CHAPTER TWO
ALTERNATIVES

2.1 INTRODUCTION

Title 23 of the Code of Federal Regulations (CFR) Part 771.123 requires UDOT to evaluate a reasonable range of alternatives and explain why alternatives were eliminated from detailed study. This chapter describes the alternative development and screening process, the range of conceptual alternatives that were considered but eliminated from further evaluation, the build alternatives carried forward for detailed study in the Final EIS, and the Preferred Alternative for the I-15, Payson Main Street Interchange project.

NEPA requires that a No-Build Alternative be included and advanced for detailed study. The No-Build Alternative serves as a baseline for comparison of the build alternatives.

REASONABLE ALTERNATIVE

An alternative that is practical or feasible from a technical and economic perspective and meets the purpose and need for the project.

2.2 ALTERNATIVE DEVELOPMENT

A wide range of alternatives was developed to meet the purpose and need of the project. As discussed in Chapter 1, the purpose of the project is to:

- **Improve traffic operations by reducing expected roadway congestion at the Main Street interchange:** Payson is projected to experience substantial growth by the year 2040; traffic operations at the Main Street interchange will fail by 2040 if no improvements are made.
- **Address design deficiencies to meet current roadway design standards:** The existing Main Street interchange does not meet current design standards, which affects safety at the interchange and along Main Street.

Conceptual alternatives were developed to address these needs based on previous studies, including the 2008 *I-15 Corridor Utah County to Salt Lake County EIS* and a concept report commissioned by UDOT in 2011, and comments received from the community and agencies.

2.2.1 Agency, Stakeholder, and Public Input

Input from the community, state, and federal agencies was critical in identifying, refining, and evaluating alternatives to meet the needs of the study area. Input was collected through various methods including holding a public scoping meeting, forming community and agency stakeholder groups, and meeting with city representatives.

Conceptual alternatives were initially presented at the following meetings:

- Stakeholder working group meeting on March 18, 2015
- Public scoping meeting on March 19, 2015
- Cooperating agency meeting on April 30, 2015

The project team sought input from these groups throughout the alternative development and screening process (see Chapter 4).

2.3 ALTERNATIVES CONSIDERED

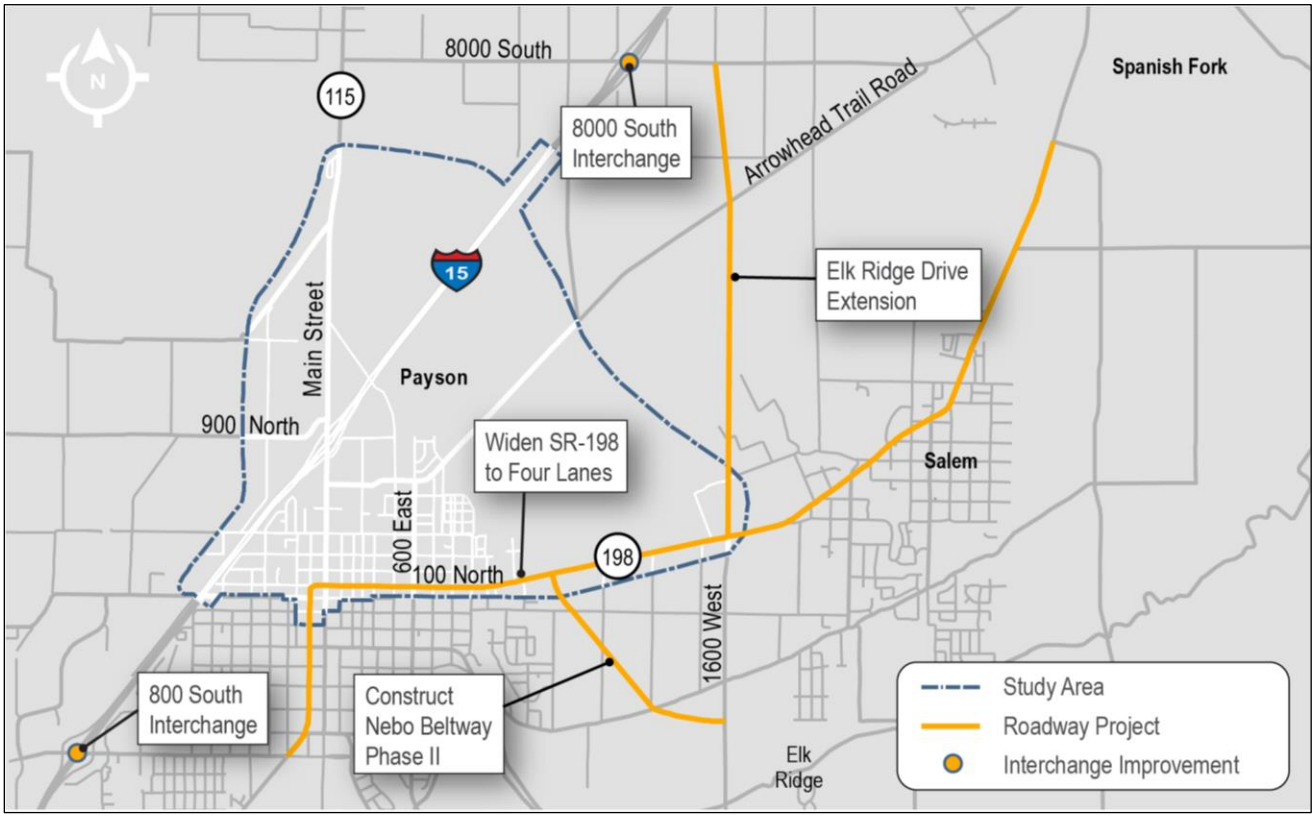
Accommodate Travel Demand

Four categories of conceptual alternatives, as well as no-build, transportation system management (TSM), and transit alternatives, were developed—each attempt to address future travel demand differently.

No-Build Alternative: The No-Build Alternative assumes 2040 traffic conditions without improvements to the existing interchange or Main Street. This alternative assumes the completion of all other projects proposed in the MAG long-range transportation plan, *TransPlan40*, which includes (see Figure 2-1):

- Widening of SR-198 to four lanes
- Capacity improvements at the SR-164 (8000 South) interchange
- Capacity improvements at the SR-178 (Payson 800 South) interchange
- Construction of Nebo Beltway Phase II (see Section 2.3.5 for more information regarding Nebo Beltway)

FIGURE 2-1
No-Build Alternative



Transportation System Management (TSM) Alternative: The TSM Alternative would optimize signal timing at the existing interchange and along Main Street. No other improvements, such adding lanes at the interchange, would be included.

Transit Alternative: This alternative would improve the public transit system in Payson. The planned FrontRunner commuter rail station would be moved from 800 South to Main Street, north of the interchange. An enhanced bus route with 30-minute headways would run from the Payson FrontRunner station along SR-198 to the Spanish Fork FrontRunner station. A local bus route with 15-minute headways would begin at the Payson FrontRunner station, continue south on Main Street to SR-198 where it would continue south until turning west onto 800 South, then turn north after crossing over I-15. Ridership at the FrontRunner station would increase by 1,480 people per day over the planned station location at 800 South, with a daily ridership of 1,800 people in 2040. Bus ridership along the enhanced bus route to Spanish Fork would be 240 people per day and the local bus route would have 410 people per day in 2040 (Hereth 2016).

Improve Existing Interchange ("I") Alternatives: The I alternatives would address the future traffic needs by improving the existing interchange in its current location. This would direct all traffic to and from I-15 onto Main Street, and would require widening Main Street to five lanes between I-15 and SR-198 (also referred to as 100 North).

Relocate Interchange ("R") Alternatives: The R alternatives would accommodate future traffic needs by relocating the interchange northeast along I-15, close to its current location. This would eliminate direct access to Main Street, and direct all traffic onto a new

arterial road (Nebo Beltway Phase I). Main Street would not need to be widened.

Combination of Improve Existing Interchange and Relocate ("C") Alternatives: The C alternatives would provide additional capacity at two locations—the existing Main Street interchange and a new interchange to the northeast. The new interchange would connect to the new Nebo Beltway Phase I, drawing some traffic away from Main Street. Main Street would still have direct access to and from I-15, and would need to be widened to five lanes to 600 North.

Add New Interchange ("A") Alternative: The A alternative would provide additional capacity by adding a new interchange farther north, and keep the existing Main Street interchange open.

Address Design Deficiencies

All build alternatives were designed to meet current standards set by UDOT and comply with guidance from AASHTO to address the safety concerns and design deficiencies associated with the current interchange. In addition, for all build alternatives (except Alternative R2), the railroad paralleling I-15 to the west would be elevated over Main Street to eliminate the conflict between automobiles and trains.

Active Transportation

While the primary purpose of the project is to accommodate future travel demand, the development process also considered UDOT's active transportation policy (UDOT 07-117), which states:

> *The needs of bicyclists, pedestrians, and other Active Transportation users will be routinely considered as an important aspect in the funding, planning, design, construction, operation, and maintenance of Department transportation facilities.*

Improved sidewalks and bike lanes are included in all alternatives that would widen Main Street to SR-198 or include the proposed Nebo Beltway Phase I.

2.3.1 Improve Existing Interchange ("I") Alternatives

Twelve conceptual I alternatives were developed to accommodate future travel demand (at the existing interchange and along Main Street) by improving the existing interchange in place. In general, the I alternatives would also add capacity at the existing Main Street interchange by widening Main Street to five lanes—two travel lanes in each direction with a median lane—between the interchange and SR-198. Main Street would be widened because the operation of the interchange and Main Street are interrelated; if capacity is increased at the interchange without widening Main Street, the interchange is projected to fail as congestion increases on Main Street. This could cause travel delay and safety issues on southbound I-15 during afternoon peak hours as vehicles waiting to exit I-15 line up into the travel lanes.

The conceptual I alternatives are listed below, and shown on Figures 2-2 through 2-14.

Conceptual I Alternatives	Figure No.
I1: Long-Span Structure	Fig. 2-2*
I2: Roundabouts	Fig. 2-3*
I3: Oval-a-bout	Fig. 2-4*
I4: Main Street over I-15	Fig. 2-5*
I5: Diverging Diamond Interchange	Fig. 2-6*
I6: Realign Main Street South under I-15	Fig. 2-7*
I7: Add Arterials	Fig. 2-8
I8: One-way Streets	Fig. 2-9
I9: Realign Main Street South over I-15	Fig. 2-10*
I10: Realign Main Street North over I-15	Fig. 2-11*
I11: Realign Main Street North under I-15	Fig. 2-12*
I12: Two-way Streets	Fig. 2-14

**Alternative extends down Main Street to SR-198; see also Figure 2-13.*

FIGURE 2-2
Conceptual Alternative I1: Long-Span Structure

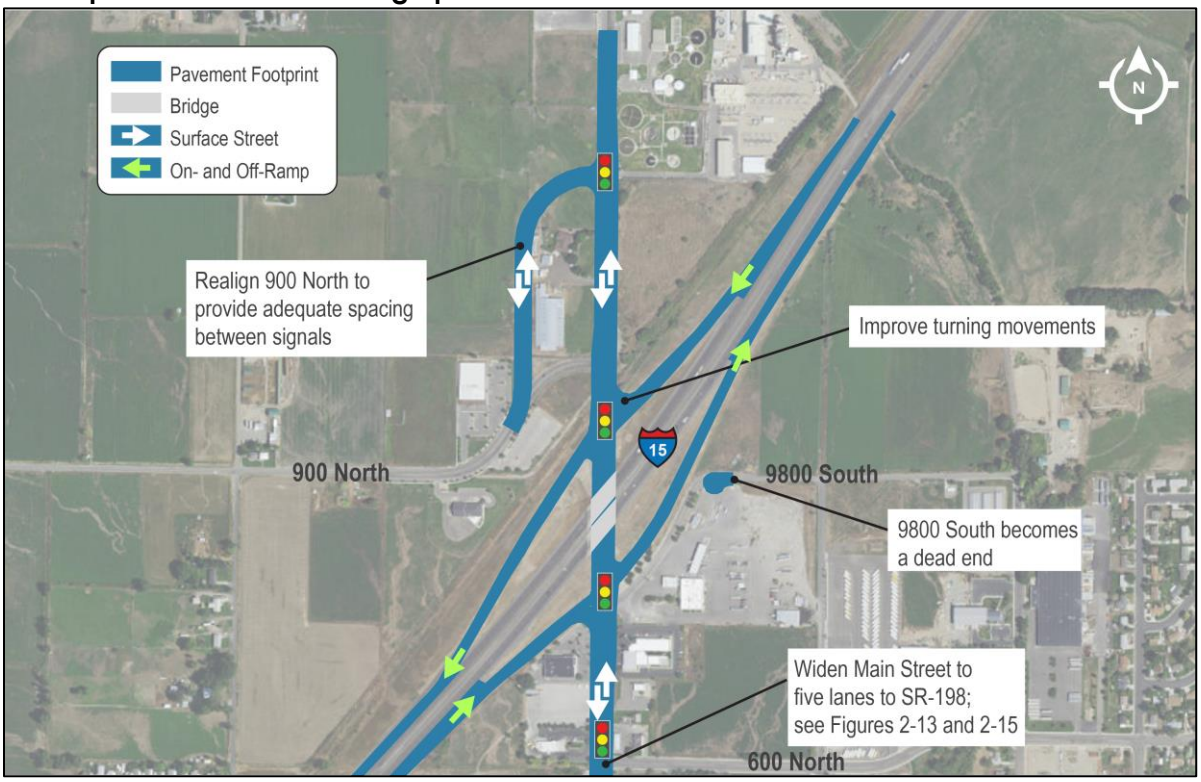


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FIGURE 2-3
Conceptual Alternative I2: Roundabouts

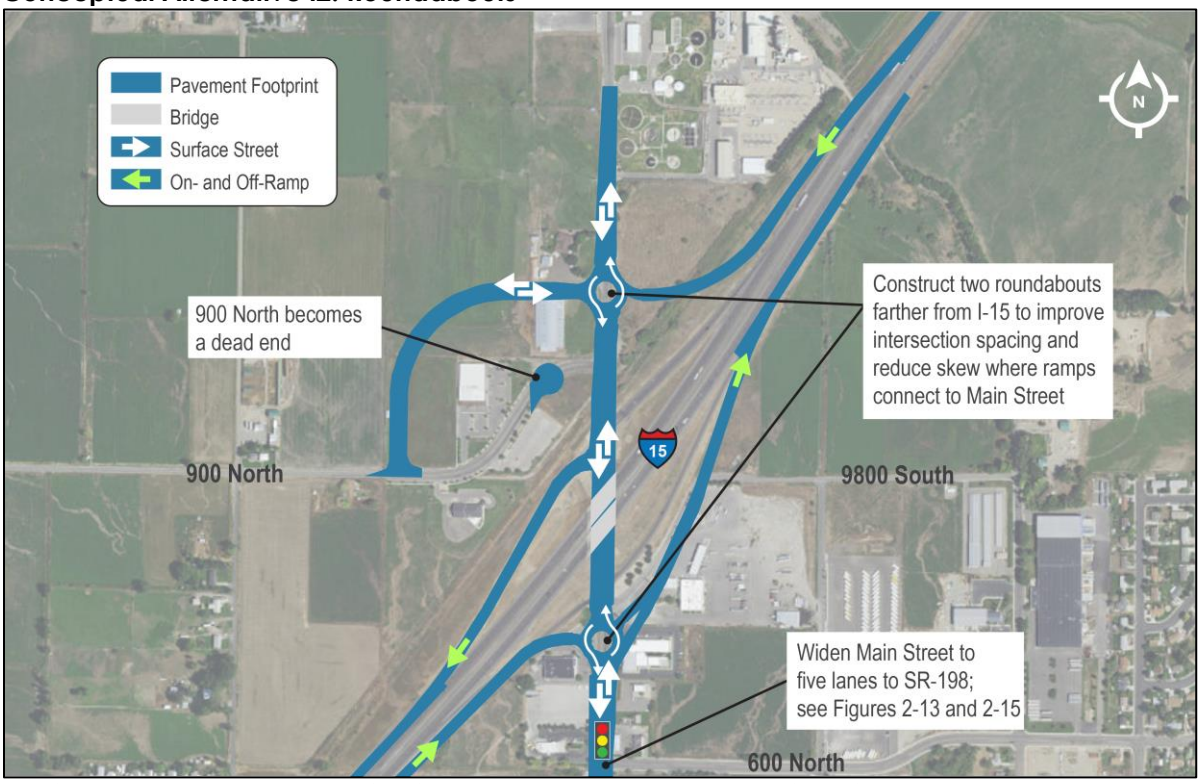

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FIGURE 2-4
Conceptual Alternative I3: Oval-a-bout

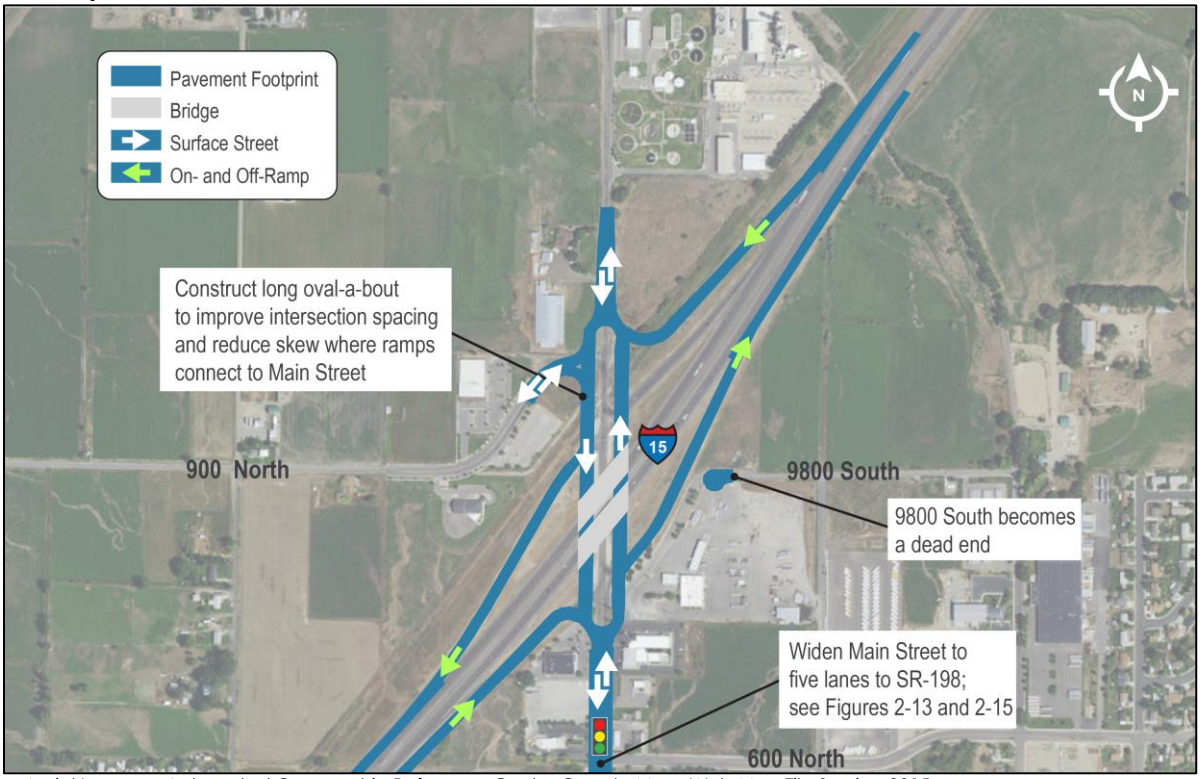

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FIGURE 2-5
Conceptual Alternative I4: Main Street over I-15

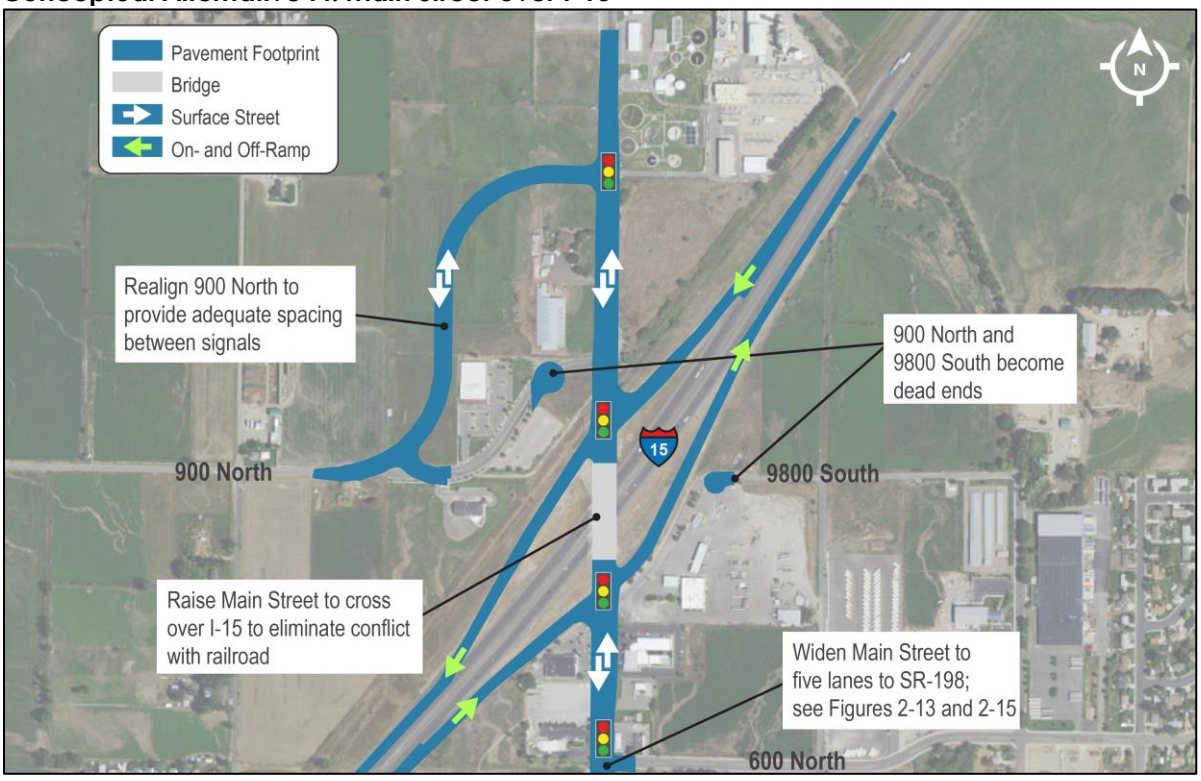

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FIGURE 2-6
Conceptual Alternative I5: Diverging Diamond Interchange

