existing ITS features in the project area will remain. The build alternatives provide opportunities to expand the existing ITS, and implement improved incident management strategies to minimize diversions through the local road network during incidents.

Design Evaluation – Highway Build Alternatives

A design evaluation was conducted for the proposed roadway design based on the design criteria in PENNDOT design manuals for an Urban Interstate (I-80). The design evaluation indicates the proposed roadway improvements can be designed to meet design criteria.

Traffic Data and Traffic Forecasts

To understand existing traffic patterns in the study area and to provide a basis for traffic forecasts, a comprehensive traffic data collection program was conducted for this project. The traffic counts were collected in 2013 for I-80 ramps and surrounding roadways.

Completion of construction is anticipated in 2025 (opening year), with a design year 20 years beyond (2045). The existing I-80 traffic volumes were increased by 2 percent per year to determine the 2045 volumes. The existing traffic volumes on the local roads were increased based on the ramp volume increases and carried through the roadway network. Traffic reassignments were completed for the alternatives based on new ramps, removed ramps, and the closure of Shafer's School House Road at US 209 to determine the 2045 build alternative volumes.

Safety

Each build alternative was developed with the intent to eliminate or minimize the following substandard features that currently exist in this area:

- Insufficient Acceleration and Deceleration lane lengths along I-80 at the interchanges
- Improper ramp terminal spacing along I-80 which creates a short weave section
- Insufficient Median and Shoulder Widths along I-80
- Deteriorated roadway and bridge components

For the I-80 project, the HSM Enhanced Interchange Safety Analysis Tool (ISATe) was used for the mainline and ramps, and the Predictive Method for Urban and Suburban Arterials for the ramp termini intersections. Specific geometry and traffic volume data were input for each alternative and output results indicate that the build alternatives are substantially safer than the No Build alternative (44% fewer crashes per year predicted). Alternative 2D is similar to the other build alternatives for the mainline and ramps, and has fewer predicted crashes at the ramp termini intersections.

Congestion

Using 2045 design year volumes, all freeway segments operate at Level of Service D or better during the AM peak period, and Level of Service E or better during the PM peak period. The segment located at the west limit of the project (between Interchange 302 and 303) experiences Level of Service F during the PM peak period due to the bottleneck condition created at the project limits.

Ramp merge and diverge analyses indicate all merges and diverges will operate at Level of Service D or better for all build alternatives during the peak hours.

Weave analyses indicate that all weaves within the reconstruction area will operate at Level of Service D or better, with the exception of I-80 WB between Interchange 308 to 307 which operates at Level of Service E in the PM peak for all build alternatives. The design criteria for an auxiliary lane where an on-ramp is followed by an off-ramp is 2000 feet. For the build alternatives the proposed lengths are

considerably longer. For Alternative 2A, the auxiliary lanes for I-80 EB between Exit 305 and 307 in Alternative 2A is approximately 4600 feet, and between Exit 304 and 307 for Alternative 2B and 2D is approximately 4600 to 4800 feet. The auxiliary lanes for I-80 WB between Exit 305 and 307 in the three build alternatives are approximately 5500 to 6400 feet in length. This maximizes the distance for motorists to maneuver along I-80 and the high volumes to/from US 209.

Compared to the No-Build alternative, each build alternative provides an improvement in Level of Service during peak periods under design year conditions. Each of the build alternatives operates at similar Level of Services throughout the corridor.

Ramp terminus intersections were found to operate at acceptable Level of Service D or better for each build alternative during the 2045 peak hours. The analyses indicate signalization would be implemented for ramp terminus intersections at the following locations:

- Interchange 303, SR 611/Exit 303 Connector Road - all alternatives
- Interchange 304, West Main Street (Bus. 209) / I-80 On and Off Ramps – Alternatives 2B and 2D
- Interchange 305, West Main Street/ I-80 Westbound Ramps - all alternatives
- Interchange 307, US 611 /Westbound I-80 On/Off Ramps - all alternatives
- Interchange 307, PA 191 /Eastbound I-80 On/Off Ramps – Alternatives 2B and 2D
- Dreher Avenue Connector / West Main Street.

For each build alternative, the westbound Main Street on ramp provides access to I-80 only and not to US 209 southbound. For Alternative 2A, additional traffic is expected to utilize Main Street (Business 209) south of I-80 to access US 209/ US 33 southbound. With the closure of the median opening and removal of the signalized intersection at US 209 /Schaefer's Schoolhouse Road, this traffic will need travel Business 209 to access US 33 and US 209. Main Street traffic is also anticipated to be reduced between the I-80 ramps and Bridge Street due to the new ramps at Interchange 303. For Alternatives 2B and 2D, traffic along Main Street destined to US 209 south can use the new ramps at Main Street /US 209.

The proposed improvements for Alternatives 2B and 2D include a new EB on-ramp from Interchange 303 and a new off-ramp to Interchange 304 (Route 209 South). For Alternative 2B, the new off ramp to Interchange 304 (Route 209 South) begins at the Exit 303 EB off ramp. The ramp then splits for traffic destined to Exit 303 and 304. For Alternative 2D, the Exit 304 off ramp begins after Exit 303 and includes a weave between the new Exit 303 EB on-ramp and the new Exit 304 off ramp. For Alternative 2D, the weave analyses indicate it will operate at an acceptable LOS C or better.

