## CHAPTER ONE PURPOSE \& NEED

### 1.1 INTRODUCTION

This Environmental Impact Statement (EIS) for the Interstate 15 (I-15), Payson Main Street Interchange project has been prepared according to the provisions of the National Environmental Policy Act (NEPA), Title 23 of the Code of Federal Regulations (CFR) Part 771, 40 CFR 1500-1508, and the Federal Highway Administration (FHWA) Technical Advisory T6640.8A, Guidance for Preparing and Processing Environmental and Section $4(f)$ Documents. This EIS also conforms to the requirements of the Utah Department of Transportation (UDOT).

### 1.2 LEAD, COOPERATING, AND PARTICIPATING AGENCIES

### 1.2.1 Lead Agencies

UDOT has assumed FHWA's responsibilities under NEPA and other federal environmental laws for review and approval of federally assisted highway projects within Utah. These responsibilities have been assigned in the Memorandum of Understanding between the FHWA and the UDOT concerning the State of Utah's Participation in the Surface Transportation Project Delivery Program Pursuant to 23 USC 327, executed on January 17, 2017. As such, the environmental review, consultation and other actions required by applicable

## LEAD AGENCIES

The Utah Department of Transportation is the lead agency for the I-15, Payson Main Street
Interchange Environmental Impact Statement project.

Federal environmental laws for this project are being, or have been, carried-out by UDOT pursuant to 23 USC 327 and the Memorandum of Understanding (MOU).

In addition, 23 CFR 771.111 requires lead agencies to do the following:

- Identify and involve cooperating and participating agencies
- Develop coordination plans
- Provide opportunities for the public and participating agencies to be involved in defining the purpose and need statement and determining the range of alternatives
- Collaborate with participating agencies to determine methodologies and the level of detail for analyzing alternatives
- Provide oversight with regard to managing the NEPA process and resolving issues


### 1.2.2 Cooperating and Participating Agencies

The Council on Environmental Quality (CEQ) defines cooperating agencies as federal agencies other than the lead federal agency that have jurisdiction by law or special expertise with respect to the project. Cooperating agencies for the I-15, Payson Main Street Interchange project are listed in Table 1-1. These agencies have been involved in the preparation of this EIS through participation in the development of the relevant technical studies and methodologies and identification of the EIS content necessary to meet NEPA requirements and other requirements regarding jurisdictional approvals, permits, licenses, and clearances.

Participating agencies, as defined by 23 CFR 771.107(h), include any federal, state, local, or tribal government agency that might have an interest in the project. The participating agencies involved with the preparation of this EIS are listed in Table 1-1. These agencies have assisted with identifying environmental issues of concern that may need to be analyzed in detail in this EIS before a decision can be made or that may prevent approval of the project.

TABLE 1-1
Cooperating and Participating Agencies*

| Agency or Local <br> Government | Type of Involvement |
| :--- | :--- |
| U.S. Army Corps of <br> Engineers (USACE) | Cooperating |
| U.S. Fish and Wildlife Service <br> (USFWS) | Cooperating |
| Advisory Council on Historic <br> Preservation (ACHP) | Cooperating |
| U.S. Environmental <br> Protection Agency (EPA) | Participating |
| Payson City | Participating |
| Utah Transit Authority (UTA) | Participating |

* The full list of agencies and local governments invited to become cooperating or participating agencies and any responses received are included in Appendix A.


### 1.3 PROJECT HISTORY

The problems associated with the Payson Main Street interchange have been known for more than 10 years and are described in detail in this chapter. The improvement of the interchange is included in the Mountainland Association of Governments (MAG) long-range transportation plan, TransPlan40, and was considered in the I-15 Corridor Utah County to Salt Lake County EIS. In 2011, UDOT commissioned a concept report to study possible interchange design options.