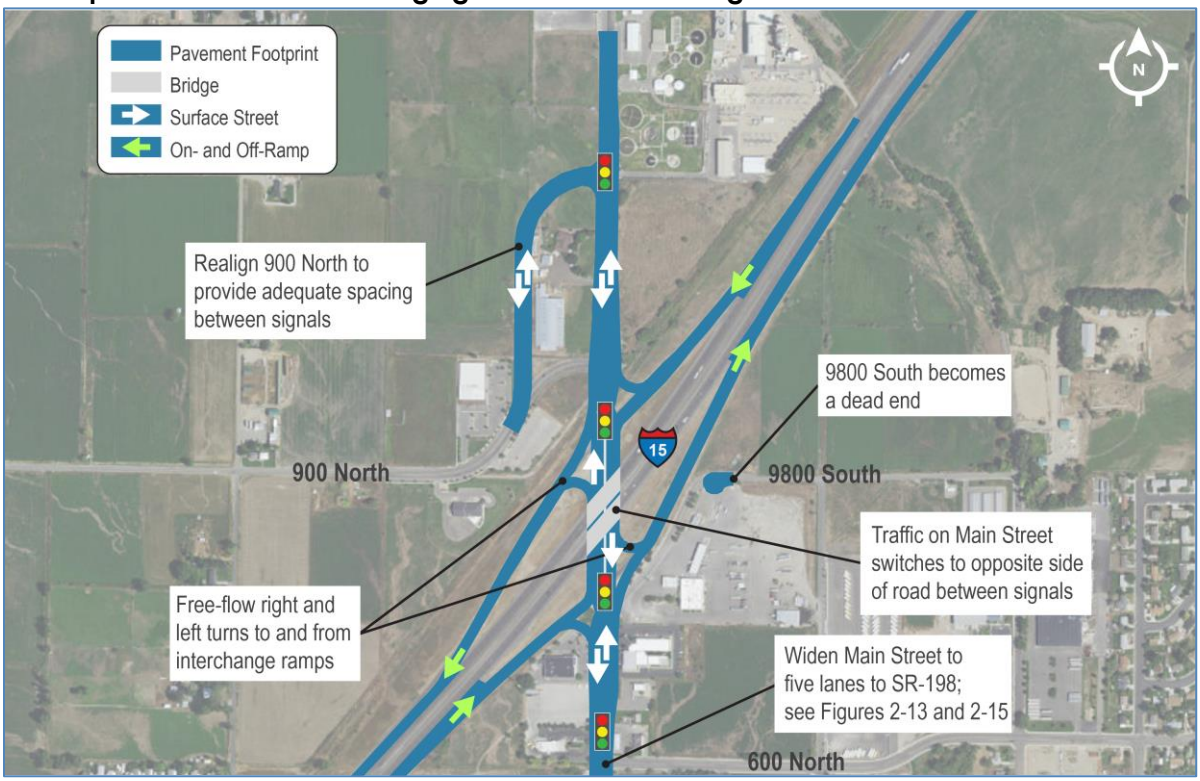

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FIGURE 2-7
Conceptual Alternative I6: Realign Main Street South under I-15

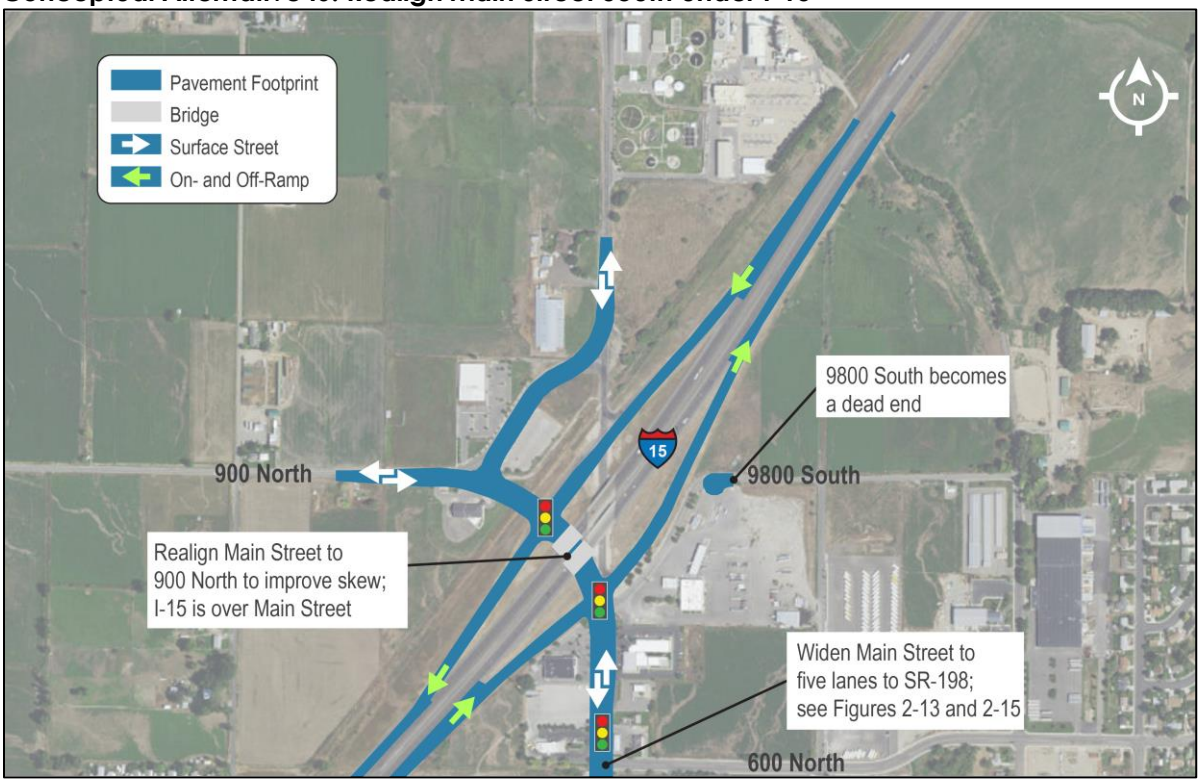

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FIGURE 2-8
Conceptual Alternative I7: Add Arterials

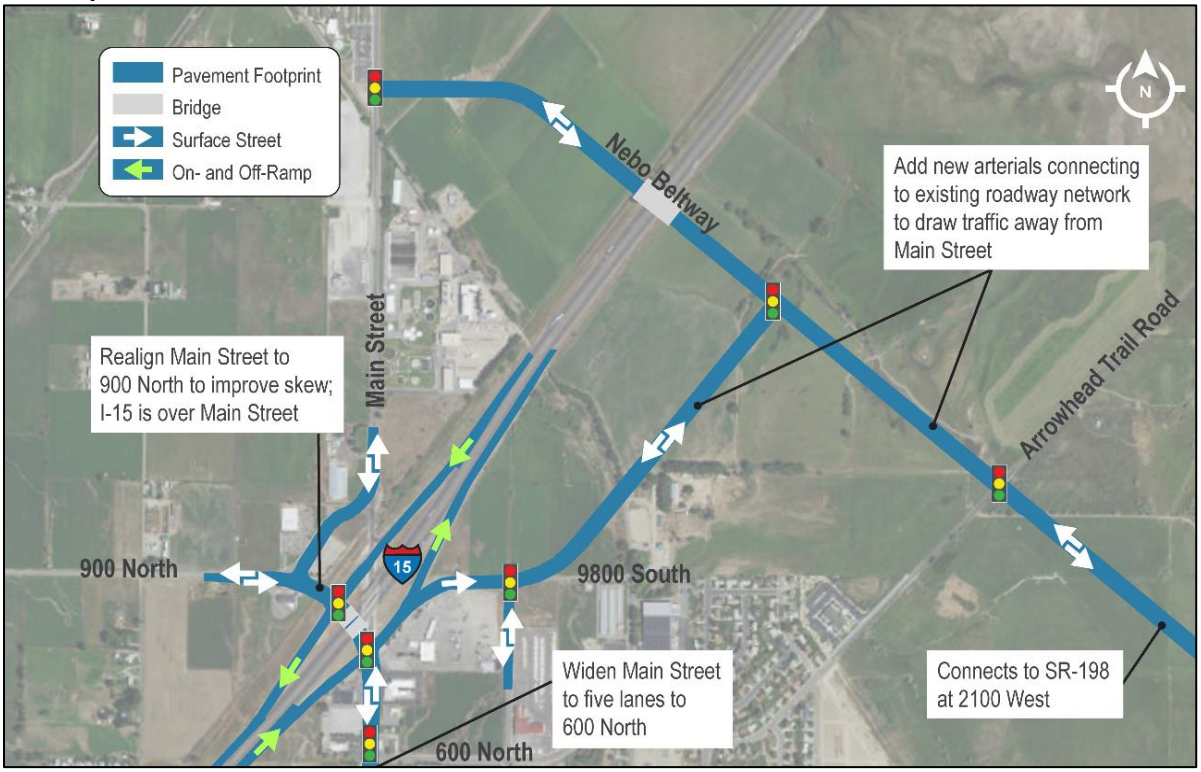

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FIGURE 2-9
Conceptual Alternative I8: One-way Streets

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FIGURE 2-10
Conceptual Alternative I9: Realign Main Street South over I-15

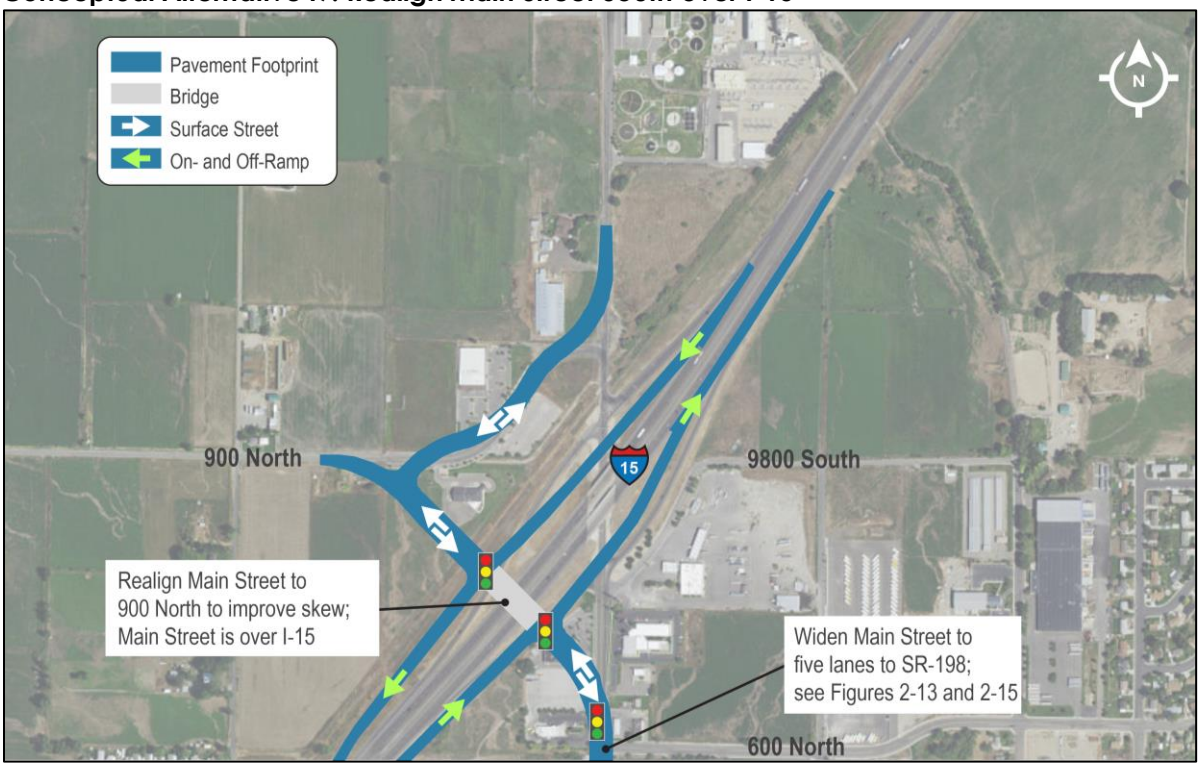

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FIGURE 2-11
Conceptual Alternative I10: Realign Main Street North over I-15

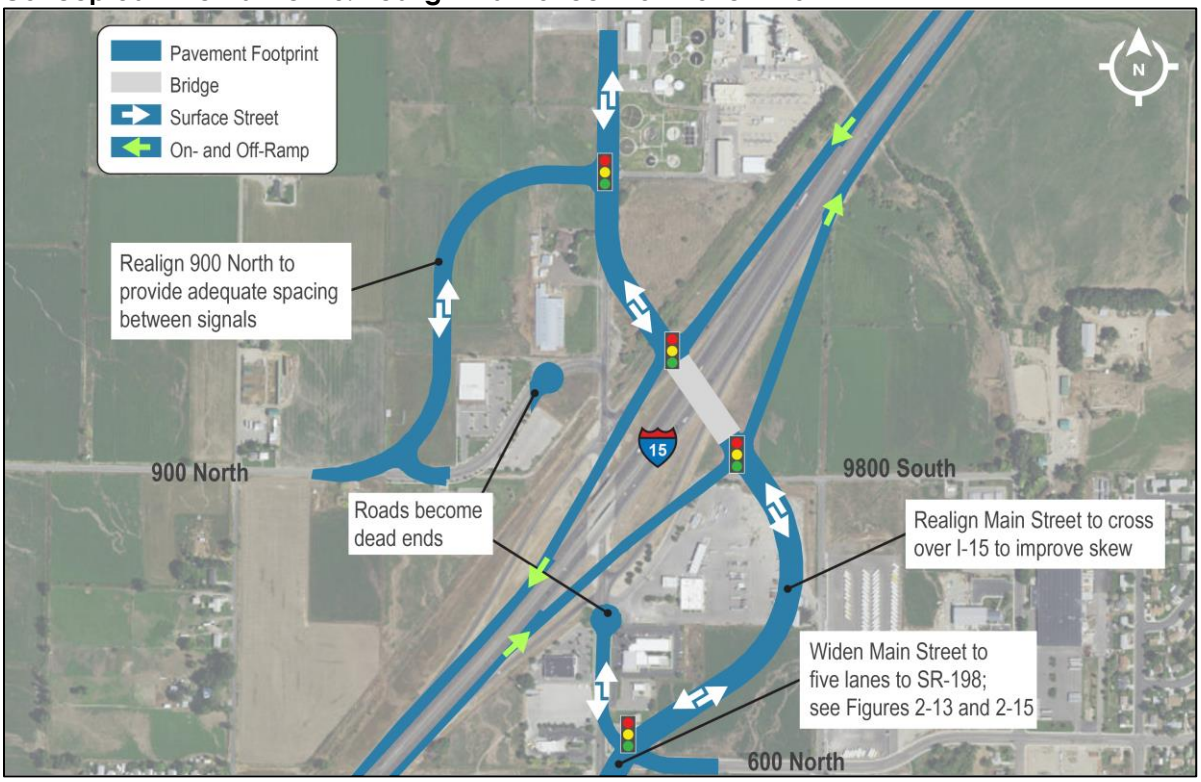

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FIGURE 2-12
Conceptual Alternative I11: Realign Main Street North under I-15

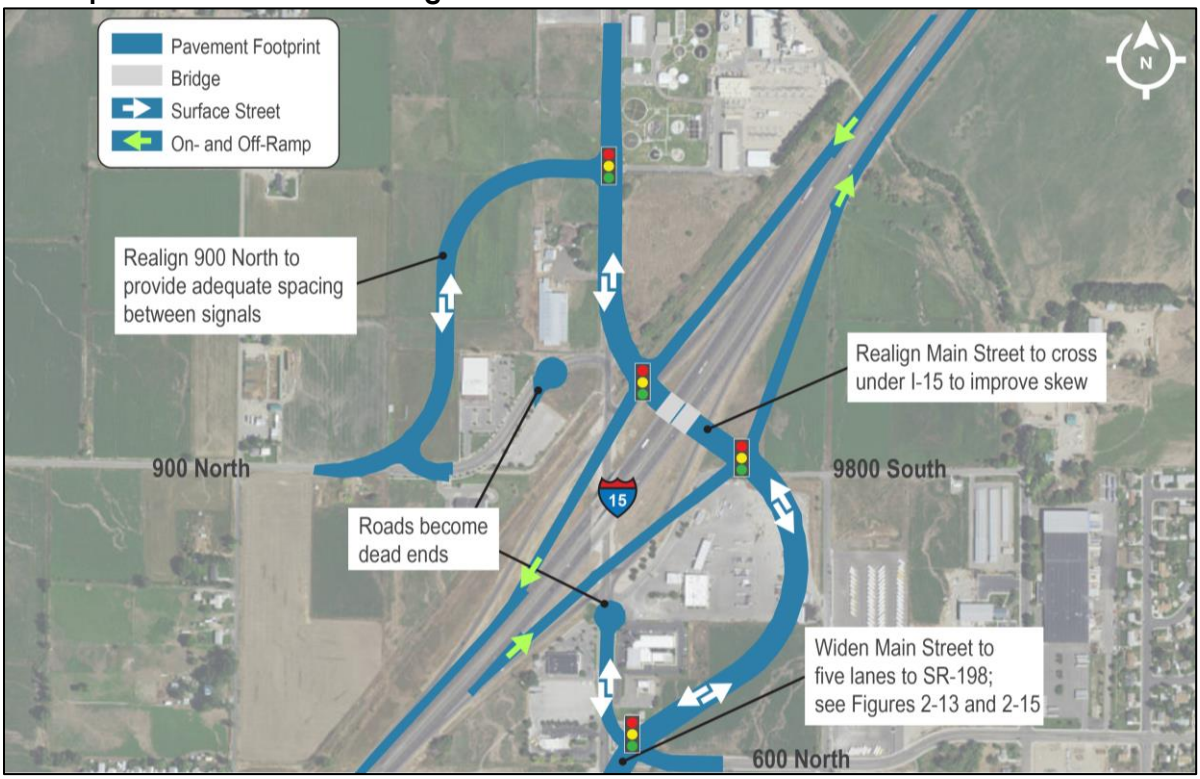

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FIGURE 2-13
Widen Main Street for Conceptual Alternatives I1 through I6 and I9 through I11

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FIGURE 2-14
Conceptual Alternative I12: Two-way Streets

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Main Street Widening

Because the operations of the interchange and Main Street are closely interrelated, options for widening Main Street were evaluated to ensure future travel demand would be accommodated at the interchange and along Main Street. Main Street would be widened from an existing width of 66 feet to 113 feet, as shown on Figure 2-15. This option applies to Alternatives I1 through I6 and I9 through I11 (see Figure 2-13), and would extend from the interchange to SR-198. Table 2-1 lists the Main Street widening options evaluated for the I alternatives to minimize impacts while still meeting traffic needs.

The option of widening Main Street to the east was selected because it had fewer full property acquisitions and fewer adverse effects to historic resources (i.e., demolished or removed historic homes).

MAIN STREET WIDENING TO SR-198

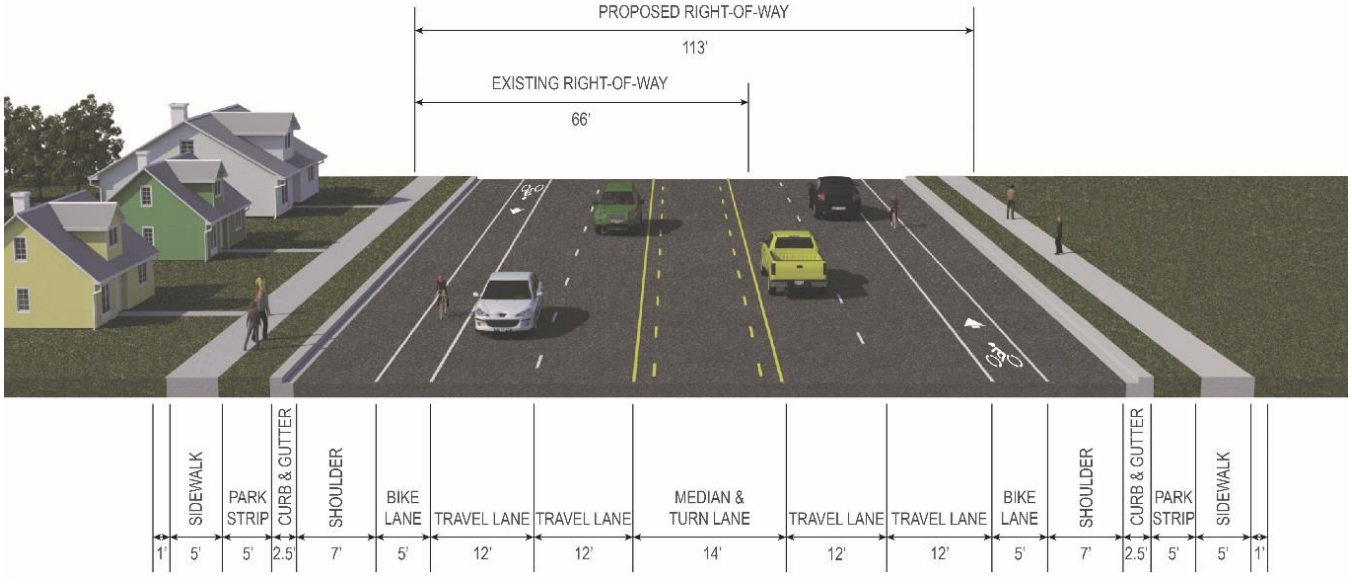
To accommodate traffic operations and projections, the following I alternatives would require Main Street to be widened from the interchange to SR-198: Alternatives I1 through I6 and Alternatives I9 through I11. For the remaining I alternatives—I7, I8, and I12—the widening would be limited to 600 North instead of SR-198.

TABLE 2-1
Comparison of Main Street Widening Options

Design Option	Full Acquisition/ Relocation*	Historic Resources Adversely Affected*
Widen both sides (symmetrical)	61	36
Widen east	38	20
Widen west	47	28

**Preliminary estimates based on conceptual design. These estimates were used for early comparison purposes, and may differ from those described in Chapter 3 or elsewhere in the Final EIS.*

FIGURE 2-15
Main Street Cross-Section—Widen to Five Lanes



2.3.2 Relocate ("R") Alternatives

The conceptual R alternatives would provide the needed capacity by relocating the interchange and closing the existing interchange at Main Street. Because most future population growth is projected where there is more developable land, northeast of the current interchange location, the interchange would be relocated to this area. The proposed Nebo Beltway Phase I would connect the interchange to SR-198 (see Section 2.3.5, Nebo Beltway Phase I, for more information). Each conceptual R alternative was relocated within one mile of the current interchange location to provide a relatively convenient connection to Payson and to comply with FHWA and AASHTO interchange spacing guidelines, which require one-mile spacing between urban interchanges (FHWA 2010). The Benjamin interchange is approximately 2.5 miles northeast of the existing Main Street interchange.

NEBO BELTWAY PHASE I

If the interchange is relocated, or if an additional interchange is added, the proposed Nebo Beltway Phase I would provide a connection from the new interchange to the existing local road network. Nebo Beltway Phase I is planned as a five-lane road connecting to SR-198 for all conceptual R, C, and A alternatives. See Section 2.3.5, Proposed Nebo Beltway Phase I.

The conceptual R alternatives are shown on Figures 2-16 and 2-17.