The proposed improvements for Alternatives 2B and 2D include a new WB on-ramp from Interchange 304 (US 209 north) and a new WB off-ramp to Interchange 303. For Alternative 2B, an I-80 WB collector-distributor road begins near Exit 304. At that point, I-80 WB traffic exits for Exit 304 and 303. The I-80 WB on-ramp from Main Street also connects to the collector-distributor road, followed by the new on-ramp from Interchange 304 (US 209 north). The collector-distributor provides an off-ramp to Exit 303 and on-ramp to I-80 WB near Interchange 303. The collector-distributor road weave section analysis indicates it will operate at LOS A. For Alternative 2D, the Exit 304 WB on ramp and the new Exit 303 WB off-ramp form an auxiliary lane. For Alternative 2D, the weave analysis for this section indicates it will operate at an acceptable LOS C or better.

Mobility

The No Build Alternative does not provide an improvement to the mobility of the corridor since it does not improve minimum vertical clearances for bridges and does not provide full movement interchanges. The 2045 no build conditions are expected to operate at unacceptable levels of service. With a higher level of congestion on I-80, the local trips that currently use I-80 for one or two interchanges may instead avoid I-80 and stay on the local roadways. During incidents in the corridor, traffic will continue to divert to the local roadway network.

Mobility during construction will be maintained. Each build alternative will be four lanes of traffic, two in each direction, on I-80 at all times during construction, except for short term closures necessary for the safe execution of specific construction activities.

Each build alternative will improve mobility by providing required minimum vertical clearances of 16'6", to facilitate freight mobility and the Strategic Highway Network (STRAHNET) system to support the Department of Defense's operations.

Alternative 2A proposes changing Interchange 303 to full movement and elimination of partial movement Interchange 306. The partial movement Interchange 304 and full movement Interchanges 305 and 307 are proposed to remain. There is minimal improvement to mobility for this alternative.

Alternative 2B and 2D propose full movement interchanges at Exit 303, 304, 305 and 307. Due to the proximity of Exit 304 and 305 they function as a single full movement interchange. Additional mobility benefits from full movement interchanges, eliminating Interchange 306, and eliminating/combining ramp movements are provided by these two build alternatives.

The local road impacts for the removal of various mainline ramps is offset by the new Dreher Avenue Connector road, new ramps at West Main Street and Route 209, as well as the new ramps that provide full interchange movements at Interchange 303 and 304.

Operations

Operational improvements to the deficient bridges and substandard vertical clearances are addressed in all of the build alternatives.

Safety/Mobility/Operations Summary

The no build alternative does not meet the project needs to improve safety, congestion and mobility.

TSM strategies evaluated include ramp metering, high occupancy vehicle (HOV) facilities, park and ride facilities, Intelligent Transportation Systems (ITS) Facilities, and transit investment alternatives. The TSM alternative alone does not satisfy any of the project needs and, therefore, would not be considered a viable alternative. The existing ITS features in the project area will remain. The build alternatives provide opportunities to expand the existing ITS, and implement improved incident management strategies to minimize diversions through the local road network during incidents.

Based on the evaluation of these alternatives, Alternative 2D provides the best combination of improvements to meet the project needs of improving safety and congestion, maintaining future mobility by providing roadway and bridge operational improvements and system continuity. Alternative

2D provides fewer direct ramp merge/diverge locations to I-80, more ramps that connect to auxiliary lanes, and increased spacing between Interchange 303 and 304 compared to Alternative 2B. Alternative 2D also provides opportunities to implement improved incident management strategies and minimize diversions through the local road network during incidents. Therefore, Alternative 2D is recommended to be progressed through the design process and implemented for this project.

Preliminary Signing

A preliminary signing plan has been prepared to demonstrate that the proposed roadway improvements can be signed to comply with current PennDOT and MUTCD signing requirements. The preliminary signing plans address the signing requirements on I-80 and SR 209 with proposed directional signing shown. The preliminary signing plan for the proposed highway improvement Alternatives 2A, 2B, and 2D are included in Appendix O.

Estimate, Funding and Schedule

The improvements proposed under the I-80 project are currently estimated at around \$600 million for Alternative 2D.

The Department plans to deliver this project through a design, bid, build process. The project is currently undergoing review in accordance with the National Environmental Policy Act (NEPA). The project schedule reflects NEPA clearance in 2017. The preliminary engineering and final design are planned to progress with completion in 2021. Once construction begins, it is anticipated that construction would occur over a three to four year period.

G. LOCAL GOVERNMENT AGREEMENTS

The PennDOT is the applicant for the POA request and the provision for a local government endorsement does not apply. The PennDOT currently owns and maintains the roadway and bridges, and will continue to at completion of the project.

The Department of Transportation has completed extensive transportation and environmental studies and believes this project is in the public interest including highway users.

Local government endorsement letters do not apply to this project, however, extensive public involvement and coordination has occurred already and will continue to occur with these agencies as part of the environmental process.

The PennDOT is working to obtain NEPA clearances for the project, and will obtain all necessary permits during final design.

H. APPENDICES DOCUMENTATION

The following Appendices are provided as supporting documentation. Hardcopies of Appendix D and O are attached. All Appendices are included on CD-ROM.

- Appendix A - Existing Traffic Narrative
- Appendix B - Existing Traffic Analysis
- Appendix C - Crash Data Summary
- Appendix D - Alternative 2A, 2B, 2D Schematics
- Appendix E - Design Criteria
- Appendix F - Traffic Growth
- Appendix G - No Build Traffic Analysis
- Appendix H - Build Alternatives Volume Assignments
- Appendix I - Build Alternatives Volume Schematics
- Appendix J - Build Alternatives Traffic Analysis
- Appendix K - Interchange 308 Information
- Appendix L - Interchange 302 Information
- Appendix M - Intersection Signal Analysis /Local Road Intersection Map
- Appendix N - Environmental Features
- Appendix O - Preliminary Signing Plan
- Appendix P - Gore to Gore Distances
- Appendix Q - HSM Spreadsheets
- Appendix R - FHWA Interstate Access Policy Points Summary