In 2008, multiple concepts were considered and evaluated for the Payson Main Street interchange as part of the l-15 Corridor Utah County to Salt Lake County EIS. The EIS identified the preferred design concept for the Main Street interchange as a reconstruction of the existing diamond interchange to a new diamond interchange. The design concept also included widening Main Street (State Route [SR] 115) to two lanes in each direction and realigning it to cross over I-15 and the Union Pacific railroad west of I-15. These improvements would reduce the skew where I-15 crosses Main Street and correct safety problems associated with the existing interchange ramps and the at-grade railroad crossing. The improvements would have also increased the distance between local business access and the interchange ramps. In addition, a new connection between Main Street and 900 North would have been provided (FHWA 2008). Since the Record of Decision was issued for the I-15 Corridor Utah County to Salt Lake County EIS in 2008, the long-range transportation plan and planned land uses near the Main Street interchange have changed such that UDOT determined it was necessary to reexamine the transportation needs and solutions in northern Payson.

In August 2011, UDOT commissioned a concept report that considered another design option for improving the Payson Main Street interchange. This concept would move the interchange 3,500 feet north of the existing interchange to align with a proposed arterial
road called Nebo Beltway, accommodate future growth planned in the area, and provide access to a potential future Utah Transit Authority (UTA) FrontRunner commuter rail station west of I-15. The new interchange would cross over I-15. The underpass at the existing Main Street interchange would be preserved, but the ramps would be removed.

The design concepts that were developed as part of the I-15 Corridor Utah County to Salt Lake County EIS and the 2011 concept report were considered as part of the alternative development process for this EIS. A full range of reasonable alternatives has been developed and evaluated as part of this EIS, as described in Chapter 2.

### 1.3.1 Transportation Planning in the Study Area

MAG is the designated metropolitan planning organization that works in partnership with UDOT and other stakeholders to develop the regional transportation plan for the communities in its jurisdiction. MAG's jurisdiction includes communities in Utah, Summit, and Wasatch counties. As the regional metropolitan planning organization, MAG provides input into the decision process for highway and transit projects in Utah County.

MAG's most recent regional transportation plan, TransPlan40, was adopted in 2015 and includes the Main Street interchange and Main Street improvements (MAG 2015). TransPlan40 categorizes roadway, active transportation, and transit projects into the following three phases:

- Phase 1: 2015 to 2024
- Phase 2: 2025 to 2034
- Phase 3: 2035 to 2040

Recognizing the intent of UDOT to prepare an EIS to address the problems associated with the Main Street interchange, MAG identified two projects in Phase I to
address the transportation needs at the interchange and along Main Street to 100 North (SR-198). One project includes modifying (i.e., moving) the Main Street interchange and possibly adding connections to Main Street and SR-198. This connection is also referred to in the transportation plan as the Nebo Beltway. TransPlan40 divides Nebo Beltway into three phases, the first two phases are within the study area. Phase I would connect I-15 and SR-198; Phase II would connect SR-198 to Elk Ridge Drive. The other project includes improving the Main Street interchange in its current location with the possibility of widening Main Street to five lanes. Even if the latter option were implemented, other transportation infrastructure improvements could be made to accommodate the future Nebo Beltway. The outcome of this EIS will determine which project identified in the plan for the Payson Main Street interchange is constructed.

Table 1-2 summarizes other TransPlan40-identified road, active transportation, and transit projects within the study area.

The Payson City General Plan was adopted in 2003 to guide development within the city. Chapter 4.3 of the plan describes the existing road network within the city and identifies future road improvement projects. Main Street, between 900 North and 100 North, is identified in the general plan as a major arterial road. According to the plan, Main Street experienced the most traffic growth between 1995 and 2000 compared to the city's other arterial roads. To make Main Street more efficient, the general plan proposes improvements to the following intersections:

- I-15 on-ramps and off-ramps
- 600 North
- 400 North

Table 1-2
Transportation and Transit Projects in the Study Area

| Project Type | Project Description | Phase |
| :--- | :--- | :---: |
| Widening—Road | SR-198: Widen road to four lanes with a multiuse trail from Arrowhead Trail <br> Road to 800 South in Payson | 1 |
| New Construction—- <br> Road | Nebo Beltway: New two-lane road from l-15 through Elk Ridge, <br> Woodland Hills, and Spanish Fork | 2 |
| Active Transportation | SR-198 Connector Trail: 10-foot-wide asphalt trail (included with SR-198 <br> widening project) | 1 |
| Transit | New FrontRunner commuter rail service between Provo and Payson | 2 |
| Transit | New FrontRunner commuter rail service between Payson and Santaquin | 3 |

Source: MAG 2015

The general plan does not specify how these intersections should be improved. However, it does state that traffic signals or roundabouts should be considered. In addition, Main Street is designated as a design corridor, which means it should be designed in a way that shows the beauty of Payson (Payson City 2003).