Conceptual R Alternatives	Figure No.
R1: Relocate Near	Fig. 2-16
R2: Relocate Far	Fig. 2-17

FIGURE 2-16
Conceptual Alternative R1: Relocate Near (0.2 Miles)

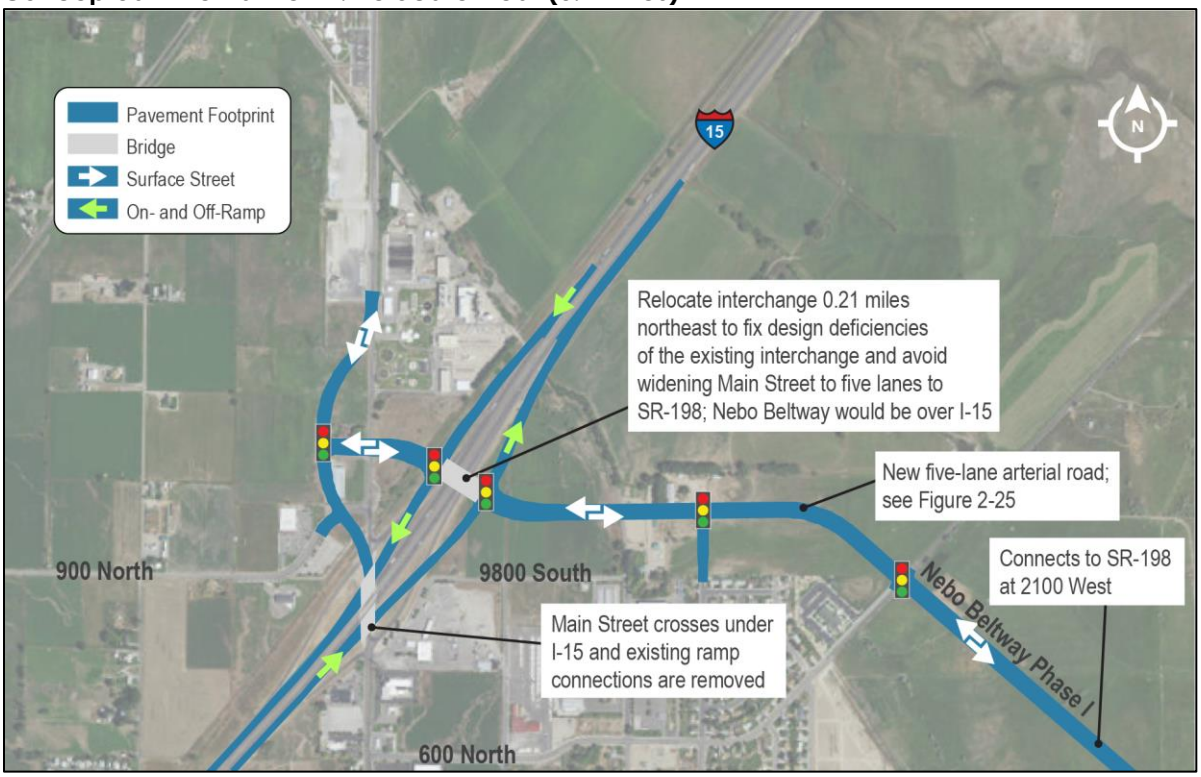


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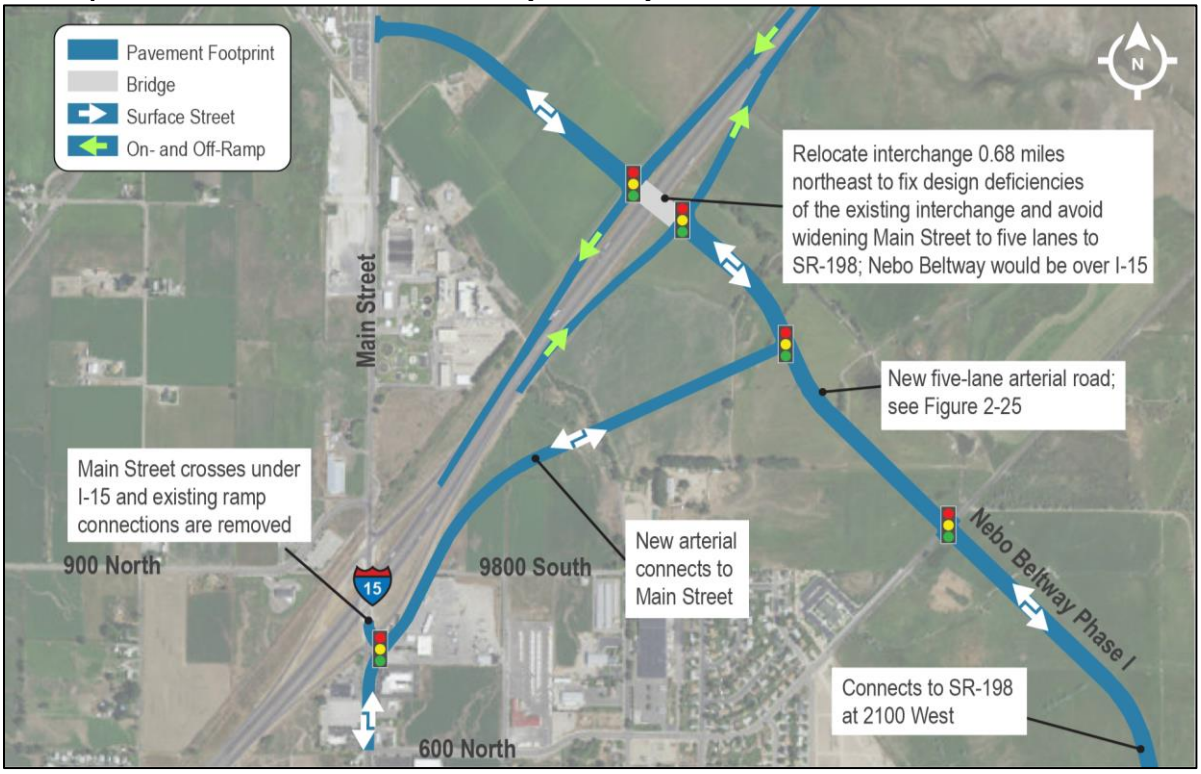
FIGURE 2-17
Conceptual Alternative R2: Relocate Far (0.7 Miles)



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2.3.3 Combination of Improve Existing Interchange & Relocate ("C") Alternatives

The conceptual C alternatives incorporated components from the I and R alternatives to maintain the existing connection to Main Street without the right-of-way impacts associated with the I alternatives, and without the loss of the direct connection to Main Street under the R alternatives.

Conceptual C Alternatives	Figure No.
C1: Braided Ramps	Fig. 2-18
C2: Collector-Distributor Ramps	Fig. 2-19
C3: Frontage Road Ramps	Fig. 2-20
C4: Split Diamond	Fig. 2-21
C5: Full and Half	Fig. 2-22
C6: Frontage Road Ramps 600 East	Fig. 2-23

The C alternatives listed above would provide capacity at both the existing Main Street interchange and at a new interchange to the northeast. The new interchange would connect to the Nebo Beltway Phase I, drawing some traffic away from Main Street (see Section 2.3.5, Proposed Nebo Beltway Phase I, for more information). Although Main Street would still have direct access to I-15, it would not need to be widened to five lanes to SR-198. Main Street would be widened to five lanes between I-15 and 600 North to accommodate projected traffic volumes at the interchange and then taper to its current two-lane configuration.

FHWA and AASHTO guidelines state the minimum spacing between urban interchanges is one mile. If interchanges are less than one mile from each other, braided ramps, collector-distributor roads, or frontage roads need to be included to mitigate the effects of the closely spaced interchanges (FHWA 2010). The additional interchange under each C alternative would

be less than one mile from the existing interchange; therefore, various ramp and frontage road configurations were developed to connect the current and the new interchange.

To improve the skew of the current interchange, Main Street would be realigned under each C alternative to connect to 900 North, instead of maintaining its current north–south alignment. The conceptual C alternatives are shown on Figures 2-18 through 2-23.

FIGURE 2-18
Conceptual Alternative C1: Braided Ramps

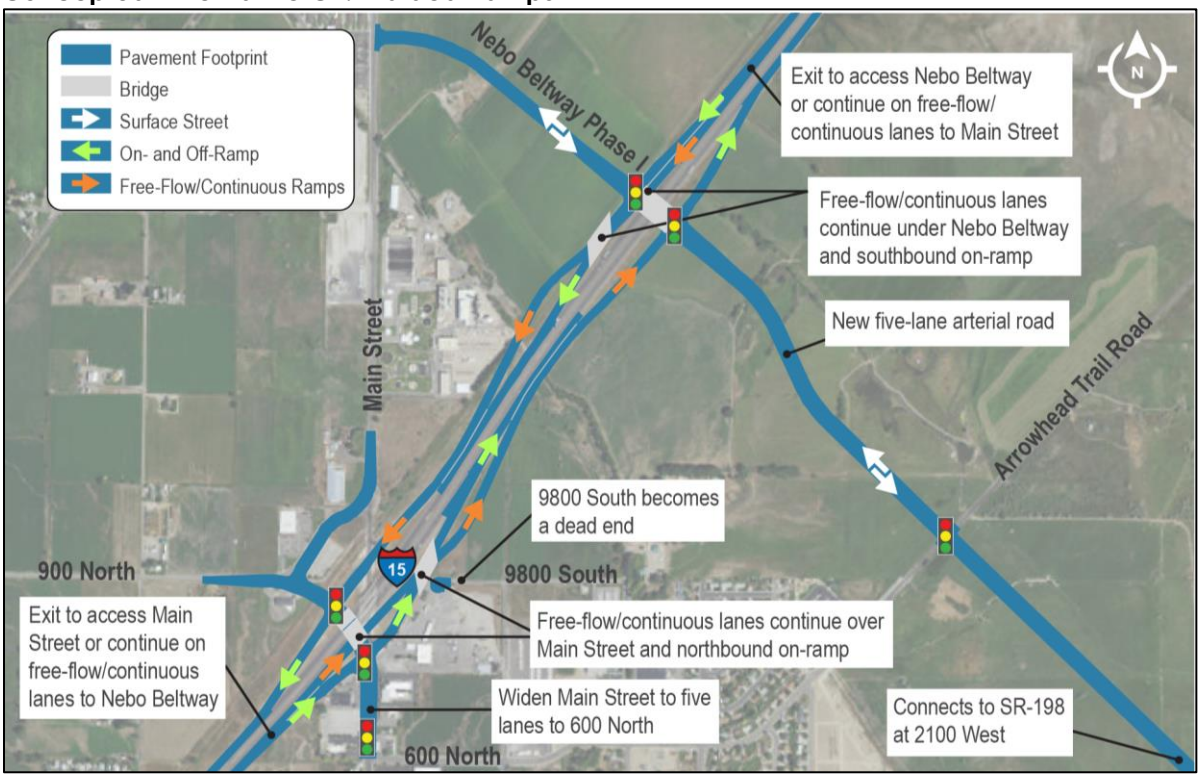

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FIGURE 2-19
Conceptual Alternative C2: Collector-Distributor Ramps

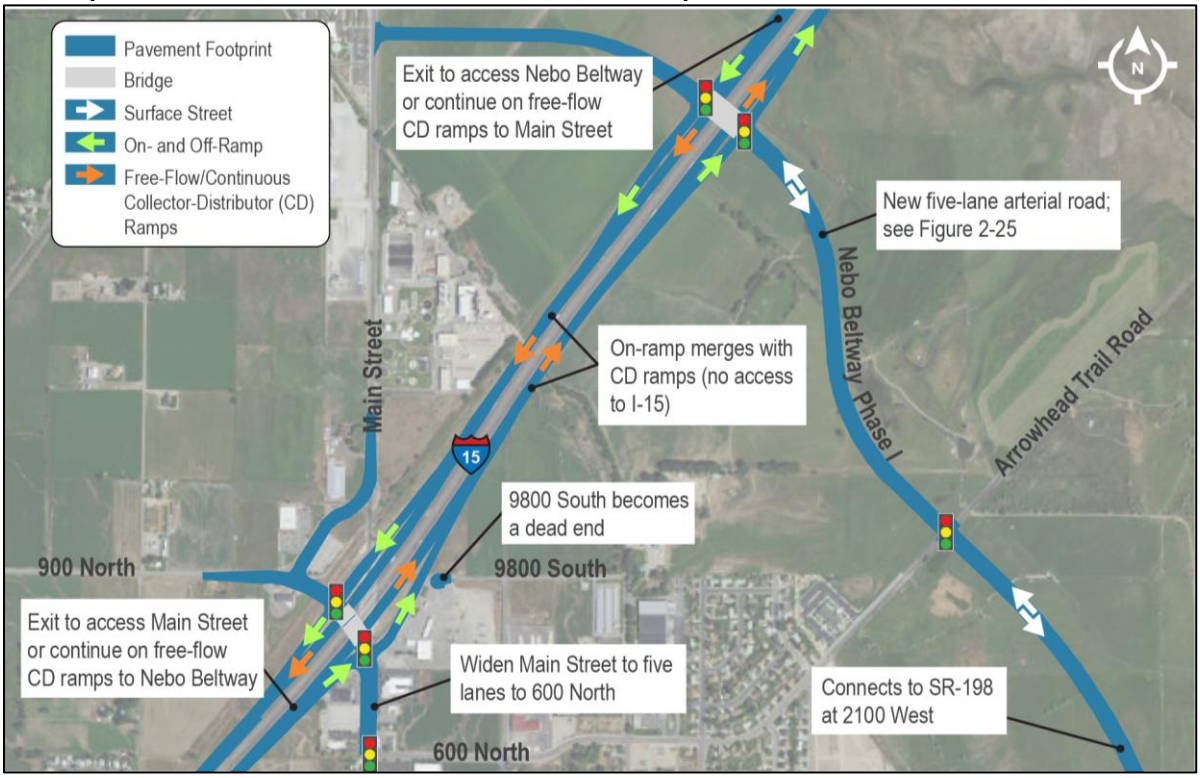

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FIGURE 2-20
Conceptual Alternative C3: Frontage Road Ramps

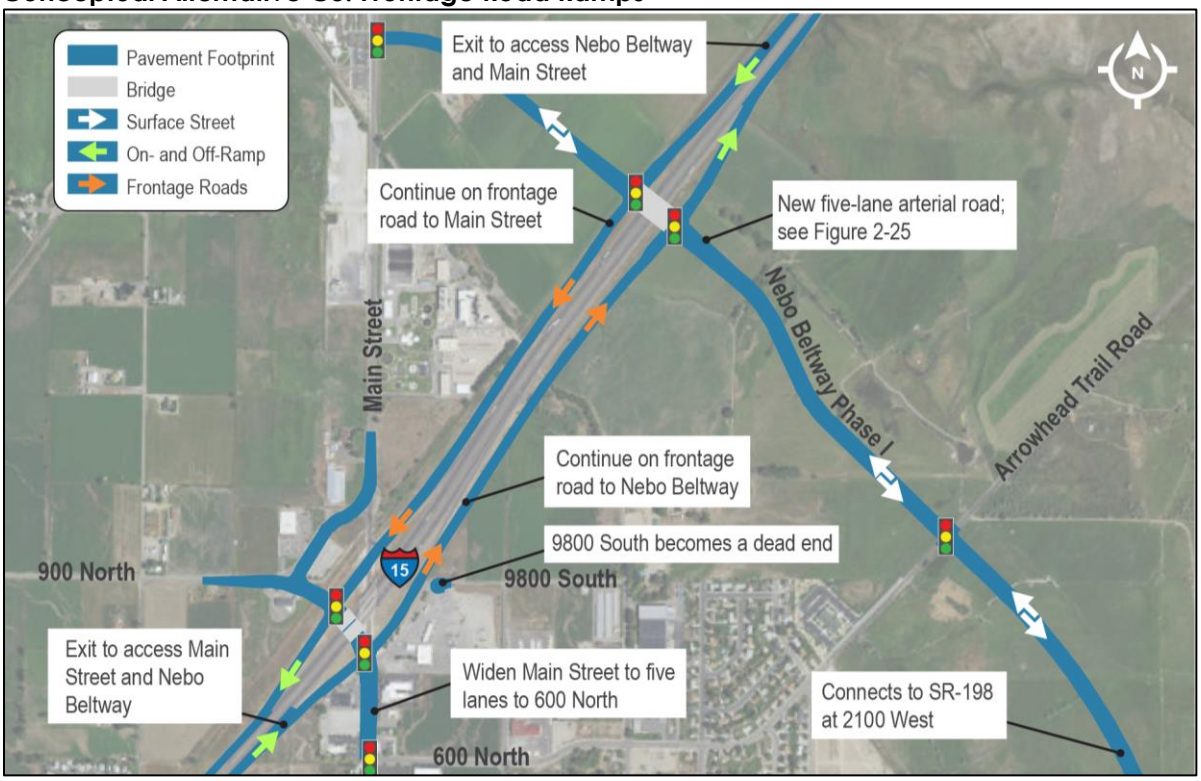

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FIGURE 2-21
Conceptual Alternative C4: Split Diamond

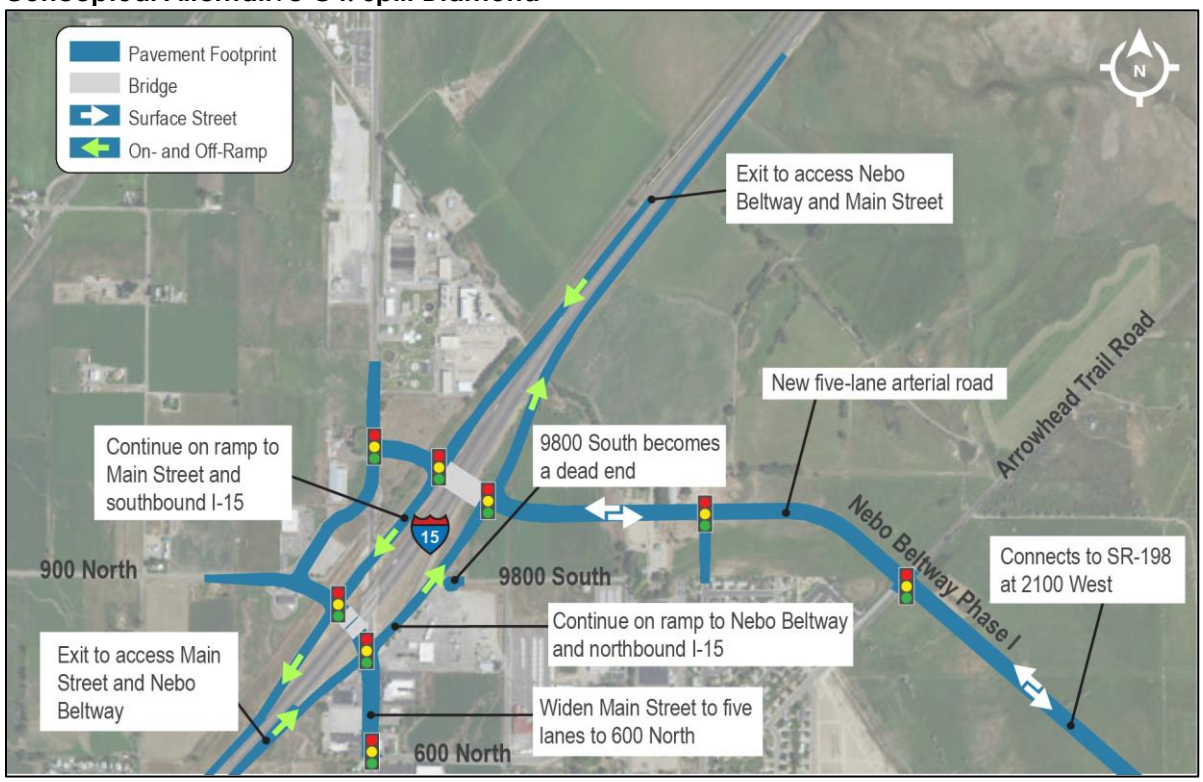

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FIGURE 2-22
Conceptual Alternative C5: Full and Half

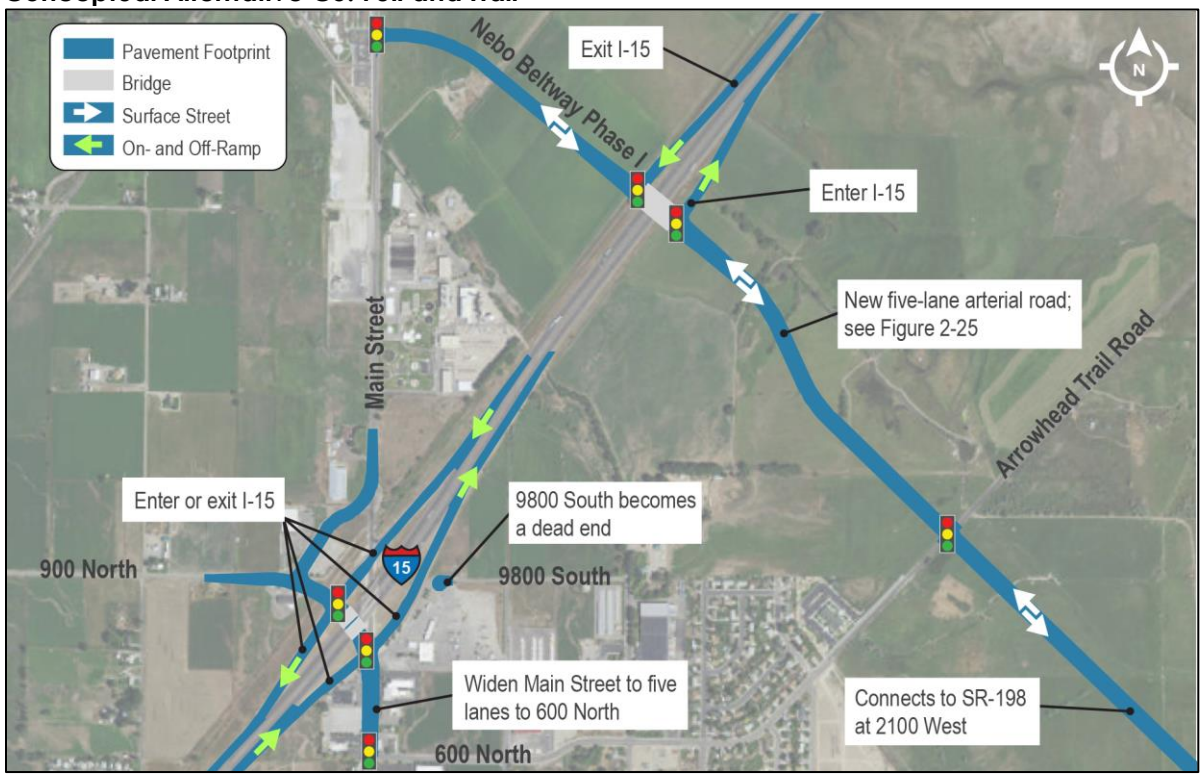

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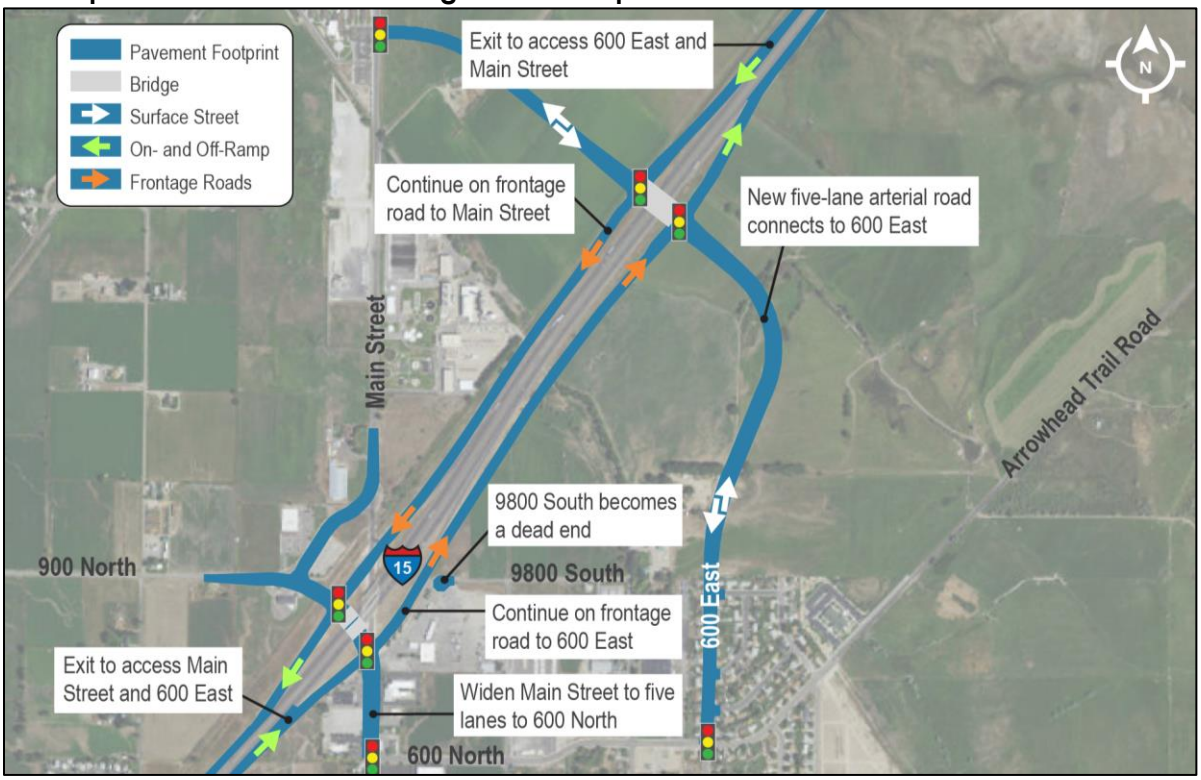
FIGURE 2-23
Conceptual Alternative C6: Frontage Road Ramps 600 East



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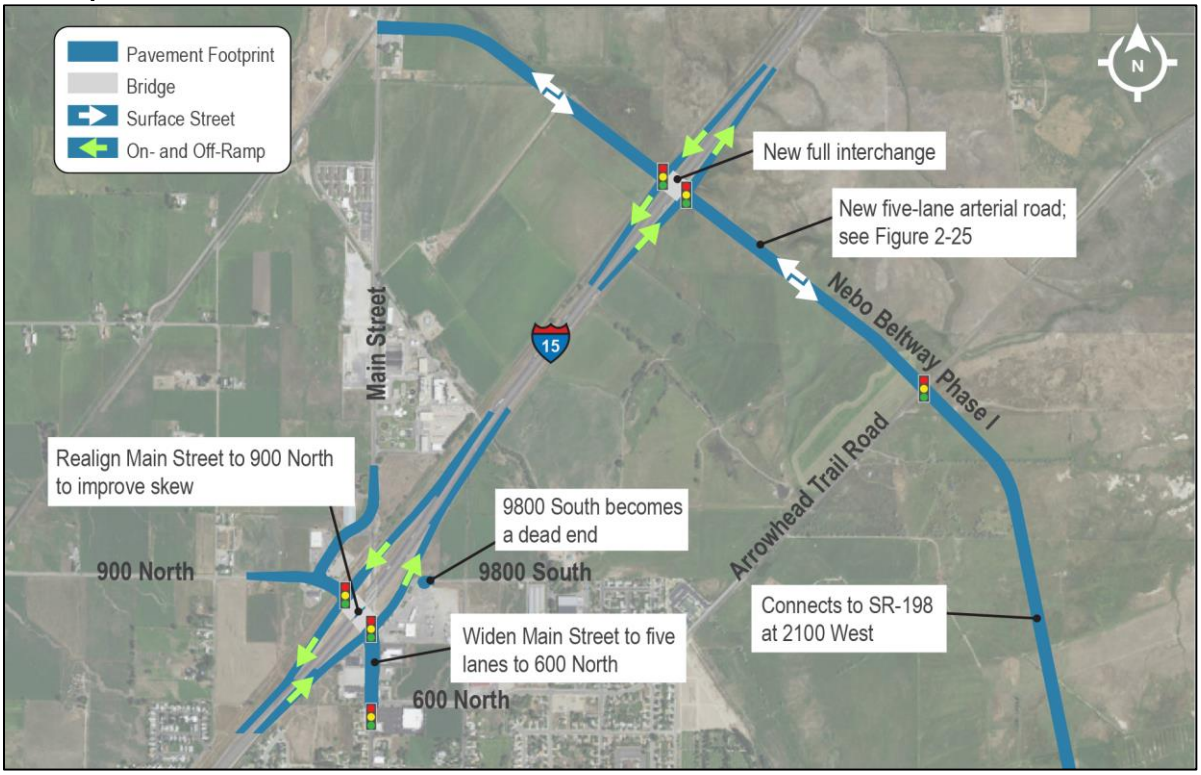
2.3.4 Add New Interchange ("A") Alternative

The conceptual A alternative would accommodate the projected lack of capacity at the interchange by adding another full interchange approximately one mile northeast of Main Street and keeping the existing Main Street interchange open. Unlike the C alternatives, there is no need for ramps or frontage roads to connect the two interchanges because the additional full interchange would be one mile from the existing interchange (see Figure 2-24). The proposed Nebo Beltway Phase I would connect the additional interchange to SR-198 (see Section 2.3.5, Proposed Nebo Beltway Phase I, for more information).

As described in Chapter 1, the purpose of the project is to reduce projected congestion at the Main Street interchange and on Main Street between I-15 and SR-198, as well as to address design deficiencies at the existing interchange. To meet the purpose of the project, the A alternatives would need to draw enough traffic away from the Main Street interchange that Main Street would not need to be widened to SR-198. Otherwise, an I alternative would still be needed to meet the purpose of the project.

To address the design deficiencies of the current interchange, Main Street would be realigned to connect to 900 North, instead of maintaining its current north–south alignment.

FIGURE 2-24
Conceptual Alternative A1: One Mile North of Main Street



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2.3.5 Nebo Beltway Phase I

Nebo Beltway Phase I is an arterial road associated with the R, C, and A alternatives. *TransPlan40* divides Nebo Beltway into three phases: Phase I, Phase II, and Vision. The segment of Nebo Beltway that is associated with the R, C, and A alternatives is included in Phase I; Phase II is included under the No-Build Alternative (see Section 2.3). The purpose of Nebo Beltway Phase I is to alleviate congestion on Main Street by providing an alternate route for traffic to access I-15. As such, Nebo Beltway Phase I is an essential component of the R, C, and A alternatives. Under these alternatives, some traffic would be diverted from Main Street to the proposed Nebo Beltway Phase I, which would connect I-15 to SR-198. Main Street would not be widened to SR-198 under these alternatives because enough traffic would be diverted onto Nebo Beltway Phase I.

Various alignments were developed for Nebo Beltway Phase I between I-15 and SR-198 during the alternative development process. Northern termini were based on the proposed I-15 interchange locations for each R, C, and A alternative. Southern termini along SR-198 were considered at Elk Ridge Drive, 2100 West, and 2300 West (see Figure 2-25). 2100 West was ultimately chosen as the southern terminus through coordination with Payson City to be consistent with the *Payson City Street Master Plan*, *TransPlan40,* and *Provo to Nebo Corridor Study*, and connect with future phases of Nebo Beltway.

The *Provo to Nebo Corridor Study,* in particular, examined various alignments between I-15 and SR-198. After considering traffic modeling results, environmental impacts, and public input, the study concluded that the optimum intersection with SR-198 would be at 2100 West (InterPlan 2009).

Elk Ridge Drive was not selected as the southern terminus because *TransPlan40* identifies the extension of Elk Ridge Drive from SR-198 to 8000 South as a separate and independent project (see Figure 2-1).

Nebo Beltway Phase I was analyzed as a five-lane facility to be consistent with *TransPlan40* and Phase II recommendation described in the *Provo to Nebo Corridor Study* (InterPlan 2009). The proposed five-lane Nebo Beltway Phase I cross-section is shown on Figure 2-26. Bike lanes were included on Nebo Beltway Phase I in accordance with UDOT policy to improve active transportation opportunities on state facilities where feasible (see Section 2.3 for more information). In addition, a goal of the Payson City General Plan is to develop an effective multi-use trail system that connects to regional trails, and *TransPlan40* acknowledges there will be a greater need for nonmotorized transportation facilities, including bike lanes, as the population increases. *Transplan40* includes the Highway 198 Connector Trail, which would connect to the proposed bike lanes on Nebo Beltway Phase I (see Section 3.10 for more information).

Nebo beltway Phase I is intended to be an arterial road for motorized vehicles. Placing curbs, gutters, sidewalks, and park strips are essential to ensure pedestrian safety and access to future developments. Lane and shoulder widths are based on UDOT design standards for arterial roads. Shoulder width, however, could be reduced if it is determined during final design that on-street parking would be prohibited. Park strips provide a buffer between pedestrians and vehicles, and provide snow storage during the winter. This buffer would be more important if the shoulder widths are reduced. The side slopes are variable and the slope could be increased during final design to reduce impacts.

FIGURE 2-25
Nebo Beltway Phase I Alignments for R, C, and A Alternatives

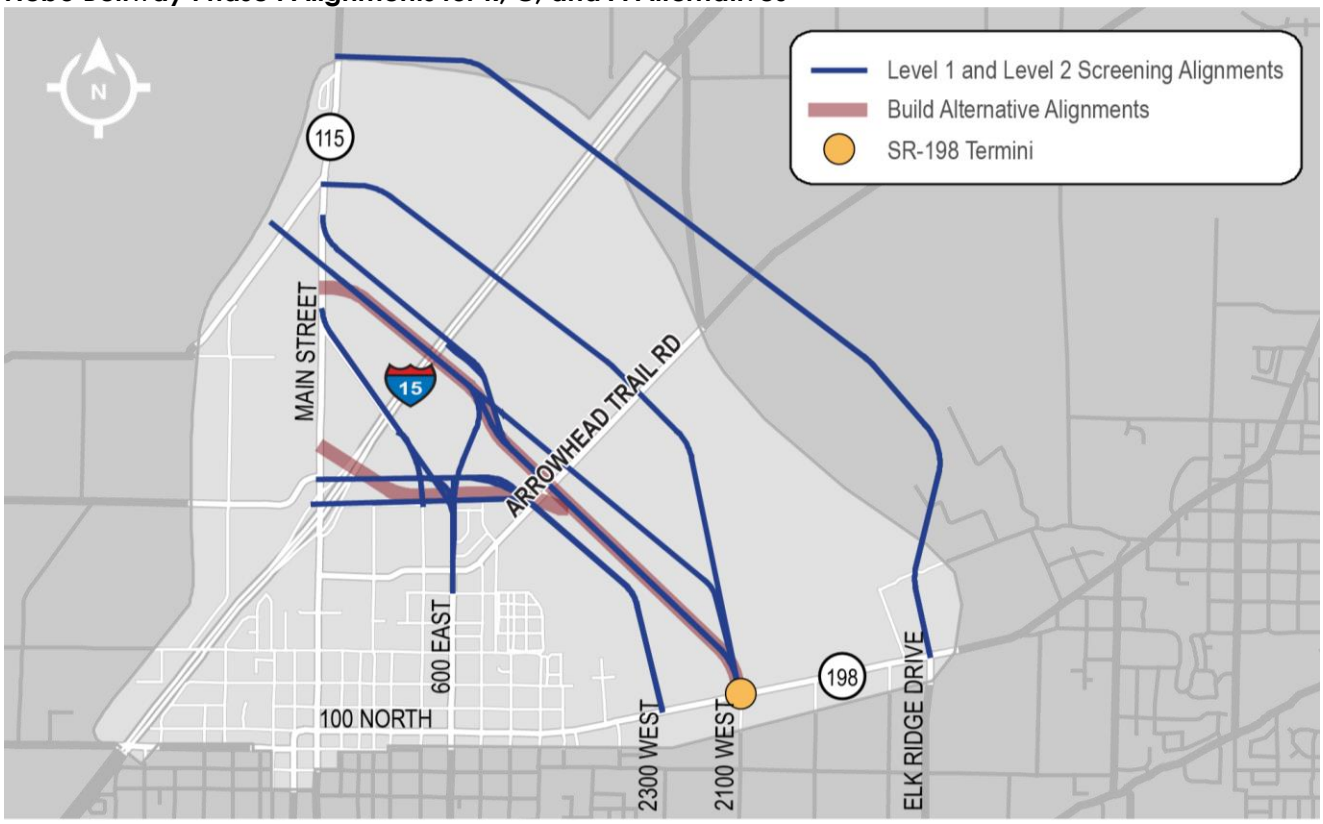
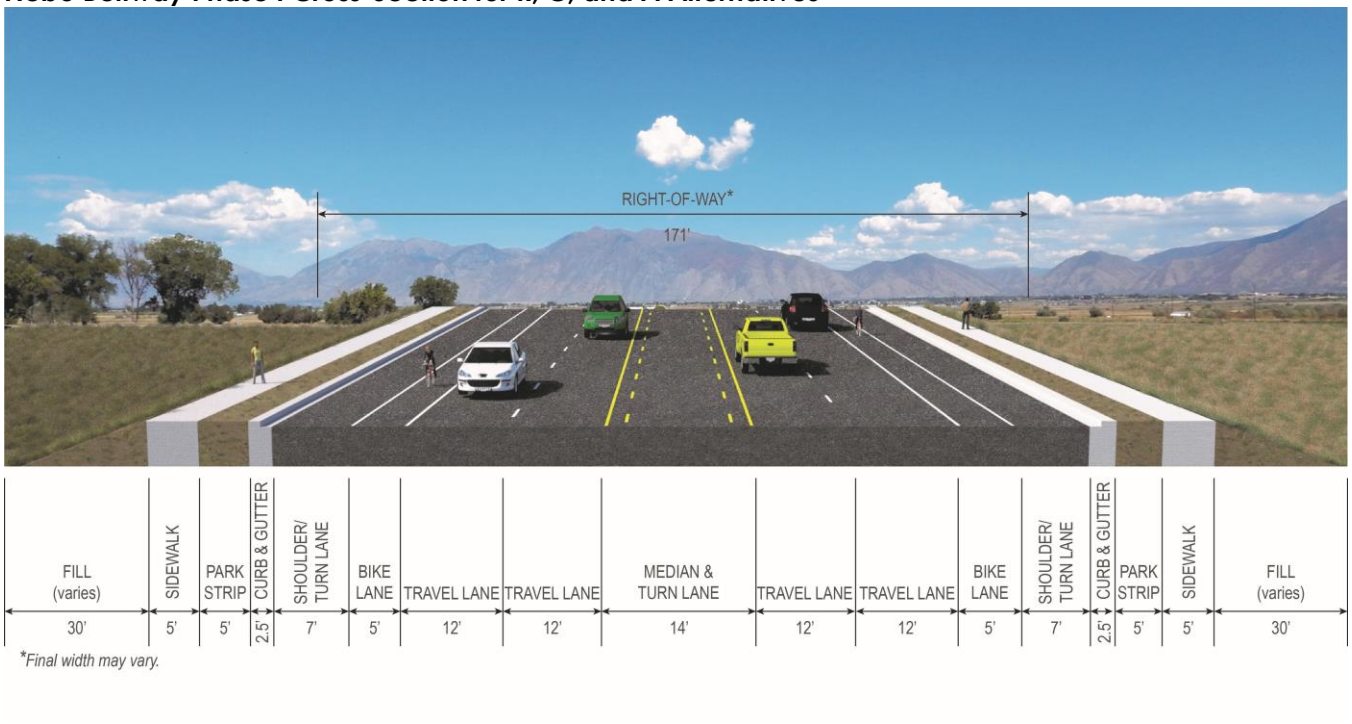


FIGURE 2-26
Nebo Beltway Phase I Cross-Section for R, C, and A Alternatives



2.4 ALTERNATIVE SCREENING

This section describes the alternative screening process and criteria developed through coordination with the cooperating and participating agencies and the stakeholder working group to determine which alternatives to carry forward for detailed study. The screening process was divided into the following levels, as illustrated on Figure 2-27:

- Level 1: Assessed the alternative's ability to meet the purpose and need
- Level 2: Compared select impacts of each alternative

As alternatives progressed through the screening process, they were eliminated for the following primary reasons:

- The alternative did not satisfy the purpose and need (Level 1; address safety deficiencies and provide LOS D or better at the interchange and along Main Street in 2040).
- The alternative did not comply with FHWA's Interstate Access Policy.
- The alternative's design and performance (i.e., its ability to reduce congestion) was similar to another reasonable alternative, but the alternative had comparatively greater or similar environmental impacts (Level 2 alternative screening).

LEVEL OF SERVICE (LOS)

LOS is a method of measuring and describing the operating performance of an intersection or road. LOS D and above are considered acceptable operating conditions. See Section 1.5.1, Need for the Project, for additional LOS information.

2.4.1 Level 1 Screening

Level 1 focused on each alternative's ability to reduce projected congestion and improve safety at the interchange and along Main Street, and meet current UDOT and AASHTO design standards and guidelines.

Prior to initiating Level 1 screening, all conceptual alternatives were developed at a high level to show the general alignment and identify the number of lanes needed along Main Street and new arterial roads at each interchange. Conceptual alternatives that did not meet the purpose and need were considered unreasonable and eliminated from further consideration.

Level 1 Criteria & Screening Methods

Level 1 screening criteria were based on LOS, which is described in detail in Section 1.5.1, Need for the Project, as well as compliance with design criteria in UDOT's *R930-6 Access Management* and AASHTO's *2011 Green Book*. Table 2-2 describes the Level 1 criteria and performance measures for screening the alternatives.

The most recent MAG Regional Travel Demand Model (Version 8.0) and traffic counts conducted by the project team were used to determine the expected LOS and delay for each alternative. The MAG Regional Travel Demand Model used projected population, employment, travel behavior, and transportation system information to forecast future travel demand.

FIGURE 2-27
Alternative Screening Process

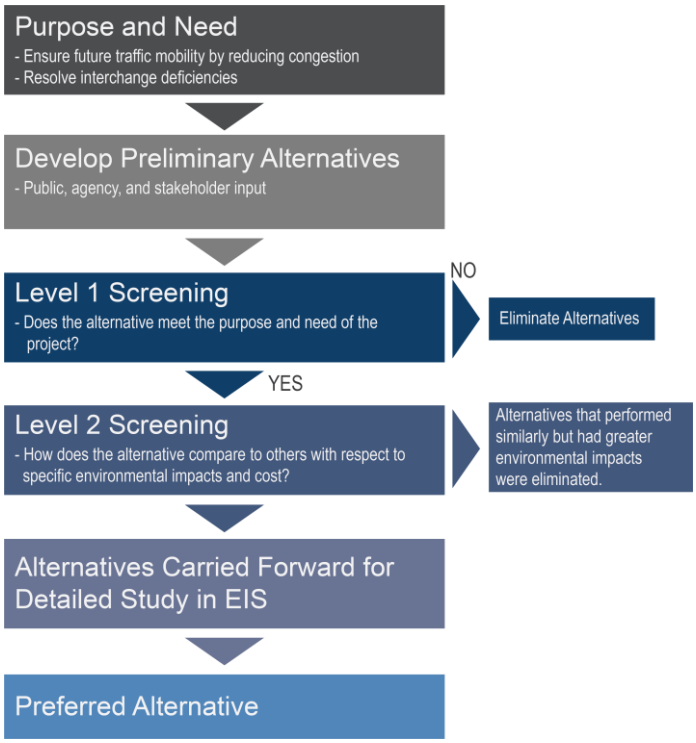


TABLE 2-2
Level 1 Alternative Screening Criteria*

Project Purpose	Criteria	Performance Measure
Ensure Future Traffic Mobility	Reduce Congestion	Interchange operates as LOS D or better in 2040. Main Street operates at LOS D or better in 2040 between the interchange and SR-198. Interchange delay (seconds per vehicle).
Resolve Interchange Safety Deficiencies	Intersection Crossing Angle	On- and off-ramps intersect Main Street between 60 and 90 degrees.
	Intersection Radius	Radius at the on- and off-ramps is a minimum 75 feet.
	Railroad Crossing Access Spacing	Space between southbound on- and off-ramps and the railroad is a minimum 250 feet.
	Access Management (Intersection Spacing)	Space between northbound on- and off-ramps and frontage roads is a minimum 300 feet.

**Design standards are specified in UDOT's* R930-6 Access Management *and AASHTO's* 2011 Green Book.

Level 1 Alternative Screening Results

Table 2-3 summarizes how each conceptual alternative performed in meeting the project purpose and need. All conceptual build alternatives would improve the design deficiencies of the existing interchange, and most would provide the minimum LOS D or better at the interchange and along Main Street. Although the No-Build Alternative would result in LOS F at the interchange and along Main Street and did not resolve the interchange's design deficiencies, it was retained as required by NEPA to provide a baseline comparison for the build alternatives carried forward for detailed study.

The TSM and Transit alternatives were eliminated because they did not provide LOS D or better along Main Street. In addition, these alternatives did not address the design deficiencies of the existing interchange.

Alternatives I7 and A1 were eliminated because they did not provide LOS D or better along Main Street without widening Main Street to five lanes to SR-198 (both alternatives were developed to improve and maintain the existing interchange in its current location without widening Main Street). Under Alternative I7, the additional arterial would not directly connect to I-15 and, therefore, would not draw enough traffic off of Main Street. Alternative A1 fails because the additional interchange is too far from the existing interchange to draw enough traffic from Main Street.

Although Alternative C5 met the Level 1 screening criteria, it was eliminated because FHWA would not approve a half interchange. The half interchange does not meet the requirements of the fourth point in FHWA's *Interstate Access Policy*, which states that a proposed access must provide for all traffic movements. Less than full interchanges (e.g., half interchanges) may be considered only for special access to managed lanes, such as transit-only or high-occupancy vehicle lanes. Alternative C5 would not provide special access to managed lanes.