### 1.4 PROPOSED ACTION

The proposed action is to improve the operation and safety of the I-15, Main Street interchange in northern Payson, Utah, and ensure consistency with the MAG long-range transportation plan. At the interchange, Main Street is a north-south arterial that consists of three lanes from the interchange to 600 North, then narrows to two lanes to 100 North (SR-198). Because operations of the interchange and Main Street are interrelated, improvements to Main Street are included as part of the proposed action, which is further described in Section 1.4.2, Logical Termini and Independent Utility or Significance.

### 1.4.1 Study Area

The 4.6 -square-mile study area centers on I-15 Exit 250 in Payson (see Figure 1-1). The western boundary generally follows the Union Pacific railroad tracks west of I-15 and 3550 West. The southern boundary parallels SR-198, and the eastern boundary follows a northwest line across agricultural fields for approximately

## PROPOSED ACTION

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2.3 miles until it crosses I-15. The northern boundary extends to the intersection of Dixon Road and SR-115 (Main Street).

The study area boundary was identified to include the reasonable range of alternatives to be developed for this EIS, including alternatives that would relocate the Main Street interchange north of its existing location. The actual study area used to analyze each environmental resource varies, as described in Chapter 3.

Figure 1-1

## Study Area



### 1.4.2 Logical Termini \& Independent Utility or Significance

As specified in 23 CFR 771.111(f), the proposed project must do the following:

- Connect logical termini and be of sufficient length to address environmental matters on a broad scope
- Have independent utility or independent significance (be usable and a reasonable expenditure even if no additional transportation improvements in the area are made)
- Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements


## Logical Termini

Logical termini are defined as the rational end points for a transportation improvement and environmental
impact analysis. The proposed project area must be of sufficient length to address the environmental issues on a broad scope. The logical termini shown on Figure 1-2 were chosen so that environmental issues can be treated on a sufficiently broad scope to ensure that the proposed project would function properly-without requiring additional improvements elsewhere-and not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Northwest Logical Terminus: The northwest terminus is on Main Street approximately 0.7 miles north of the Payson City Power Plant. This location was selected to allow for flexibility in locating a new or additional interchange northeast of its current location.

Figure 1-2
Logical Termini


Northeast Logical Terminus: The northeast terminus is on I-15 approximately 1.3 miles northeast of the existing Main Street interchange. This location was selected to allow for flexibility in locating a new or additional interchange northeast of its current location.

Southeast Logical Terminus: The southeast terminus, at SR-198 and 2100 West, was selected to align alternatives with the existing road network and future segments of Nebo Beltway, as identified by Payson City and in TranspPlan40.

Southwest Logical Terminus: The southwest terminus, at Main Street and 100 North (SR-198), was selected on the basis of projected traffic volumes and the relationship between 100 North (SR-198), Main Street, and the Main Street interchange. As the primary eastwest arterial through Payson, 100 North serves as the primary highway that connects I-15 and Main Street to

## LEVEL OF SERVICE (LOS)

LOS is a method of measuring and describing the operating performance of an intersection or road. LOS is described by a letter grade that ranges from A for "excellent conditions" (free flowing) to F for "failing conditions" (extremely congested, stop-and-go traffic). LOS is further described in Section 1.5.1, Need for the Project.

Mountain View Hospital and the surrounding communities of Elk Ridge, Salem, and Woodland Hills. In addition, 100 North is one of Payson's key commercial corridors.