TABLE 2-3
Level 1 Alternative Screening Results[1]

Alternative	Level of Service[2]		Interchange Delay (seconds/ vehicle)	Meets Design Criteria (Yes or No)	Screening Result
	Interchange	Main Street			
No-Build (2040)	F	F	218	No	Carried Forward
Transportation System Management (2040)	N/A[2]	F	N/A[2]	No	Eliminated
Transit (2040)	N/A[2]	F	N/A[2]	No	Eliminated
Improve Existing Interchange (I Alternatives)					
I1: Long-span Structure	B	C	24	Yes	Carried Forward
I2: Roundabouts	B	C	19	Yes	Carried Forward
I3: Oval-a-bout	B	C	27	Yes	Carried Forward
I4: Main Street over I-15	B	C	24	Yes	Carried Forward
I5: Diverging Diamond Interchange	B	C	21	Yes	Carried Forward
I6: Realign South under I-15	B	C	27	Yes	Carried Forward
I7: Add Arterials	N/A[3]	E	N/A[3]	Yes	Eliminated

TABLE 2-3
Level 1 Alternative Screening Results[1]

Alternative	Level of Service[2]		Interchange Delay (seconds/ vehicle)	Meets Design Criteria (Yes or No)	Screening Result
	Interchange	Main Street			
I8: One-way Streets	N/A[4]	C	N/A[4]	Yes	Carried Forward
I9: Realign Main Street South over I-15	B	C	27	Yes	Carried Forward
I10: Realign Main Street North over I-15	B	C	29	Yes	Carried Forward
I11: Realign Main Street North under I-15	B	C	29	Yes	Carried Forward
I12: Two-way Streets	B	C	21	Yes	Carried Forward
Relocate Interchange (R Alternatives)					
R1: Relocate Near (0.2 miles)	B	D	24	Yes	Carried Forward
R2: Relocate Far (0.7 miles)	B	C	18	Yes	Carried Forward
Combination of Improve Existing Interchange and Relocate (C Alternatives)					
C1: Braided Ramps	B	D	21	Yes	Carried Forward
C2: Collector-Distributor Ramps	B	D	23	Yes	Carried Forward
C3: Frontage Road Ramps	B	C	20	Yes	Carried Forward
C4: Split Diamond	B	C	24	Yes	Carried Forward
C5: Full and Half	N/A[5]	D	N/A[5]	Yes	Eliminated
C6: Frontage Road Ramps 600 East	B	C	20	Yes	Carried Forward
Additional Interchange (A Alternative)					
A1: One Mile North of Main Street	N/A[2]	**F**	N/A[2]	Yes	Eliminated

1. *Preliminary estimates based on conceptual designs. These estimates were used for early comparison purposes, and may differ from those described in Chapter 3 or elsewhere in the Final EIS.*
2. *LOS was determined using PTV Vissim v7 microsimulation traffic modeling software.*
3. *Interchange analysis was not performed because of "failing" LOS on Main Street (i.e., LOS E or LOS F).*
4. *Interchange analysis was not performed because Alternative I8 can be paired with any I alternative interchange configuration.*
5. *Although the alternative meets the Level 1 screening criteria, FHWA determined they would not approve the half interchange alternative because it does not meet the requirements of the FHWA Interstate Access Policy Point No. 4. Interchange analysis was not performed because FHWA would not approve the alternative.*

2.4.2 Level 2 Screening

The purpose of Level 2 screening was to reduce the number of alternatives that advanced from Level 1 screening to a reasonable range that could be analyzed in detail in the Final EIS. This was accomplished by quantifying, at a high level, impacts to select resources and comparing the impacts of one alternative to another.

Level 2 screening criteria did not include a minimum acceptable impact value (that is, alternatives were not eliminated because they exceeded an impact threshold). Instead, alternatives that performed

similarly in meeting the purpose of the project, but resulted in greater impacts compared to other alternatives, were eliminated.

Prior to initiating Level 2 screening, alternatives that advanced from Level 1 screening were designed in more detail. The project team refined the horizontal alignment (the location and orientation of the highway) and laid out travel lane, bike lane, shoulder, curb and gutter, park strip, and sidewalk widths. Assumptions were developed to estimate the vertical alignment (the roadway's change in elevation) and fill/side slope for the railroad, I-15, Nebo Beltway Phase I, and Main Street to determine the overall right-of-way requirements for each alternative. Under all conceptual alternatives, except Alternatives I4, I9, I10, and R2, the railroad paralleling I-15 would be elevated over the Main Street interchange.

Level 2 Criteria and Screening Methods

Level 2 criteria compared impacts to waters of the U.S. (i.e., wetlands, creeks, and ditches), Section 4(f) historic resources and recreational resources, right-of-way acquisition, and commercial driveways. These criteria, listed in Table 2-4, were selected based on applicable federal regulations—such as Section 4(f) of the U.S. Department of Transportation Act of 1966, Section 404 of the Clean Water Act, and Executive Order 11990, Protection of Wetlands—and comments received during agency and public outreach.

Level 2 screening was divided into primary and secondary tiers as shown in Table 2-4. The primary tier identified, at a high level, environmental resources protected by federal law, including Section 4(f) historic sites and recreation resources, and waters of the U.S. These resources were given special consideration during screening because federal law requires UDOT to consider and analyze alternatives that avoid these resources to the extent practicable.

SECTION 4(f)

Section 4(f) is a federal regulation that protects certain types of properties from being affected by transportation projects. These properties include certain historic sites, publicly owned parks and recreation areas, and wildlife and waterfowl refuges.

Section 4(f) requires UDOT to consider alternatives that do not use (i.e., affect) publicly owned parks, recreation areas, wildlife and waterfowl refuges, or historic sites. The use of these resources may not be approved unless a determination has been made that there is no feasible and prudent alternative that avoids these resources (other than *de minimis* use). Impacts to other environmental resources that are severe even after reasonable mitigation, or the inability to meet purpose and need, may render an alternative not prudent.

Section 404 of the Clean Water Act and Executive Order 11990 direct all federal agencies to consider alternatives that do not affect wetlands, and to mitigate impacts to wetlands if impacts are unavoidable. Furthermore, 40 CFR 230.10(a) states, "No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." A practicable alternative, as defined by 40 CFR 230.10(a)(1), is any alternative that does not discharge dredge or fill material into waters of the U.S. and is capable of being done after considering cost, existing technology, and logistics while satisfying the purpose of the project.

TABLE 2-4
Level 2 Alternative Screening Criteria

Criteria		Performance Measure
Primary	Historic Resources (Section 4(f))	Number of eligible historic properties affected
	Recreation Resources (Section 4(f))	Number of existing and planned parks, trails, and other publicly owned recreation facilities affected
	Wetlands, Creeks, and Ditches	Acres of wetlands and other waters of the U.S. affected Linear feet of ditches and creeks affected
Second	Right-of-way	Number of partial acquisitions Number of full acquisitions and relocations
	Commercial Driveway Impacts	Number of business accesses (driveways) that would be closed or substantially altered
Cost		Estimated cost to design, construct, and mitigate the alternative (Note: Cost is only considered a screening criterion when it is necessary to compare differences between alternatives.)

The secondary tier of Level 2 screening identified right-of-way acquisition and business impacts associated with each alternative. Secondary tier results were considered when primary tier results did not clearly differentiate alternatives. The cost of an alternative was not necessarily a factor in selecting one alternative or another, but was included to ensure an alternative was feasible with the Utah Statewide Transportation Improvement Program.

Level 2 Criteria Assumptions

Full property acquisitions for residential and commercial properties were identified using 20-foot and 10-foot setbacks, respectively. These setbacks were established through coordination with Payson City staff and review of standard setbacks for residential and commercial land uses set forth in Title 19 Zoning Ordinance of the Payson City Municipal Code. If a residential or commercial building was within the specified setbacks from the proposed right-of-way line, the property was assumed to be a full acquisition. In addition, a property was considered a full acquisition if all access points (i.e., driveways) were removed from the property, even if the building was not directly impacted.

Impacts to historic resources were based on right-of-way acquisition. Full acquisition and relocation of a property with a historic resource was considered adverse because it would remove the historic building, and a partial acquisition was considered non-adverse. The project team assumed partially acquiring property from a historic resource would not affect its eligibility for listing on the National Register of Historic Places (NRHP) because the historic building would remain in place.

SECTION 404

Section 404 of the Clean Water Act and Executive Order 11990 direct all federal agencies to consider alternatives that do not affect wetlands, and to mitigate impacts to wetlands if impacts are unavoidable.

Commercial driveway impacts were based on whether access to property was within 300 feet of the stop line at the interchange. Driveways within 300 feet of the stop line would be removed or relocated.

Impacts to wetlands and other waters of the U.S. were initially based on preliminary traffic numbers and preliminary horizontal layout with assumed offsets for impacts. After the candidate build alternatives were designed in greater detail, it became apparent that the initial assumptions and methodology underestimated impacts to wetlands and other waters of the U.S.

Subsequently, the methodology for estimating impacts was refined to include impacts from realigning the railroad, providing access for maintenance along I-15, greater offsets to represent cut and fill lines, and updated 2017 UDOT standards. The impacts in Table 2-5 and Table 2-6 reflect the refined wetlands impacts.

Level 2 Alternative Screening Results

Table 2-5 summarizes the key differences between alternative categories. In general, the I alternatives would have greater impacts to historic resources, more full property acquisitions/relocations, and fewer impacts to waters of the U.S. compared to the R and C alternatives. The R alternatives would have the fewest impacts to historic properties and full property acquisitions/relocations compared to the I and C alternatives. The C alternatives would have the greatest impacts to waters of the U.S. compared to the R and I alternatives. None of the alternatives would completely avoid wetlands and other waters of the U.S.

See Table 2-6 and Table 2-7 for detailed Level 2 screening results by alternative.

TABLE 2-5
Summary of Level 2 Alternative Screening Results by Category*

Alternative Category	Number of Adverse Effects on Historic/Section 4(f) Properties	Number of Full Property Acquisitions/Relocations	Acres of Wetland Impacts
I Alternatives	19–23	38–54	0.08–1.63
R Alternatives	0	2–4	1.81–3.91
C Alternatives	2–4	10–25	2.38–5.39

**Preliminary estimates based on conceptual designs. These estimates were used for early comparison purposes, and may differ from those described in Chapter 3 or elsewhere in the Final EIS.*

TABLE 2-6
Level 2 Alternative Screening Results—Primary Tier*

Alternative	Historic/Section 4(f) Resources		Wetlands/Waters of the U.S.		
	Number of Adverse Effects	Number of Non-adverse Effects	Wetland Impacts (acres)	Ditches (linear feet)	Creeks (linear feet)
Improve Existing Interchange (I Alternatives)					
I1: Long-span Structure[1]	**20**	**18**	**0.54**	**1,794**	**45**
I2: Roundabouts	20	18	0.53	1,644	79
I3: Oval-a-bout	20	18	0.48	1,644	48
I4: Main Street over I-15	20	18	0.19	0	0
I5: Diverging Diamond Interchange	20	18	0.56	1,644	47
I6: Realign South under I-15	20	18	0.34	1,644	0
I8: One-way Streets	19	23	0.56	1,644	45
I9: Realign Main Street South over I-15	20	18	0.08	0	0
I10: Realign Main Street North over I-15	20	18	0.20	26	0
I11: Realign Main Street North under I-15	20	18	1.63	2,906	53
I12: Two-way Streets	23	31	0.56	1,644	53
Relocate Interchange (R Alternatives)					
R1: Relocate Near (0.21 mile)[1]	**0**	**0**	**1.81**	**2,657**	**95**
R2: Relocate Far (0.68 miles)[1]	**0**	**1**	**3.91**	**3,413**	**237**
Combination of Improve Existing Interchange and Relocate (C Alternatives)					
C1: Braided Ramps[1]	**2**	**1**	**3.98**	**2,823**	**287**
C2: Collector-Distributor Ramps	2	1	4.93	3,136	182
C3: Frontage Road Ramps[1]	**2**	**1**	**5.39**	**4,665**	**244**
C4: Split Diamond[1]	**4**	**1**	**2.38**	**3,114**	**91**
C6: Frontage Road Ramps 600 East	2	1	3.36	1,932	244

**Preliminary estimates based on conceptual designs. These estimates were used for early comparison purposes, and may differ from those described in Chapter 3 or elsewhere in the Final EIS.*

1. Alternative carried forward for detailed study.

TABLE 2-7
Level 2 Alternative Screening Results—Secondary Tier and Cost*

Alternative	Secondary			Cost ($ millions)
	Full Acquisition/ Relocations (number of parcels)	Partial Acquisitions (acres)	Commercial Driveway Impacts (number reduced, relocated, or removed)	
Improve Existing Interchange (I Alternatives)				
I1: Long-span Structure[1]	**42**	**13.5**	**3**	**73.1**
I2: Roundabouts	42	18.8	4	84.5
I3: Oval-a-bout	41	9.8	4	94.1
I4: Main Street over I-15	46	15.3	3	97.6
I5: Diverging Diamond Interchange	42	14.6	3	82.6
I6: Realign South under I-15	42	8.7	4	70.8
I8: One-way Streets	42	15.4	5	71.6
I9: Realign Main Street South over I-15	46	6.6	3	83.0
I10: Realign Main Street North over I-15	40	27.7	3	89.0
I11: Realign Main Street North under I-15	38	24.3	3	74.6
I12: Two-way Streets	54	23.3	7	128.3
Relocate Interchange (R Alternatives)				
R1: Relocate Near (0.2 miles)[1]	**4**	**46.4**	**1**	**100.1**
R2: Relocate Far (0.7 miles)[1]	**2**	**64.6**	**0**	**77.1**
Combination of Improve Existing Interchange and Relocate (C Alternatives)				
C1: Braided Ramps[1]	**10**	**73.1**	**4**	**155.8**
C2: Collector-Distributor Ramps	20	74.2	4	167.6
C3: Frontage Road Ramps[1]	**12**	**67.0**	**4**	**117.2**
C4: Split Diamond[1]	**13**	**40.5**	**4**	**126.9**
C6: Frontage Road Ramps 600 East	25	50.9	4	107.6

**Preliminary estimates based on conceptual designs. These estimates were used for early comparison purposes, and may differ from those described in Chapter 3 or elsewhere in the Final EIS.*

1. Alternative carried forward for detailed study.

Based on the Level 2 screening results the following alternatives, hereafter referred to as the build alternatives, were carried forward for detailed study in the EIS:

- I1: Long-span Structure
- R1: Relocate Near (0.2 miles)
- R2: Relocate Far (0.7 miles)
- C1: Braided Ramps
- C3: Frontage Road Ramps
- C4: Split Diamond

The following sections explain why each conceptual alternative was eliminated or carried forward for detailed study in the Final EIS.

Improve Existing Interchange Alternatives

The I, C, and R alternatives would all operate similarly with respect to LOS at the interchange and on Main Street. However, the I alternatives would result in substantially different impacts compared to the R and C alternatives. The I alternatives would have greater impacts to historic sites (Section 4(f) resources) and right-of-way, and fewer impacts to waters of the U.S. Although Section 4(f) requires UDOT to consider alternatives that do not use Section 4(f) resources, carrying forward an I alternative is necessary to satisfy the requirements of Section 404(b)(1) of the Clean Water Act, Executive Order 11990, and 40 CFR 230.10(a).

Overall, all I alternatives would operate similarly in terms of LOS at the interchange and on Main Street. Primary tier screening results in Level 2 were also similar; there would be roughly 20 greater than *de minimis* Section 4(f) uses and roughly a half-acre or less or wetlands impacts (with the exception of Alternative I11). Alternative I1 was carried forward and the other I alternatives eliminated because it would:

- Maintain a similar configuration to the existing interchange, providing driver predictability.
- Maintain the current north–south traffic flow along Main Street between Benjamin and Payson.
- Have the lowest commercial driveway impacts, compared with other I alternatives that would raise Main Street over I-15.
- Maintain the most connections to the existing roadway network.

Relocate Interchange Alternatives

The R alternatives would operate similarly to the C and I alternatives with respect to LOS at the interchange and on Main Street. Both R alternatives were carried forward because impacts to historic resources and waters of the U.S. would be comparably less than the C alternatives.

Combination of Improve Existing Interchange and Relocate Alternatives

The C alternatives performed similarly in terms of LOS at the interchange and along Main Street. Therefore, the primary tier results in Level 2 were generally used to decide which alternatives to carry forward. Alternatives that performed similarly but resulted in greater impacts compared with other C alternatives were eliminated. Table 2-8 explains why each C alternative was retained or eliminated.

TABLE 2-8
Conceptual C Alternatives Retained or Eliminated

Alternative	Retained or Eliminated	Explanation
C1: Braided Ramps	Retained	Alternative C1 would function similarly to C2 (i.e., free-flow/continuous lanes would connect the existing interchange and additional interchange), but Alternative C1 would result in fewer wetland impacts.
C2: Collector-Distributor Ramps	Eliminated	Alternative C2 would function similarly to Alternative C1 but would result in greater wetland impacts.
C3: Frontage Road Ramps	Retained	Alternative C3 would function similarly to Alternative C4 (i.e., frontage roads would connect both interchanges and both alternatives provide good predictability for drivers navigating through the interchanges and signalized frontage roads). Alternative C3 would have better LOS along Main Street compared to Alternative C1 (LOS C compared to LOD D). In addition, Alternative C3 would have fewer wetland impacts than Alternative C1.
C4: Split Diamond	Retained	Alternative C4 is substantially different from Alternative C3 in terms of where the interchange would be located, though it would function similarly to alternative C3. Alternative C4 would have the least impacts to natural resources, including wetlands, compared to all C alternatives.
C6: Frontage Road Ramps 600 East	Eliminated	Alternative C6 would function similarly to Alternative C3 (i.e., the interchange functions the same but the alignment of the arterial road is different). However, the Nebo Beltway Phase I connection to SR-198 for Alternative C3 was considered a better alignment than 600 East because 600 East is primarily a residential street and would require more full property acquisitions.

2.5 ALTERNATIVES CARRIED FORWARD

This section describes each build alternative carried forward for detailed evaluation, as well as the No-Build Alternative. Prior to assessing impacts, each conceptual alternative was refined and designed in more detail to provide a more accurate roadway footprint. As a result, the impacts discussed in Chapter 3 may differ from those disclosed throughout this chapter.

2.5.1 No-Build Alternative

The No-Build Alternative is being carried forward to satisfy the NEPA requirement to include a "no-action alternative" and provide a baseline to compare the impacts of the build alternatives.

2.5.2 Build Alternative I1: Long-Span Structure

Alternative I1 is the most similar alternative to the existing interchange. Unlike the C alternatives, Alternative I1 would improve and add capacity at the existing interchange and Main Street by widening Main Street to five lanes between the interchange and SR-198. The I-15 bridge over Main Street would be lengthened to accommodate five lanes.

To improve the skew of the existing interchange, the on- and off-ramps would be extended away from I-15, and the turning radius at each ramp would be increased. Alternative I1 would cost approximately $125M (2020 dollars) to construct.

Figures 2-28 through 2-30 show an overview of the alternative, as well as a detailed plan view of the interchange configuration and Main Street widening.

2.5.3 Build Alternative R1 Relocate Near (0.2 Miles)

Alternative R1 would close the existing Main Street interchange and replace it with a new diamond interchange approximately 0.2 miles northeast of its current location. Under Alternative R1, Nebo Beltway Phase I would be the predominant travel route, instead of Main Street; thereby reducing congestion at Main Street and the existing interchange. Motorists exiting at the new interchange would turn east onto Nebo Beltway Phase I towards SR-198 or west towards Main Street.

To comply with UDOT signalized intersection spacing standards,, Main Street north of I-15 would be shifted west, away from Nebo Beltway Phase I interchange, to provide adequate spacing between traffic signals. Main Street would be three lanes and taper to its current configuration south of 600 North. Alternative R1 would cost approximately $146M (2020 dollars) to construct.

Figures 2-31 and 2-32 show an overview of the alternative, as well as a detailed plan view of the interchange configurations under Alternative R1.

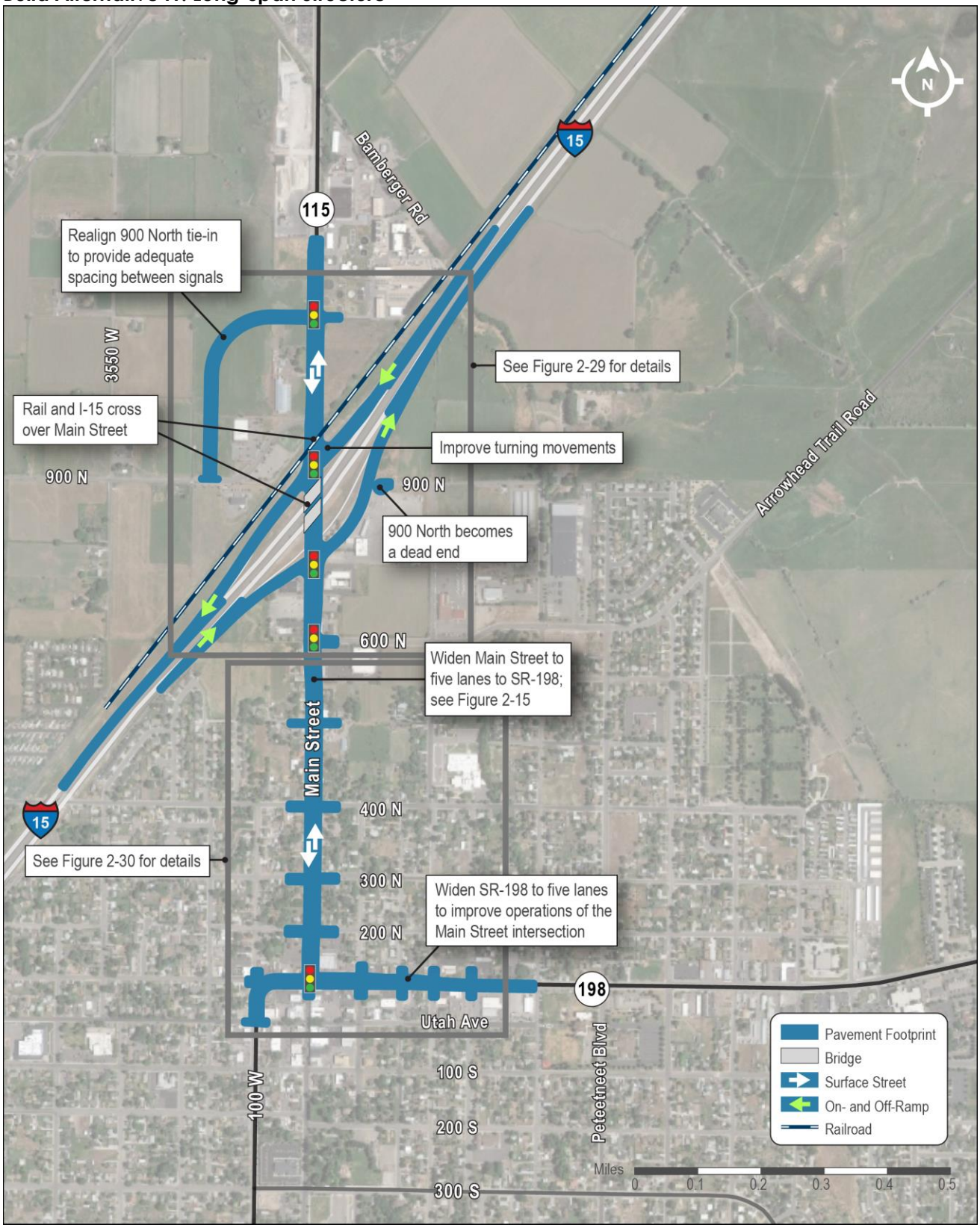
2.5.4 Build Alternative R2 Relocate Far (0.7 Miles)

Alternative R2 would close the existing Main Street interchange and replace it with a new diamond interchange approximately 0.7 miles northeast of its current location. Under Alternative R2, Nebo Beltway Phase I becomes the predominant travel route, instead of Main Street, thereby reducing congestion at Main Street and the existing interchange. Motorists exiting at the new interchange would turn east onto Nebo Beltway Phase I towards SR-198 or west towards Main Street. A new three-lane arterial road east of I-15 would provide access between Main Street and Nebo Beltway Phase I.