By the design year of 2040, southbound traffic volumes on Main Street between the interchange and 100 North during afternoon peak hours will exceed existing capacity by 40 percent. Most of Main Street from the
interchange to 100 North will be operating at level of service (LOS) E and F, which are unacceptable levels (see Section 1.5.1, Need for the Project). Similarly, the intersections at both northbound and southbound ramps will operate at LOS F by 2040. This is primarily due to a bottleneck on southbound Main Street just south of the I-15 northbound ramps (at approximately 700 North) where southbound Main Street drops from two lanes to one lane. The congestion and operational deficiencies along Main Street to 100 North are expected to increase delay and congestion on the offramps, which could cause vehicles to back onto the freeway and compromise the safety and operation of the interchange and I-15. Therefore, to improve traffic operations at the Main Street interchange, the capacity along Main Street would also need to be improved to 100 North.

Traffic volumes during afternoon peak hours along southbound Main Street are higher near the interchange and gradually decrease at each intersection south of the interchange to 100 North. UDOT considered other intersections closer to the interchange as the southwest terminus; however, the decrease in southbound traffic volume from intersection to intersection was not substantial enough to consider these intersections as the southwest terminus. Under current conditions, approximately 70 percent of the traffic at the interchange is coming from or going to 100 North. By 2040 this percentage is expected to decrease to about 60 percent, which still reflects a strong connection between the interchange and 100 North.

## Independent Utility or Significance

Independent utility means the ability of the proposed action to function independently of other planned transportation-related projects in the region. Unlike the other planned transportation projects that are discussed in more detail in Section 1.3.1, Transportation Planning in the Study Area, the proposed project would improve the safety and
capacity of Main Street and the interchange. In addition, the project has regional significance because it not only provides connectivity within Payson but also connects Payson with the surrounding communities of Elk Ridge, Salem, and Woodland Hills. As such, the project would be a reasonable expenditure to improve Main Street and the interchange without the other planned transportation projects.

### 1.5 PURPOSE AND NEED

### 1.5.1 Need for the Project

The I-15, Payson Main Street Interchange project is needed for the following reasons:

- The existing infrastructure will not be able to adequately serve the projected transportation demands from a rapidly growing population in and around Payson.
- Existing design deficiencies compromise vehicle safety and limit the overall functionality of the interchange.

This section describes the projected growth, the lack of projected traffic capacity, and the deficiencies and safety issues associated with the existing interchange.

## Population, Employment, and Housing Growth Trends

The major transportation needs in the study area are primarily the result of Payson's rapidly growing population and housing and employment base. Understanding the extent and location of future population, employment, and housing growth is important in determining future travel demand and identifying road network deficiencies. Substantial increases in these categories can negatively affect the local transportation system if the transportation system is not improved.

By 2040, Payson's population is expected to increase by approximately 31,000 people, or 166 percent ${ }^{1}$ (U.S. Census Bureau 2013a, MAG 2013). By comparison, the population of Utah County is expected to increase by 93 percent (U.S. Census Bureau 2013b, MAG 2013). The rapid population growth within and adjacent to Payson is attributable to regional forces, such as the diminishing availability of undeveloped land in northern Utah County, which will direct future population growth to Payson and other surrounding communities in the southern end of the county.

Figure 1-3 shows the population growth and where most of the growth is expected to occur in and around Payson between 2013 and 2040, based on the transportation analysis zones (TAZs) developed by MAG (MAG 2014). The population is expected to grow faster on the outskirts of Payson, including unincorporated Utah County, compared to central Payson because of the availability of developable land. As shown on Figure 1-3, large areas surrounding the Main Street interchange are projected to grow by more than 300 percent. This growth around the interchange will result in decreased LOS at the interchange and along Main Street.

With the projected population increase, the number of jobs in and around Payson is expected to increase by approximately 10,000 jobs or 157 percent, and the number of households is expected to increase by 7,400 or 123 percent by 2040 (MAG 2014). Similar to the population growth, employment, and household growth will also result in decreased LOS at the interchange and along Main Street.

## Travel Demand

This section summarizes current and future 2040 traffic conditions at the Main Street interchange and along Main Street, between 900 North and 100 North.