Main Street would not be widened under Alternative R2; however, the predominant traffic movement along Main Street would be redirected onto the new arterial road to Nebo Beltway Phase I, instead of its current north–south direction under I-15. Alternative R2 would cost approximately $109M (2020 dollars) to construct.

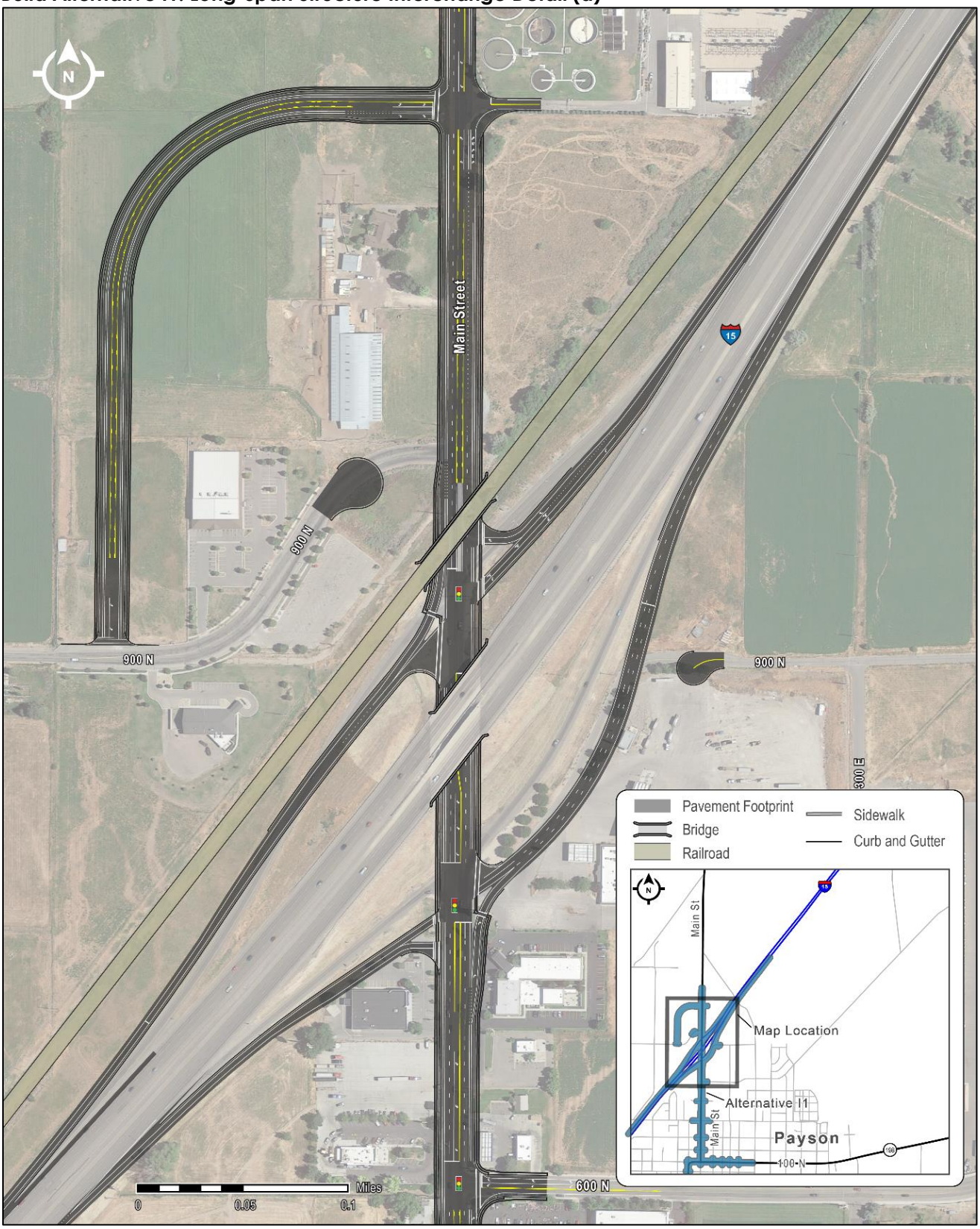
Figures 2-33 through 2-35 show an overview of the alternative, as well as a detailed plan view of the interchange configurations under Alternative R2.

FIGURE 2-28
Build Alternative I1: Long-Span Structure



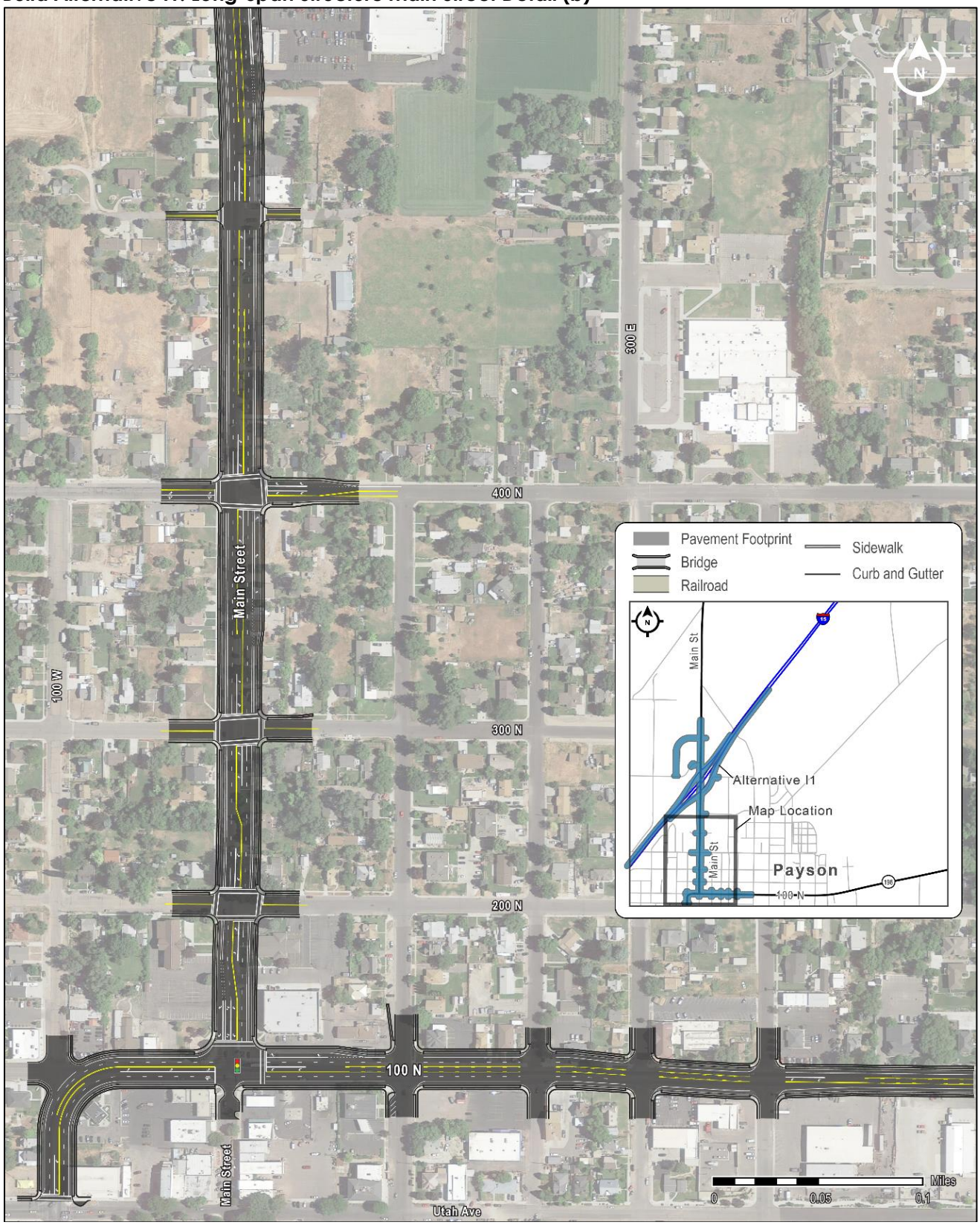
Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-29
Build Alternative I1: Long-Span Structure Interchange Detail (a)



Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-30
Build Alternative I1: Long-Span Structure Main Street Detail (b)

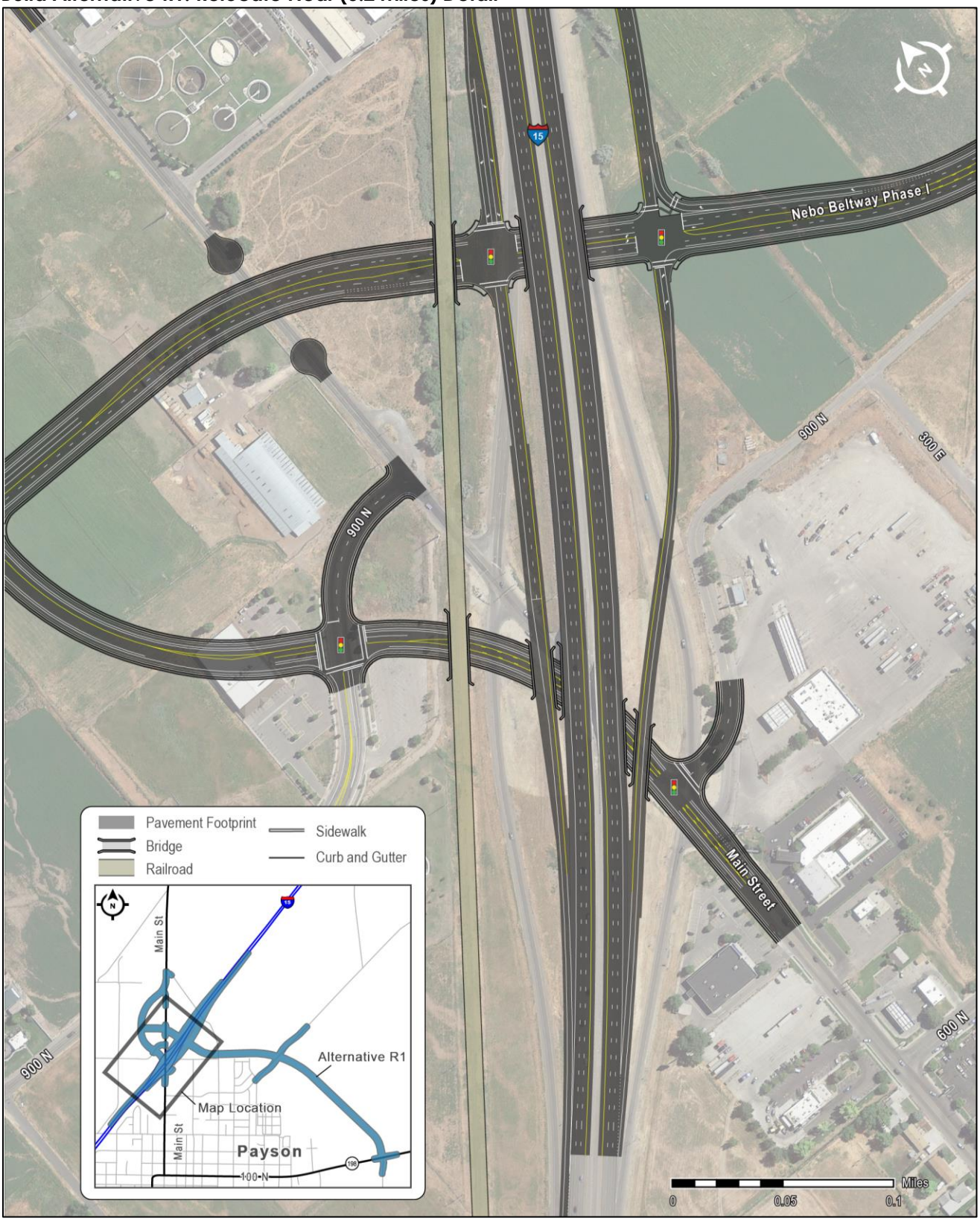


Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-31
Build Alternative R1: Relocate Near (0.2 Miles)

Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-32
Build Alternative R1: Relocate Near (0.2 Miles) Detail

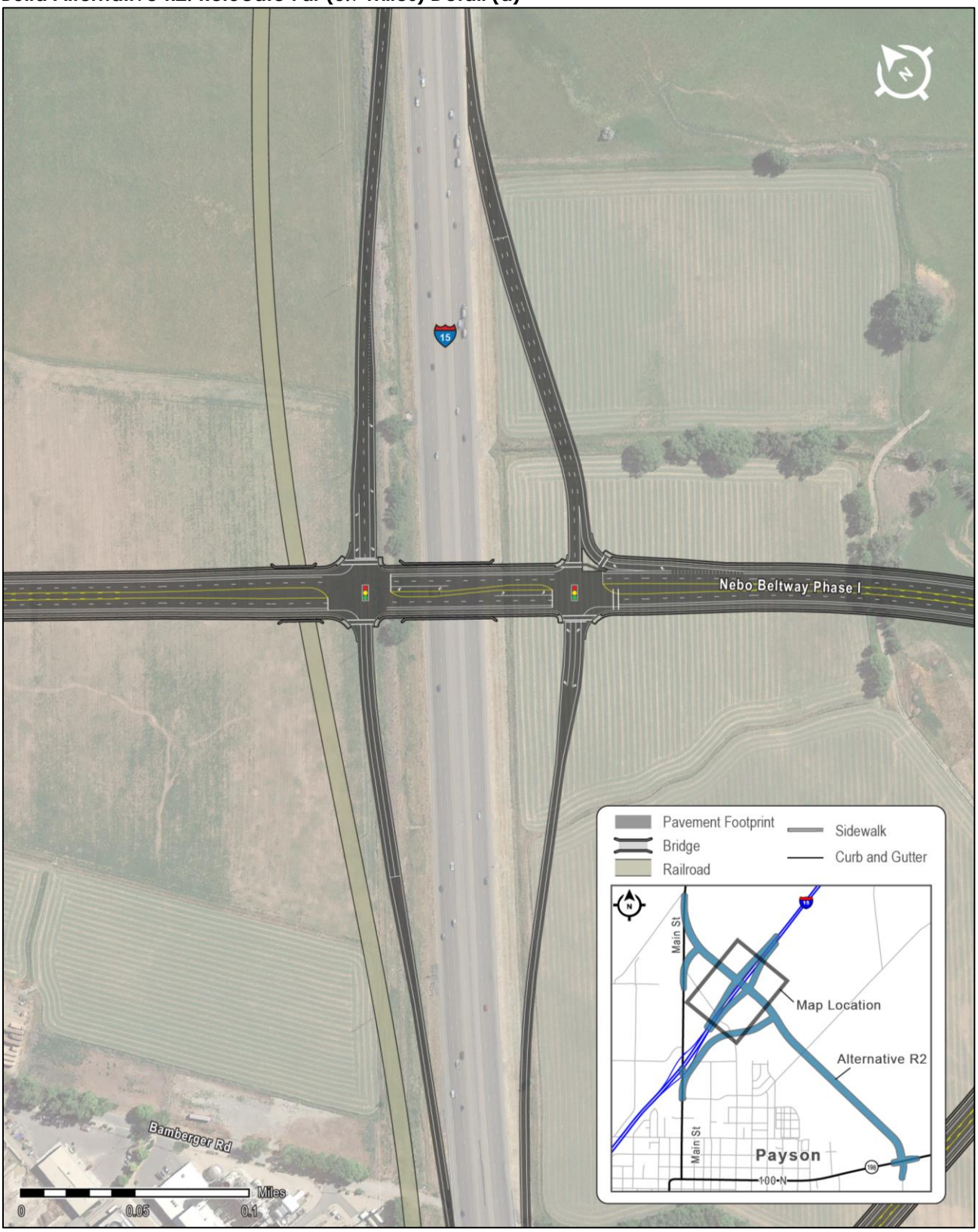


Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-33
Build Alternative R2: Relocate Far (0.7 Miles)

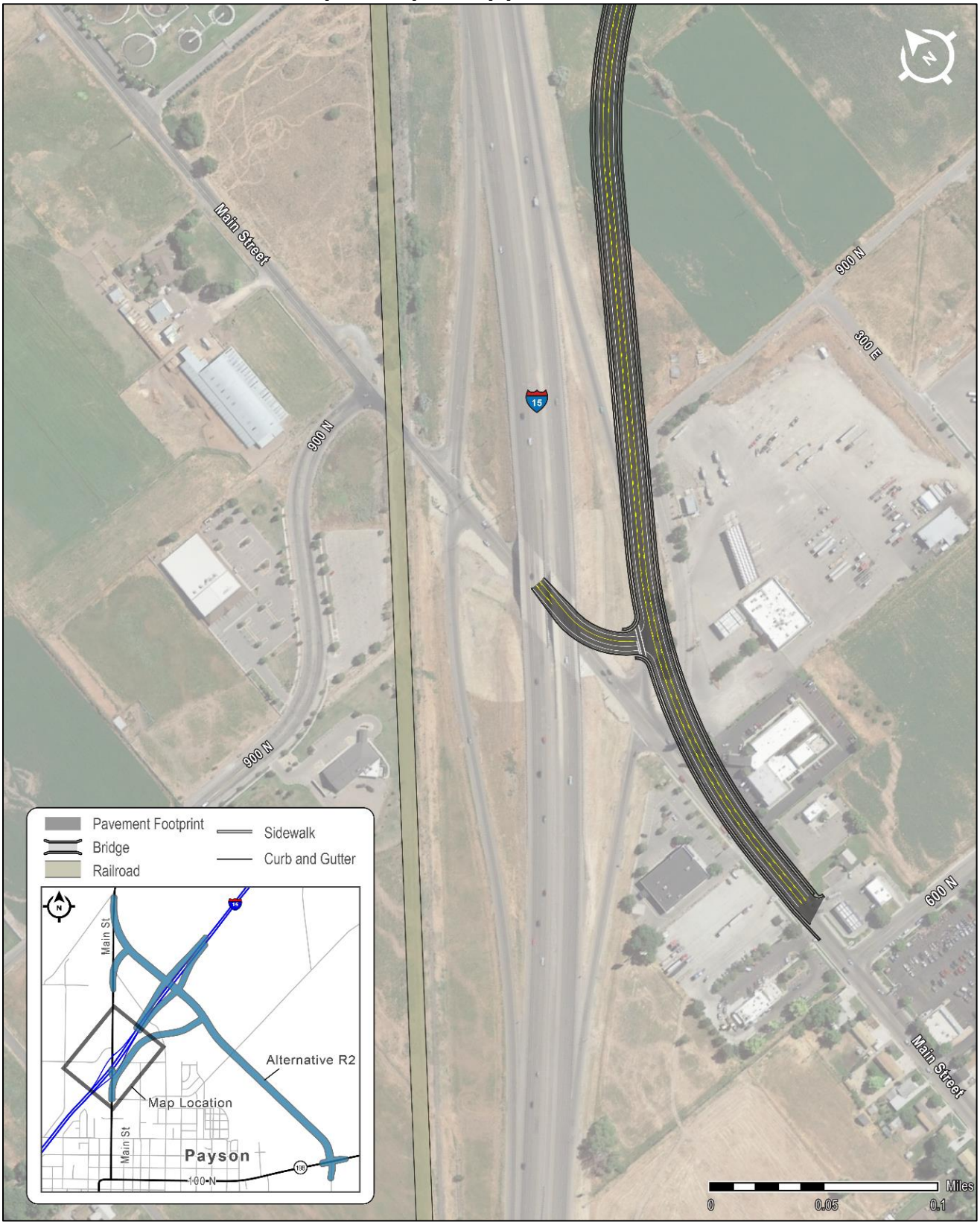
Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

Figure 2-34
Build Alternative R2: Relocate Far (0.7 Miles) Detail (a)



Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-35
Build Alternative R2: Relocate Far (0.7 Miles) Detail (b)



Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

2.5.5 Build Alternative C1: Braided Ramps

Alternative C1 would provide a free-flow connection between the Main Street interchange and a new interchange approximately 0.7 miles to the northeast. The new interchange would connect to the proposed Nebo Beltway Phase I. Braided ramps (i.e., ramps that cross over each other) would connect the two interchanges. Motorists traveling on I-15 in either direction would exit I-15 and have the option to take the nearest road (i.e., Main Street for northbound motorists or Nebo Beltway Phase I for southbound motorists) or continue to the next road in free-flow/continuous lanes without stopping at a traffic signal. Motorists entering I-15 from Main Street (northbound) or Nebo Beltway Phase I (southbound) would utilize the respective on-ramp that would cross over the free-flow continuous lanes and enter I-15 between both interchanges. From the new interchange, motorists would travel on Nebo Beltway Phase I until it intersects with SR-198 at 2100 West, thereby avoiding and reducing congestion at Main Street and the existing interchange.

Main Street would be widened to five lanes at the interchange and taper to its current configuration south of 600 North. Main Street would also be realigned to connect to 900 North, instead of maintaining its current north–south alignment to improve the skew. Alternative C1 would cost approximately $183M (2020 dollars) to construct.

Figures 2-36 through 2-38 show an overview of the alternative, as well as a detailed plan view of the interchange configurations under Alternative C1.

2.5.6 Build Alternative C3: Frontage Road Ramps

Similar to Alternative C1, Alternative C3 would include an additional interchange approximately 0.7 miles northeast of Main Street. However, frontage roads would connect the two interchanges instead of free-flow ramps. Motorists traveling on I-15 in either direction would exit I-15 and stop at the first signalized interchange (i.e., Main Street for northbound motorists or Nebo Beltway Phase I for southbound motorists) or continue on the frontage road to the next interchange. Motorists entering I-15 from Main Street (northbound) or Nebo Beltway Phase I (southbound) would utilize the frontage road to the next interchange and proceed through the signalized intersection to the respective on-ramp. From the new interchange, motorists would travel on Nebo Beltway Phase I until it intersects with SR-198 at 2100 West, thereby avoiding and reducing congestion at Main Street and the existing interchange.

Main Street would be widened to five lanes at the interchange and taper to its current configuration south of 600 North. Main Street would also be realigned to connect to 900 North, instead of maintaining its current north–south alignment to improve the skew. Alternative C3 would cost approximately $162M (2020 dollars) to construct.

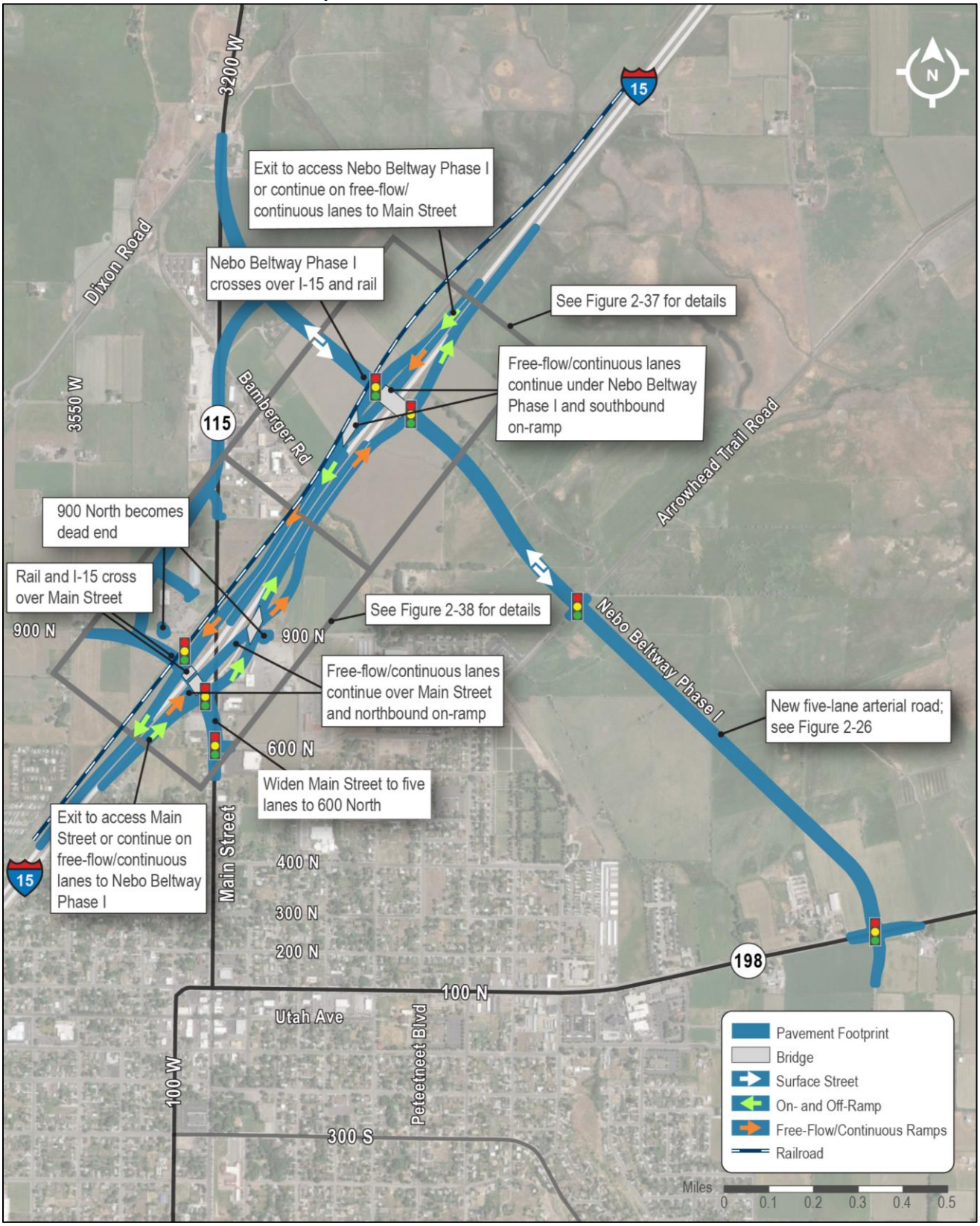
Figures 2-39 through 2-41 show an overview of the alternative, as well as a detailed plan view of the interchange configurations under Alternative C3.

2.5.7 Build Alternative C4: Split Diamond

Alternative C4 would function the same as Alternative C3, with frontage roads connecting the Main Street interchange to an additional interchange approximately 0.15 miles northeast of Main Street (compared to 0.7 miles under Alternative C3). Alternative C4 would cost approximately $145M (2020 dollars) to construct.

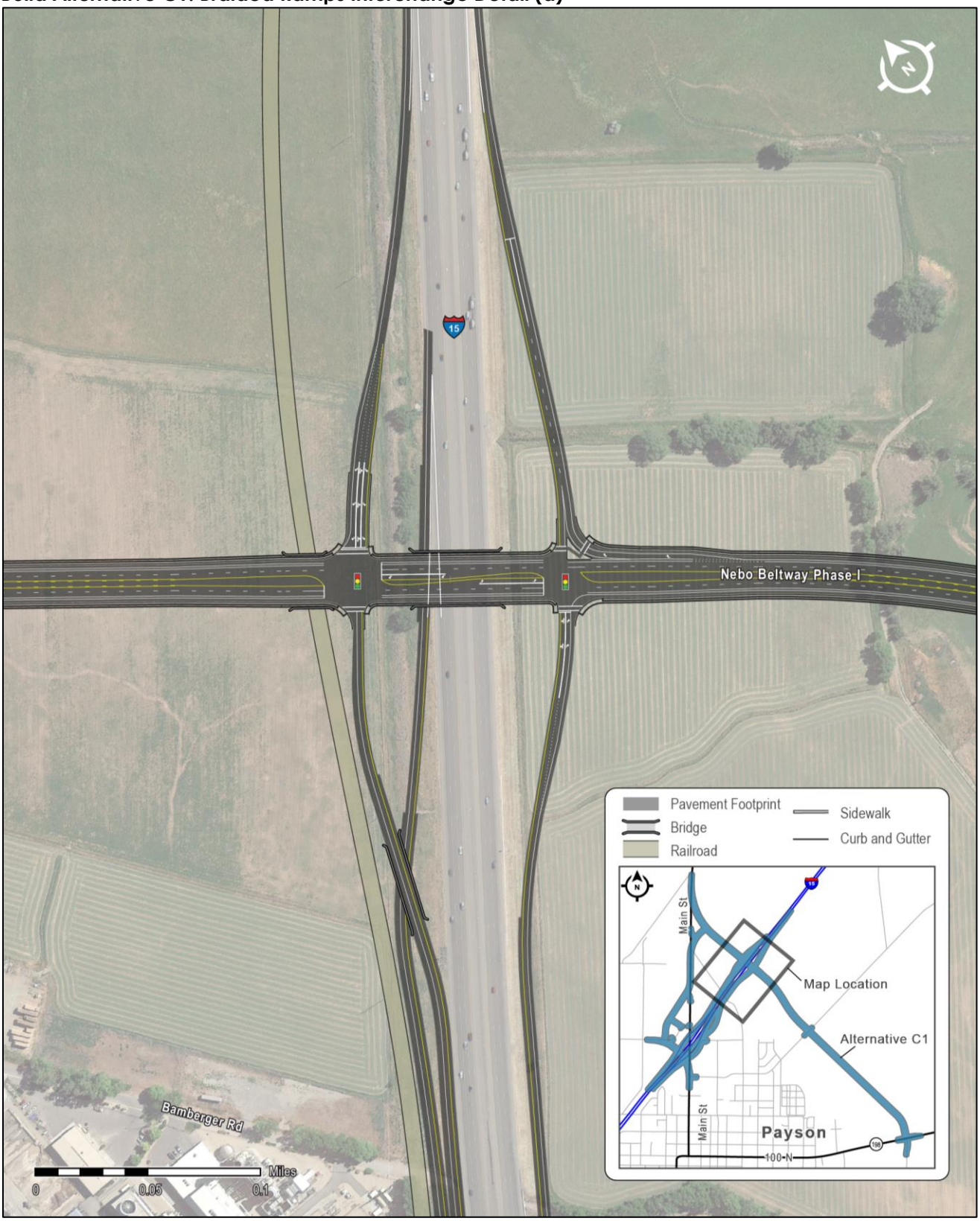
Figures 2-42 and 2-43 show an overview of the alternative, as well as a detailed plan view of the interchange configuration under Alternative C4.

FIGURE 2-36
Build Alternative C1: Braided Ramps



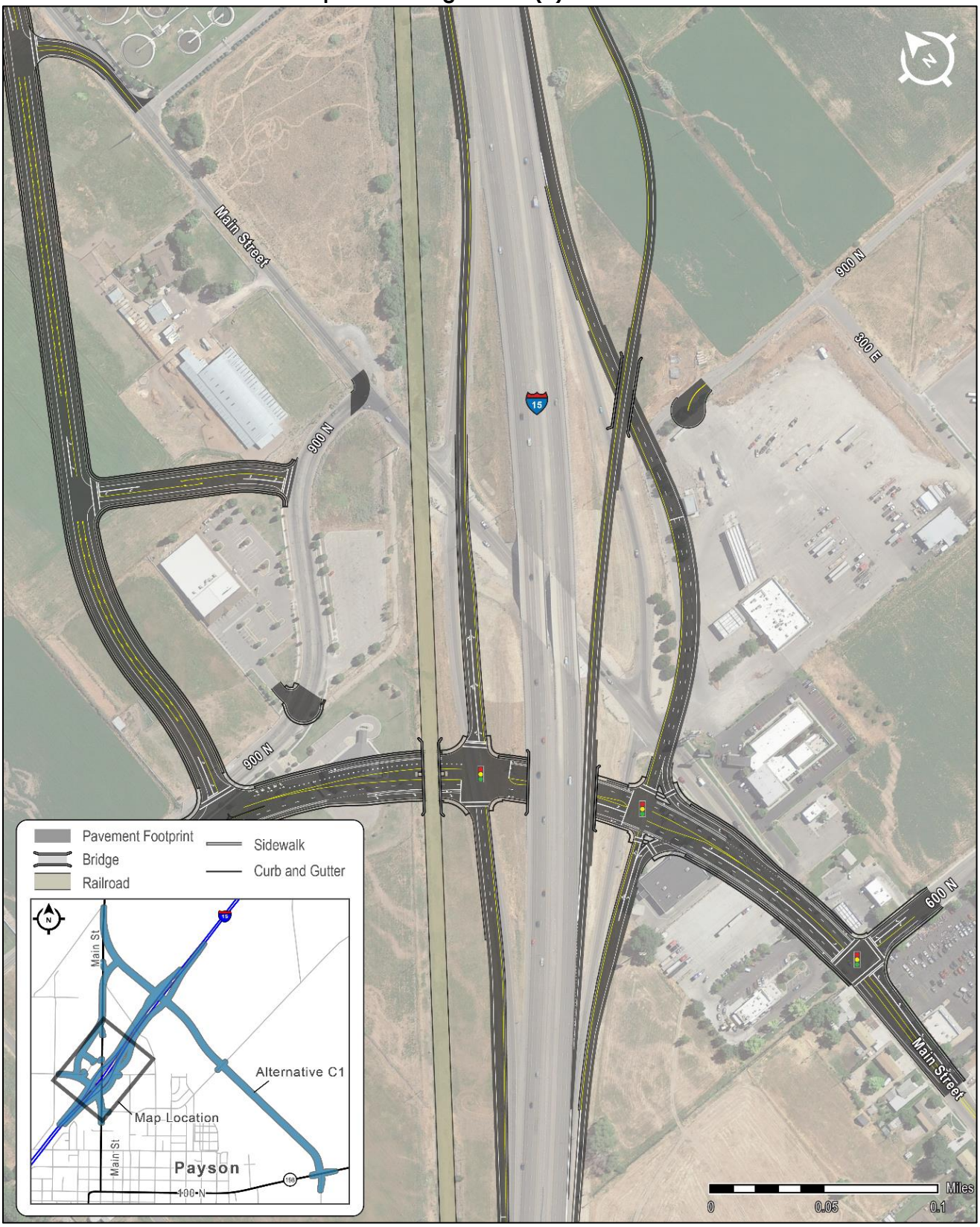
Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-37
Build Alternative C1: Braided Ramps Interchange Detail (a)



Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-38
Build Alternative C1: Braided Ramps Interchange Detail (b)

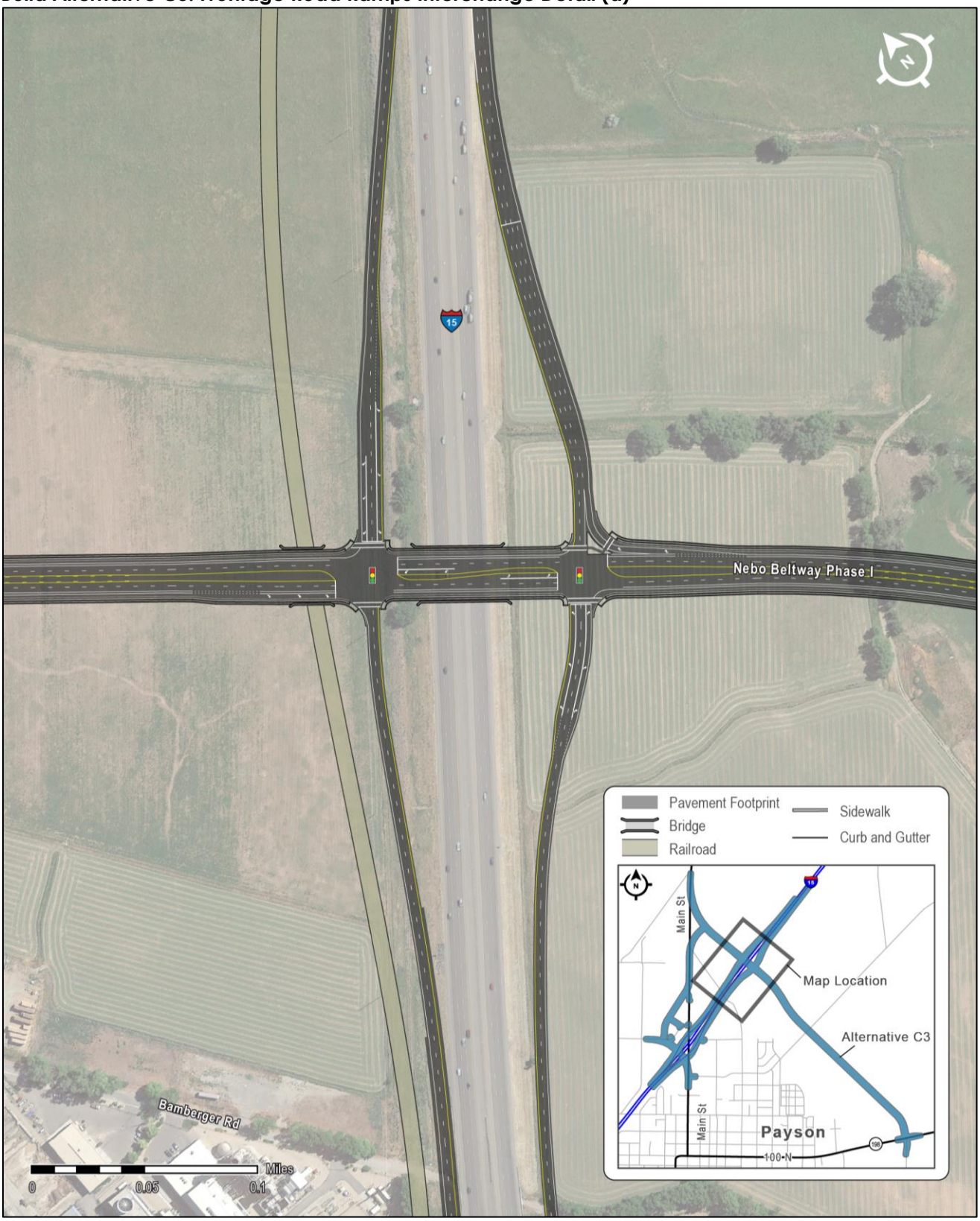


Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-39
Build Alternative C3: Frontage Road Ramps

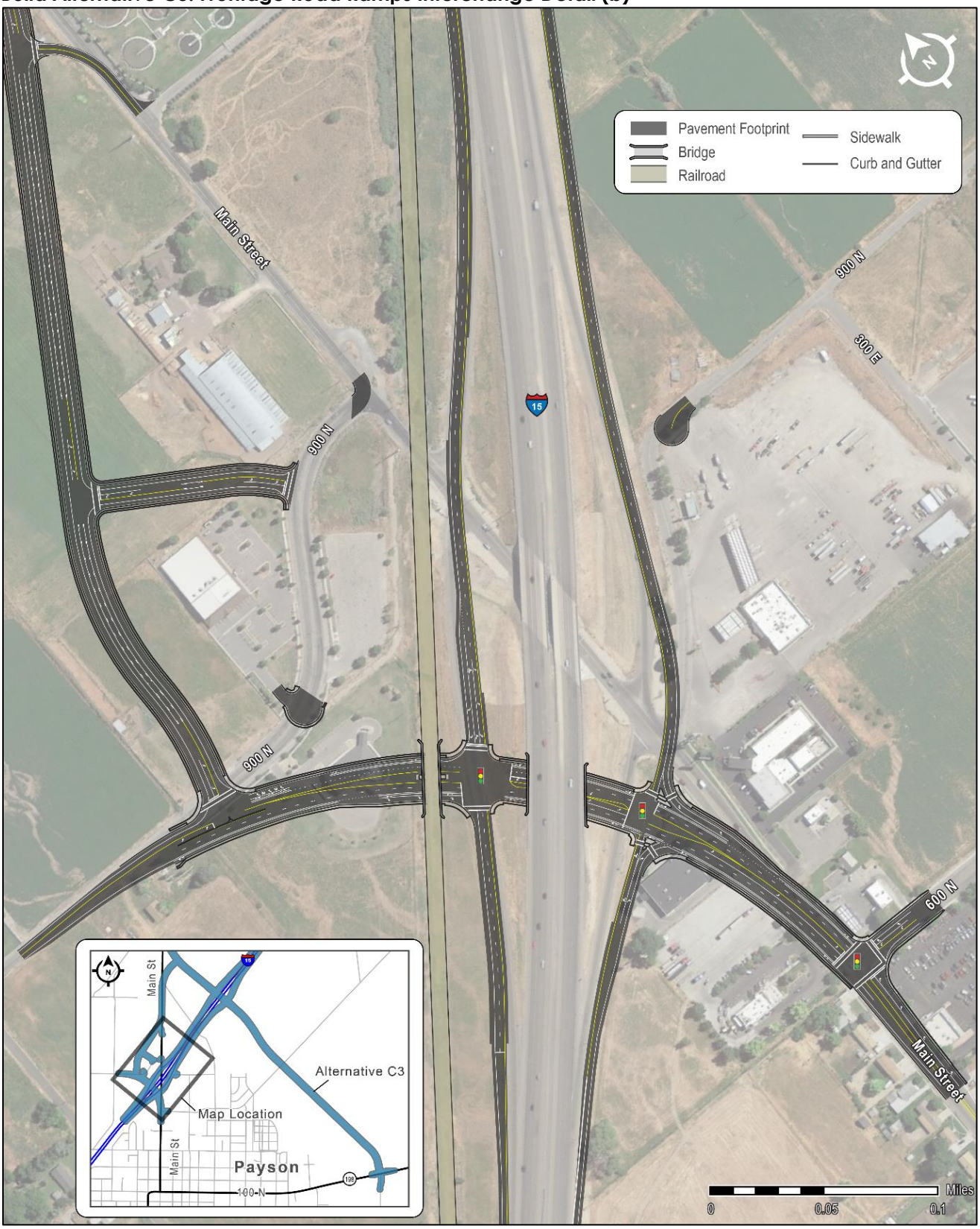
Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-40
Build Alternative C3: Frontage Road Ramps Interchange Detail (a)



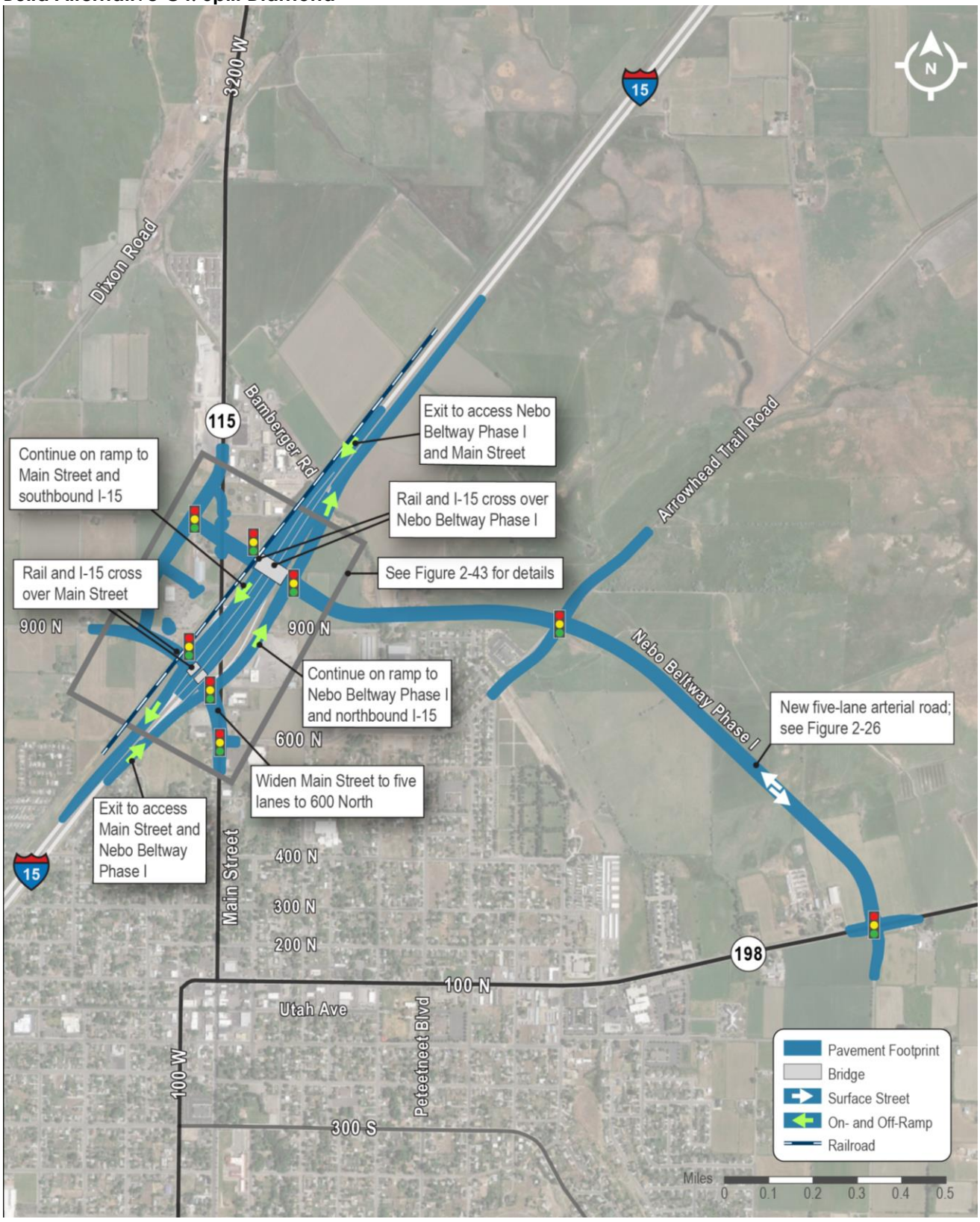
Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-41
Build Alternative C3: Frontage Road Ramps Interchange Detail (b)