[^0]Additional details can be found in the 1-15, Payson Main Street Interchange EIS Traffic Report (see Appendix B). Future traffic conditions are based on the No-Build Alternative, which assumes that some improvements will be made to Main Street, including new traffic signals at the I-15 northbound ramps, 600 North, and 400 North. However, the No-Build Alternative also assumes that no additional lanes will be added to Main Street.

Traffic data used in this section are derived from the MAG Regional Travel Demand Model (Version 8) and traffic counts conducted by the project team. The MAG Regional Travel Demand Model uses projected population, employment, travel behavior, and transportation system information to forecast future travel demand and its associated effects. The area used for traffic analysis includes adjacent interchanges and the surrounding roadway network. The traffic analysis was completed by estimating current traffic conditions and projected 2040 conditions, thereby determining the existing and future LOS.

To improve the regional travel demand model's accuracy and better match current local traffic volumes in the study area, FHWA, UDOT, and MAG worked together to make the following modifications to the travel demand model:

- Split the Payson area TAZs and used the MAG Land Use Model to distribute the land use among the new TAZs.
- Revised the highway network by adjusting speeds and capacities for some roads in the study area.

Figure 1-3
Population Growth In and Around Payson


[^1]
## Level of Service

LOS is a method of measuring and describing the operating performance of an intersection or road. LOS methodologies and criteria are developed by the Transportation Research Board and published in the Highway Capacity Manual. LOS for intersections is based on the average vehicle delay, while road LOS is based on the ratio of the peak-hour travel speed to the free-flow speed. Vehicle demand that exceeds a road's carrying capacity results in congestion, delay, and slow travel speeds.

LOS is described by a letter grade ranging from A for excellent conditions (free flowing) to F for failing conditions (extremely congested, stop-and-go traffic). LOS B through LOS E describe progressively worse traffic conditions. LOS E and LOS F are typically considered unacceptable operating conditions in urban areas, and LOS D and above are considered acceptable operating conditions (see Figure 1-4).

It is assumed that by 2040, traffic signals would be installed at the 600 North and 400 North intersections to improve the LOS along Main Street compared to current conditions. Despite these traffic signals, the LOS at the interchange would diminish from LOS B to LOS F.

Overall, the current (2014) LOS along Main Street during peak hours is within acceptable operating conditions (LOS C). By 2040, Main Street between I-15 and SR-198 will operate at LOS F during peak hours (see Figure 1-5).

Figure 1-4

## Level of Service



Figure 1-5
Current and 2040 Intersection and Roadway LOS on Main Street


## I-15 Main Street Interchange Deficiencies

On the basis of UDOT's Roadway Design Manual of Instruction, UDOT's R930-6 Access Management, and AASHTO's 2011 Green Book, the Main Street interchange is substandard according to several criteria. Table 1-3 identifies the design standard and how the existing Main Street interchange is deficient.

The current Main Street interchange configuration presents challenges for semi-trucks and other long vehicles, which often need to turn into oncoming traffic to make right turns onto Main Street (see Figure 1-6), compromising the overall safety of the interchange.

Figure 1-6
Substandard Intersection Radius


Semi-truck Turning Right onto Main Street, Crossing into Opposing Traffic (Looking South)

Table 1-3
Main Street Interchange Deficiencies

| Criteria | Minimum <br> Standard | Existing | Notes | Reference |
| :--- | :---: | :---: | :--- | :--- |
| Intersection Crossing <br> Angle | $60^{\circ}-90^{\circ}$ | $44^{\circ}$ | Intersection crossing angle is the angle at <br> which I-15 and ramps cross Main Street | Roadway Manual of <br> Instruction, <br> 2011 Green Book |
| Intersection Radius | $75^{\prime}$ | $32^{\prime}$ | Intersection radius is the area available <br> for a vehicle to make a turn within the <br> travel lane; the substandard intersection <br> radius results in vehicles crossing into the <br> opposing travel lane while turning | Roadway Manual of <br> Instruction, <br> 2011 Green Book |
| Railroad Crossing <br> Access Spacing | $250^{\prime}$ | $50^{\prime}$ | The existing southbound ramps and 900 <br> North fail to meet railroad standards | R930-6 Access <br> Management |
| Access <br> Management <br> (Intersection <br> Spacing) | $300^{\prime}$ | $40^{\prime}$ | The l-15 ramps and frontage road are <br> too close, which results in additional <br> conflict points, driver confusion, and <br> safety concerns | R930-6 Access <br> Management |

Figure 1-7 compares the existing Main Street interchange to a typical interchange with on-ramps and off-ramps that intersect at 90-degree angles.

Figure 1-7
Interchange Comparison


Existing Main Street Interchange (Oblique Angle)


Typical Interchange (Right Angle)

## Safety

The safety of the Main Street interchange was determined using the crash rate score and safety index rating developed by UDOT. The crash rate score is a method for measuring the overall safety of a road segment and identifying which road segments have the highest crash rate when compared to the statewide average crash rate for roads with a similar functional class and traffic volume. The crash rate is calculated using data collected between 2009 and 2011, while statewide average crash rates reflect five years of data collected between 2007 and 2011. Crash rate scores are reported on a scale between zero and five, with five representing the road segment with the highest actual crash rate versus the statewide average crash rate.

The safety index provides a statewide comparison of state roads, accounting for the different traffic patterns and volumes experienced in urban and rural areas. The safety index is reported on a scale between zero and 10 , with 10 representing the most unsafe conditions. Data used to calculate the safety index was collected between 2009 and 2011.

The crash rate score and safety index for Main Street at the interchange indicate that the alignment of the interchange is affecting the overall safety of Main Street (see Figure 1-8). From the I-15 interchange north, Main Street has a crash rate score of three and safety index of three. The crash rate score and safety index south of the interchange are higher (four and four). This section of Main Street also experiences 26.1 crashes per mile per year (UDOT 2015a).

Figure 1-8
Crash Rate Score and Safety Index


Source: UDOT 2015a

### 1.5.2 Purpose of the Project

On the basis of the needs presented above, the I-15, Payson Main Street Interchange project is intended to achieve the following objectives:

- Improve traffic operations in Payson by reducing expected roadway congestion at the Main Street interchange and on Main Street between approximately 900 North and 100 North: Accommodate future travel demand for automobile and freight traffic by improving LOS at the interchange and along Main Street compared to the no-build conditions.
- Address design deficiencies to meet current roadway design standards: Address the identified safety and operational inadequacies and meet UDOT and AASHTO design standards, thereby improving the functionality and safety of the Main Street interchange compared to the no-build conditions.


### 1.6 CONCLUSION

Payson City is projected to experience substantial growth by 2040, with a 166 -percent increase in population, a 157-percent increase in jobs, and a 123percent increase in housing. This growth will cause the following problems at the Main Street interchange and along Main Street if no improvements are made:

- Main Street Interchange: The southbound onramps and off-ramp intersection will worsen from LOS B (2014) to LOS F (2040). The northbound on-ramps and off-ramp intersection will worsen from LOS D to LOS E during peak hours.
- Main Street: LOS along Main Street between the interchange and 100 North will worsen. In particular, southbound LOS at the interchange will worsen from LOS B (2014) to LOS F (2040), and northbound LOS will worsen from LOS C to LOS E.

The current alignment of the interchange intersects Main Street at a substandard angle of approximately 44 degrees (UDOT and AASHTO state that the intersection cross angle should be between 60 and 90 degrees). In addition, the intersection does not meet UDOT or AASHTO guidelines for intersection radius, railroad crossing spacing, and access management. These deficiencies affect the overall safety of Main Street at the interchange.

On the basis of this information, improvements are needed to (1) accommodate future mobility in Payson by reducing expected roadway congestion and (2) correct interchange and roadway geometric deficiencies for improved safety.


[^0]:    ${ }^{1}$ Growth rate based on data from the 2013 American Community Survey and 2040 population projects from MAG between 2013 and 2040.

[^1]:    Source: MAG 2014