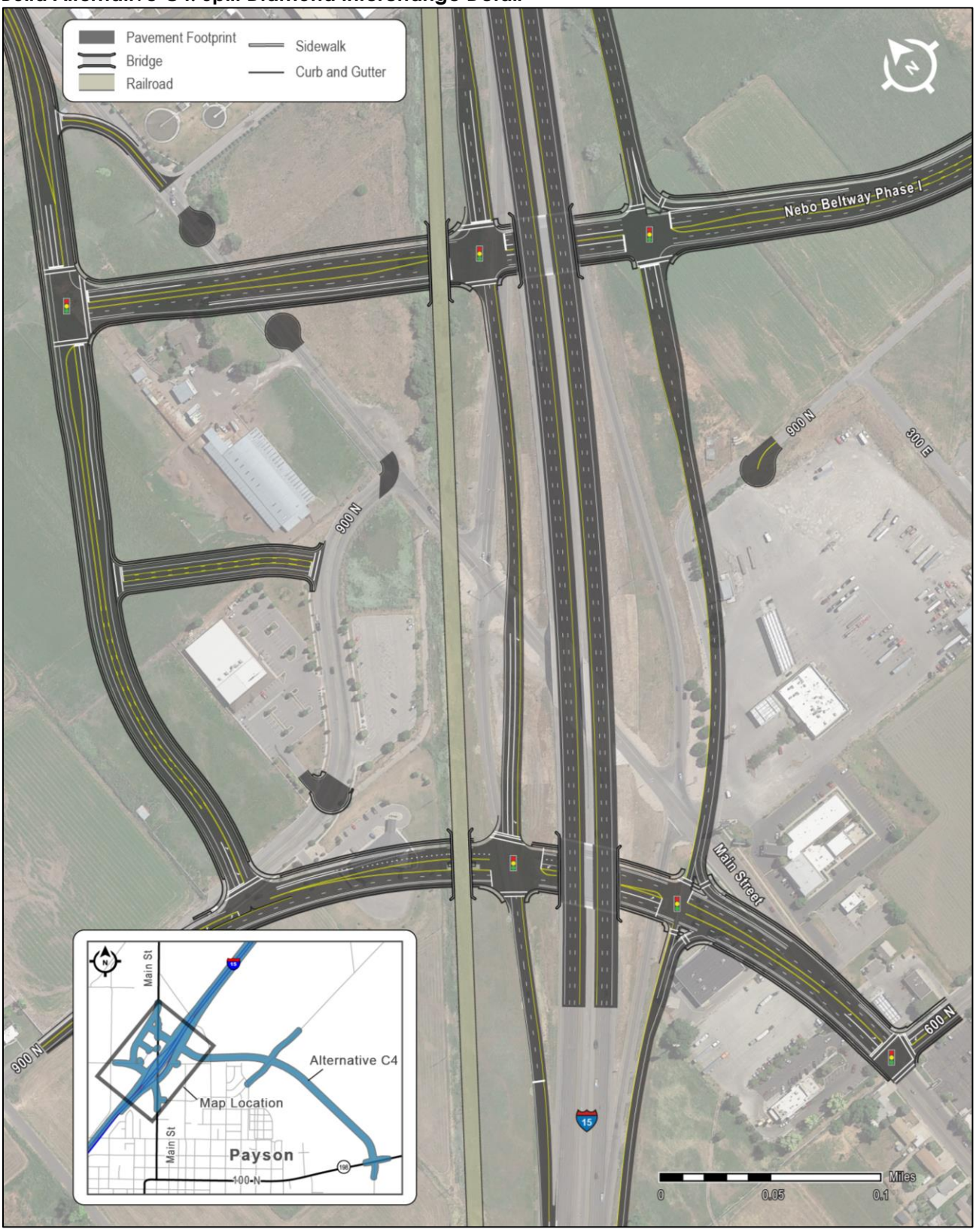
Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-42
Build Alternative C4: Split Diamond



Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

FIGURE 2-43
Build Alternative C4: Split Diamond Interchange Detail



Aerial Imagery: Automated Geographic Reference Center Google Maps Web Map Tile Service 2015

2.6 PREFERRED ALTERNATIVE

Pursuant to 23 CFR 771.125(a)(1), the lead agency must identify the preferred alternative in the Final EIS. All six candidate build alternatives—to varying degrees—would satisfy the project's purpose and need and would result in different impacts to the natural and built environment. Identification of the Preferred Alternative was based on balancing multiple considerations including the purpose and need, engineering design and traffic operations, impacts, community and economic considerations, cost, competing regulatory mandates, and public and agency input. UDOT has identified Alternative C1 as the Preferred Alternative, as described below.

2.6.1 Purpose and Need

All build alternatives would meet the purpose and need—they would reduce expected (2040) roadway congestion at the Main Street interchange and on Main Street, and would address the current design deficiencies. The differences in level of service and average vehicle delay at the interchange and on Main Street was not substantial enough to separate one alternative from another.

Because LOS and vehicle delay at the interchange and on Main Street were similar under each build alternative, UDOT examined differences in engineering design components, overall study area traffic operations, and the distribution of I-15 traffic to the surrounding roadway network between the build alternatives to identify the preferred alternative. The results of this analysis are included in Section 2.6.2.

2.6.2 Additional Design and Operational Considerations

Total vehicle delay was used to measure the overall traffic performance in the study area and was an important metric considered during the preferred alternative selection process. Total study area delay is a commonly used metric due to its ability to represent all traffic performance in any given area as a single number. Beyond just traffic congestion, lower vehicle delay also improves air quality, decreases commuting costs and economic impacts, and enhances quality of life. Table 2-9 shows that Alternative C1 is has the lowest overall study area delay in 2040.

The results of an origin-destination analysis—shown in Table 2-10—provide a general idea of how, for each alternative, traffic from I-15 is distributed to the surrounding roadway network. The circle around I-15 shown on Figure 2-44 represents a screenline that all trips to and from I-15 pass through. Table 2-10 shows that the R and C alternatives do the best job of distributing traffic to Main Street and Nebo Beltway Phase I, which are the two arterial roads that pass through the study area and are the most capable of carrying traffic to and from I-15 in 2040. However, the R alternatives also add the most traffic to 600 East, which is a heavily residential street that is sensitive to additional traffic.

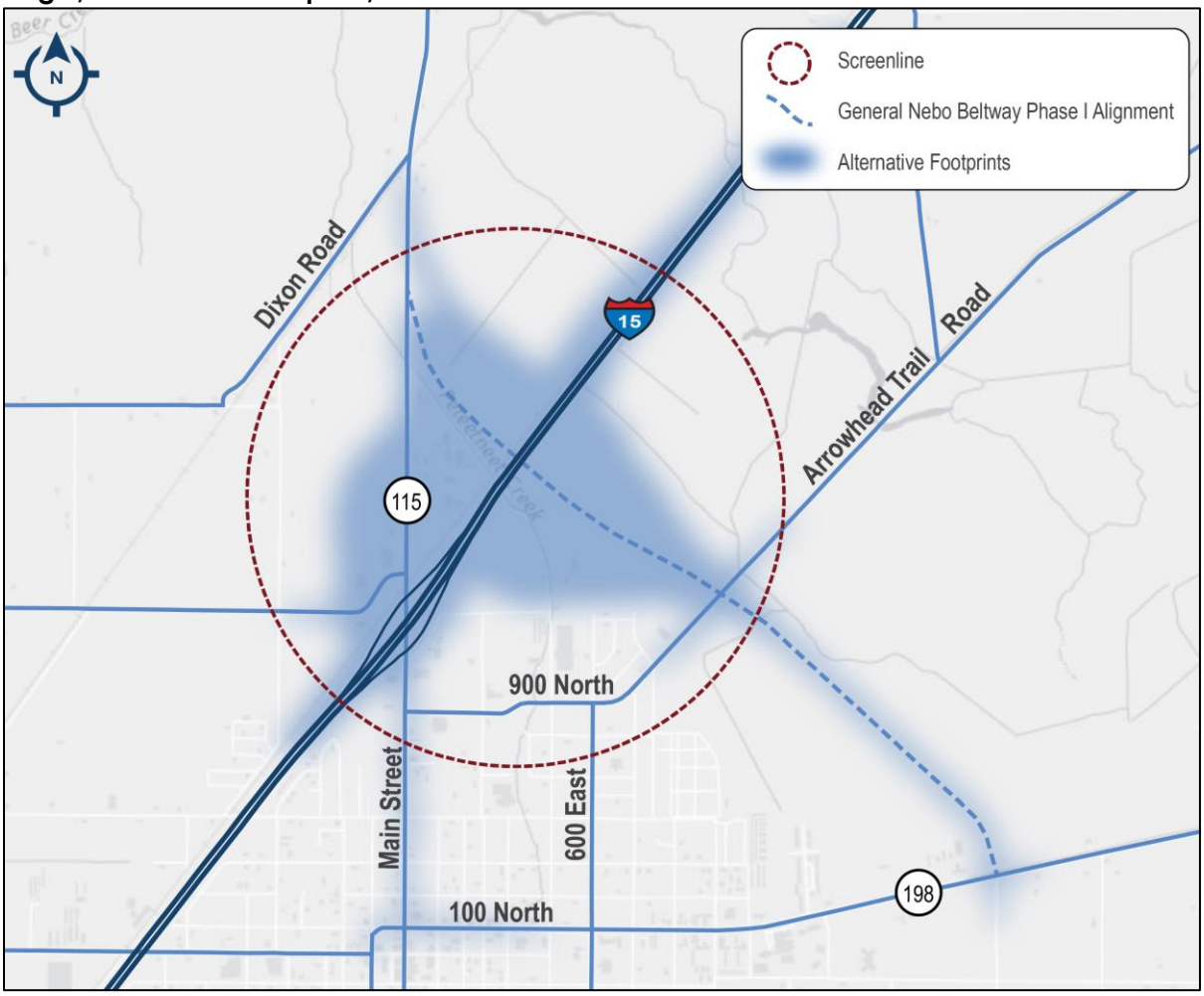
TABLE 2-9
Traffic Performance in 2040

Alternative	Level of Service		Interchange Delay (seconds/vehicle)	Average Daily Vehicle Delay in Study Area (hours)
	Interchange	Main Street		
No-Build (2040)	F	F	218	3,320
I1: Long-span Structure	B	C	24	520
R1: Relocate Near	B	D	24	510
R2: Relocate Far	B	C	18	460
C1: Braided Ramps	B	D	21	430
C3: Frontage Road Ramps	B	C	20	500
C4: Split Diamond	B	C	24	570

TABLE 2-10
Percent Distribution of 2040 Trips to/from I-15

Alternative	North Main Street (percent)	900 North (percent)	Arrowhead Trail (percent)	Nebo Beltway Phase I (percent)	600 East (percent)	South Main Street (percent)
No-Build (2040)	5	16	3	--	1	74
I1: Long-span Structure	5	8	4	--	--	82
R1: Relocate Near	4	16	4	15	18	43
R2: Relocate Far	5	8	2	32	16	36
C1: Braided Ramps	6	20	2	21	4	48
C3: Frontage Road Ramps	3	16	2	24	5	51
C4: Split Diamond	3	21	3	9	12	52

FIGURE 2-44
Origin/Destination for Trips to/from I-15



The location of Nebo Beltway Phase I influences engineering design and distribution of traffic. When located farther south—0.2 miles from Main Street for Alternatives C4 and R1—Nebo Beltway Phase I is a less attractive route and draws a lower percentage of traffic. This is likely because people in vehicles desiring to travel north on I-15 from the east side of Payson would have to travel farther out of direction to reach I-15 and would prefer to use the Benjamin interchange—the next interchange to the north. When located farther north—0.7 miles from Main Street for Alternatives C1, C3, and R2—Nebo Beltway Phase I becomes a more attractive route and would result in the highest share of traffic on Nebo Beltway Phase I.

Alternatives C4 and R1 would require reconstruction of mainline I-15—raising the grade for approximately 3,000 feet—because I-15 would need to go over both Nebo Beltway Phase I and Main Street. Reconstructing the mainline would result in maintenance-of-traffic complications during construction. These alternatives would require horizontal and vertical realignment of the railroad.

The C alternatives would provide two interchange connections to I-15. An additional interchange would result in improved regional mobility, improved network connectivity, and better emergency response times. The C alternatives would provide better accessibility to

the area west of I-15 because Main Street would be realigned to directly connect to 900 North.

In summary, when considering engineering design and traffic operations, Alternatives C1 and C3 provide the combined benefits of two interchange connections and an optimal Nebo Beltway Phase I alignment. Alternative C1 would result in less overall delay in the study area compared to Alternative C3.

2.6.3 Impacts

When considering impacts to the natural and built environment, alternatives were distinguished primarily by right-of-way and impacts to WOUS, Section 4(f) historic sites, and farmland. Impacts to these resources are summarized in Table 2-11 (see Chapter 3 for more detail). Alternative I1 would result in the greatest impact to the built environment (right-of-way and Section 4(f) historic sites) and the smallest impact to the natural environment (WOUS and farmland). In comparison, the C and R alternatives would result in a greater impact to the natural environment and a smaller impact to the built environment. Amongst the C and R alternatives, those with Nebo Beltway Phase I located farther north—Alternatives R2, C1, and C3—would result in greater impacts to WOUS and farmland, but would avoid Section 4(f) historic sites.

TABLE 2-11
Comparison of Impacts to Key Resources

Alternative	Land Acquisition and Relocations		WOUS (wetland acres/ linear feet of ditches/ Beer Creek acres)	Section 4(f) Historic Sites (greater than *de minimis* use)	Prime & Statewide Important Farmland (acres/ rating[1])
	(full acquisitions/ relocations/ acres)	(partial acquisitions/ acres)			
No-Build	0/0/0	0/0	0/0/0	NA	0/NA
I1: Long-span Structure	45/41/24.2 22 residential 17 commercial	83/17.0	0.54/1,749/0	20 buildings removed; adverse effect to historic district	15.2/123
R1: Relocate Near	7/4/16.6 1 residential 1 commercial	59/61.3	1.81/2,657/0	2 historic buildings no longer eligible for NRHP	65.3/143
R2: Relocate Far	1/1/1.9 0 residential 1 commercial	43/99.1	3.91/3,413/0	0	91.3/139
C1: Braided Ramps	8/5/15.1 0 residential 5 commercial	75/100.9	3.98/2,823/0	0	95.4/139
C3: Frontage Road Ramps	8/5/15.1 0 residential 5 commercial	73/97.5	5.39/4,665/ 0.06	0	93.2/139
C4: Split Diamond	10/6/17.8 1 residential 5 commercial	66/62.2	2.38/3,114/0	2 historic buildings no longer eligible for NRHP	68.4/143

1. *National Resources Conservation Service Conversion Impact Rating (higher rating indicates greater impact)*

2.6.4 Community, Economic, and Social Considerations

Consideration related to the community, economy, and social environment focused on existing and planned development and Payson's historic character. Alternative I1 would require the removal of 17 commercial and 22 residential properties along Main Street and SR-198. It would impact a relatively high percentage of buildings in the core area of Main Street's historic residential area, including two that are individually listed on the NRHP. Alternative I1 would adversely affect the Payson Historic District and diminish historic character that is important to the community.

The R alternatives would remove the direct connection between Main Street and I-15. The competitiveness and economic viability of freeway-dependent businesses on north Main Street could be weakened compared to locations with a direct connection at Nebo Beltway Phase I or 800 South. Right-of-way impacts would result in partial acquisitions, leaving businesses to operate despite weakened competitiveness. Other businesses on Main Street, SR-198, and in downtown Payson are less dependent on freeway traffic but still benefit from the convenience of the existing Main Street interchange. Closing the existing Main Street interchange could potentially lead to blight, threaten redevelopment prospects, diminish the community character of north Main Street, and make these commercial properties less desirable for existing and future business redevelopment over time.

Alternatives C1, C3, and R2 would be the most conducive to maximizing development potential (i.e., increasing density) for the Bamberger Ranch (750-acre Planned Community Zone, approved by Payson City in 2011) due to the location of Nebo Beltway Phase I (see Section 3.23.3 and Section 3.23.4). In comparison, Alternatives C4 and R1 would be less conducive. Alternative I1 would not benefit the Bamberger Ranch development.

The C alternatives would improve emergency response times and provide multiple routes from I-15 to Mountain View Hospital. They would also provide continued access to I-15 from Main Street without widening Main Street to accommodate future travel demand and would require no out-of-direction travel to access Main Street from I-15.

2.6.5 Cost

The preliminary cost estimates of each alternative includes preliminary engineering, right-of-way acquisition, construction, and mitigation. Table 2-12 lists the cost in 2020 dollars and provides a percentage comparison. Alternative C1 would cost the most and Alternative R2 would cost the least. Given the scale of the project and the importance of the other comparison criteria, cost difference was not a determinative factor.

TABLE 2-12
Cost Comparison

Alternative	Cost (2020 dollars)	Percentage of Highest Cost Alternatives
No-Build	0	0
I1: Long-span Structure	$125M	68
C1: Braided Ramps	$183M	100
C3: Frontage Road Ramps	$162M	89
C4: Split Diamond	$145M	79
R1: Relocate Near	$146M	80
R2: Relocate Far	$109M	60

2.6.6 Public and Agency Input

Public input regarding the project was received as comments, emails, informal polling results, and a resident-organized petition. A public open house was held on December 3, 2015 to inform and gather public input on the alternatives analysis process. Overall, the C alternatives were the most popular and Alternative C1 received the most support. At the public open house participants of an informal polling activity overwhelmingly supported the C alternatives. After the public open house, to emphasize support for the C alternatives, a Payson City resident circulated a petition through the community and received 421 signatures. Email-submitted comments received after the public open house expressed concern with impacts to historic homes on Main Street under Alternative I1. Members of the stakeholder working group expressed concerns with the economic viability of businesses on north Main Street if the interchange were to be relocated under the R alternatives.

Agency input regarding the project was received through formal scoping letters, during agency coordination meetings, and through email correspondence. During scoping, USACE recommended developing alternatives sufficient to meet requirements of Section 404(b)(1) Guidelines. Following alternative development and screening, USACE, EPA, and USFWS expressed concerns regarding indirect impacts and induced growth related to Nebo Beltway Phase I. USFWS and EPA further expressed concerns related to identification of the least environmentally damaging practicable alternative and compatibility with Section 404(b)(1) Guidelines.

2.6.7 Consideration of the Clean Water Act Section 404(b)(1) Guidelines

Section 404(b)(1) Guidelines (40 CFR 230) establish requirements which must be met in order for USACE to issue a permit under Section 404 of the Clean Water Act. The regulations establish a presumption, for non-water dependent projects, that practicable alternatives are available to avoid special aquatic sites (wetlands). An alternative is "practicable" if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." USACE can only issue a permit if there is no "practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem," unless that other alternative has "other significant adverse environmental consequence."

SECTION 404(b)(1) GUIDELINES

The guidelines establish requirements that must be met for USACE to issue a Section 404 Permit. One is there must be no "practicable alternative…which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences." This requirement is known as the least environmentally damaging practicable alternative (LEDPA) requirement.

No alternative completely avoids wetlands or other WOUS as shown in Table 2-11. Any of these alternatives would require an individual 404 permit from USACE. The practicability of alternatives that include greater than *de minimis* impacts to Section 4(f) resources is unclear, in light of Section 4(f)'s prohibition on uses of Section 4(f) resources where feasible and prudent avoidance alternatives exist.

Alternative I1 would result in the least adverse impacts to wetlands and other WOUS; however, it would result in significant impacts to historic sites protected under Section 4(f). It would result in the removal of 20 historic buildings, 18 of which are contributing within the Payson Historic District. Section 4(f) is a competing legal mandate which outlines the conditions required for UDOT to select a preferred alternative with greater than *de minimis* impacts to Section 4(f) properties (see

Section 3.17 for more information). Alternative I1 would also result in the greatest right-of-way impacts.

Alternatives C4 and R1 would result in lesser impacts to wetlands and other WOUS compared to Alternatives C1, C3, and R2 because the Nebo Beltway interchange would be located farther south, where there is less hydrology to support wetlands. However, Alternatives C4 and R1 would result in greater than *de minimis* impacts to two Section 4(f) properties. Alternative C4 would also result in slightly greater right-of-way impacts when compared to Alternatives C1, C3, and R2.

Alternatives C1 and R2 would result in similar direct impacts to wetlands and other WOUS. Alternative C3 would result in the greatest impacts to wetlands and other WOUS. None of the three result in greater than *de minimis* impacts to Section 4(f) properties. This was an important factor for UDOT selecting Alternative C1 as the Preferred Alternative over Alternative C3.

The alignment of Nebo Beltway Phase I under the build alternatives was shifted to the extent feasible to avoid or minimize impacts to wetlands W4a, W4b, W5, W6, W7a, W8, and W9a while maintaining UDOT and AASHTO design standards and a connection to future phases of Nebo Beltway (see Figure 3.14-2). In addition, modifications were considered to shift the location of the Nebo Beltway Phase I interchange under Alternatives C1, C3, and R2 closer to the Main Street Interchange, but north of alternatives C4 and R1, to minimize wetland impacts. To achieve a substantial reduction in wetland impacts, the interchange would need to be shifted approximately 0.3 miles south, which would require relocating the Utah Municipal Power Systems power plant. UDOT determined relocating the power plant would be too costly—over $100 million based on the original cost of the power plant in 2003 (Deseret News 2003)—and would result in a cost which is substantially greater than typical, which is not considered a reasonable expense. Shifting the interchange farther north would result in greater impacts to wetlands (see Figure 3.14-2 and Figure 3.14-6).

Alternatives C1, C3, and R2—and to a lesser degree Alternatives C4 and R1—may induce growth at a faster rate compared to the No-Build Alternative and Alternative I1 due to the improved access to currently undeveloped areas. However, other external factors must align for development to occur (e.g., market conditions; access to water, sewer, gas, and electric utilities; land use ordinances; and political climate). Regardless of this project or preferred alternative, population growth and subsequent conversion of agricultural uses along with the redevelopment of aging commercial properties is inevitable.

The decision-making responsibility under Section 404(b)(1) Guidelines rests with USACE. A final decision will be made when a permit is issued.

2.6.8 Conclusion

After considering all of these factors, UDOT selected Alternative C1 as the Preferred Alternative. Alternative C1 would perform best with respect to the project purpose and need—it would result in the lowest average daily vehicle delay in the study area, which is a commonly used measure of overall congestion and network efficiency. From a design and operations perspective, it would provide the combined benefits of two interchange connections and an optimal Nebo Beltway Phase I alignment. It would avoid greater than *de minimis* impacts to Section 4(f) resources. Although it would result in greater impacts to wetlands and other WOUS compared to some alternatives, UDOT does not believe those impacts, after mitigation, are so severe as to outweigh the other factors discussed in this section. Finally, Alternative C1 has the greatest support from the community.