

CHAPTER TWO: ALTERNATIVES

Chapter 2 - Alternatives is organized as follows:

- **2.1 Development of Alternatives** - Discusses the alternatives considered.
- **2.2 Alternatives Analysis Criteria** - Describes the criteria used to analyze alternatives and options.
- **2.3 Alternatives Analysis** - Discusses each alternative and option considered and the process by which alternatives and options were selected for detailed study.
- **2.4 Alternatives Selected for Detailed Study** - Describes the alternatives selected for detailed study.
- **2.5 Identification of the Preferred Alternative** - Identifies the Preferred Alternative.

2.1 DEVELOPMENT OF ALTERNATIVES

2.1.1 PRELIMINARY ALTERNATIVES DEVELOPMENT

Several preliminary alternatives were developed, evaluated, and eliminated. A brief description of these alternatives, as well as the reasons they were eliminated, are discussed below.

Transportation System Management/Transportation Demand Management Alternative

The Transportation System Management/Transportation Demand Management (TSM/TDM) Alternative includes activities that are intended to improve traffic flow and provide limited capacity improvement without building new travel lanes. TSM focuses on strategies to maximize the efficiency of the existing system through activities such as intersection improvements, turn lanes, signal coordination and optimization, ramp metering, auxiliary lanes, Intelligent Transportation Systems (ITS), and access management to reduce conflicts. This alternative would include the implementation of ITS features as described in the *Dixie Regional ITS Architecture Report*.

TDM programs are designed to reduce travel demand by encouraging the use of transit, carpools, telecommuting, and flexible work hours. These programs have typically been implemented by large employers who promote and support TDM projects. Currently, there are no large employers actively sponsoring TDM initiatives in the study area. However, as the cities of Washington County continue to grow and develop, new TDM opportunities may arise.

The detailed traffic operations and analysis models already have some TSM elements incorporated into the analysis to maximize the efficiency of the roadway and intersection operations. Even with these TSM elements incorporated, the TSM/TDM Alternative would only provide modest improvements in the operation of the overall system. The TSM/TDM Alternative would not meet the Purpose and Need of the project because it would not provide Level-of-Service (LOS) D or better for the I-15 mainline corridor between milepost (MP) 0 and MP 16 in 2040. Consequently, there is no further consideration regarding this alternative in this document.

Transit Alternative

The Transit Alternative assumes that public transit system improvements included in the St. George Urbanized Area Short Range and Long Range Transit Plan for SunTran, the City of St. George's public transit system, would be implemented. SunTran currently provides service on four routes located entirely within St. George.

The Dixie Metropolitan Planning Organization (DMPO) regional travel demand model shows that transit only accounts for about two percent of the total travel within the study area. Therefore, any improvements that could be made, beyond what is already planned, would have very little effect on overall traffic volumes and congestion in the area (see August 2006 St. George Urbanized Area Short Range and Long Range Transit Plan). In addition, the local St. George SunTran system would have to be expanded to a regional transit system serving the adjacent communities of Washington and Hurricane to have any measurable effect on I-15 traffic volumes. The Transit Alternative would not meet the Purpose and Need of the project because it would not provide LOS D or better for the I-15 mainline corridor between MP 0 and MP 16 in 2040. Consequently, there is no further consideration regarding this alternative in this document.

2.1.2 DESCRIPTION OF ALTERNATIVES

Each alternative developed assumes that all other planned regional and local transportation improvements included in approved regional and local plans would be completed by the year 2040. These include all improvements, regardless of transportation mode, in the following plans:

- DMPO 2011-2040 Regional Transportation Plan (RTP) (June 2011)
- Dixie Regional Intelligent Transportation System (ITS) Architecture Report (September 2006)
- St. George Master Traffic and Transportation Study (2008)
- Washington City Transportation Master Plan (April 2010)
- Hurricane City Transportation Master Plan (December 2011)
- St. George Urbanized Area Short Range and Long Range Transit Plan (2006)

No-action Alternative

Under the No-action Alternative, no general roadway capacity improvements would be implemented in the study area. However, the No-action Alternative does assume that general maintenance and minor roadway and safety improvements needed to preserve the safe and efficient operation of the facility would be implemented. These would include activities such as pavement preservation, roadway shoulder widening, slope flattening, guardrail and cable barrier installations, clear zone improvements, and intersection timing and striping modifications.

Build Alternatives

Project Design Criteria

As the project team developed build alternatives they were guided by the project design criteria (see Appendix A). Some of these criteria included:

- I-15 Design Speed: 70 mph to 75 mph
- Ramp Design Speed: 25 mph to 50 mph
- I-15 Lane Width: 12-ft
- Ramp Lane Width: 12-ft to 14-ft
- I-15 Shoulder: 10-ft to 12-ft (outside) and 4-ft to 12-ft (inside)
- Ramp Shoulder: 6-ft to 8-ft (outside) and 4-ft (inside)

One build alternative, the I-15 Mainline Alternative, was developed. This alternative includes several interchange improvements at various locations along the corridor.

I-15 Mainline Widening Alternative

Currently, the I-15 mainline has two general purpose lanes in each direction between the state line and SR-9, two collector/distributor lanes in each direction between Dixie Drive and Bluff Street, and one auxiliary lane between Washington Parkway and SR-9 in the northbound direction. The I-15 Mainline Widening Alternative would include improving I-15 between MP 0 and MP 16 to the degree necessary to meet LOS D or better for 2040 travel demand. Travel demand modeling has determined that the lane requirements shown in Table 2-1 and Figure 2-1 would be necessary to satisfy these 2040 conditions. See also Typical Sections in Volume 2.

Table 2-1 Lane Requirements

Direction	Proposed Number of Lanes		
	General Purpose	Auxiliary	Collector/Distributor
State Line to Port-of-Entry			
Northbound	2	0	0
Southbound	2	0	0
Port-of-Entry to Southern Parkway			
Northbound	2	1	0
Southbound	2	1	0
Southern Parkway to Brigham Road			
Northbound	3	0	0
Southbound	3	0	0
Brigham Road to Dixie Drive			
Northbound	3	2	0
Southbound	3	1	0
Dixie Drive to Bluff Street			
Northbound	3	0	2
Southbound	3	0	2
Bluff Street to St. George Boulevard			
Northbound	3	0	0
Southbound	3	0	0
St. George Boulevard to Green Springs Drive			
Northbound	3	0	0
Southbound	3	0	0
Green Springs Drive to Washington Parkway			
Northbound	3	0	0
Southbound	3	0	0
Washington Parkway to SR-9			
Northbound	3	1	0
Southbound	3	1	0

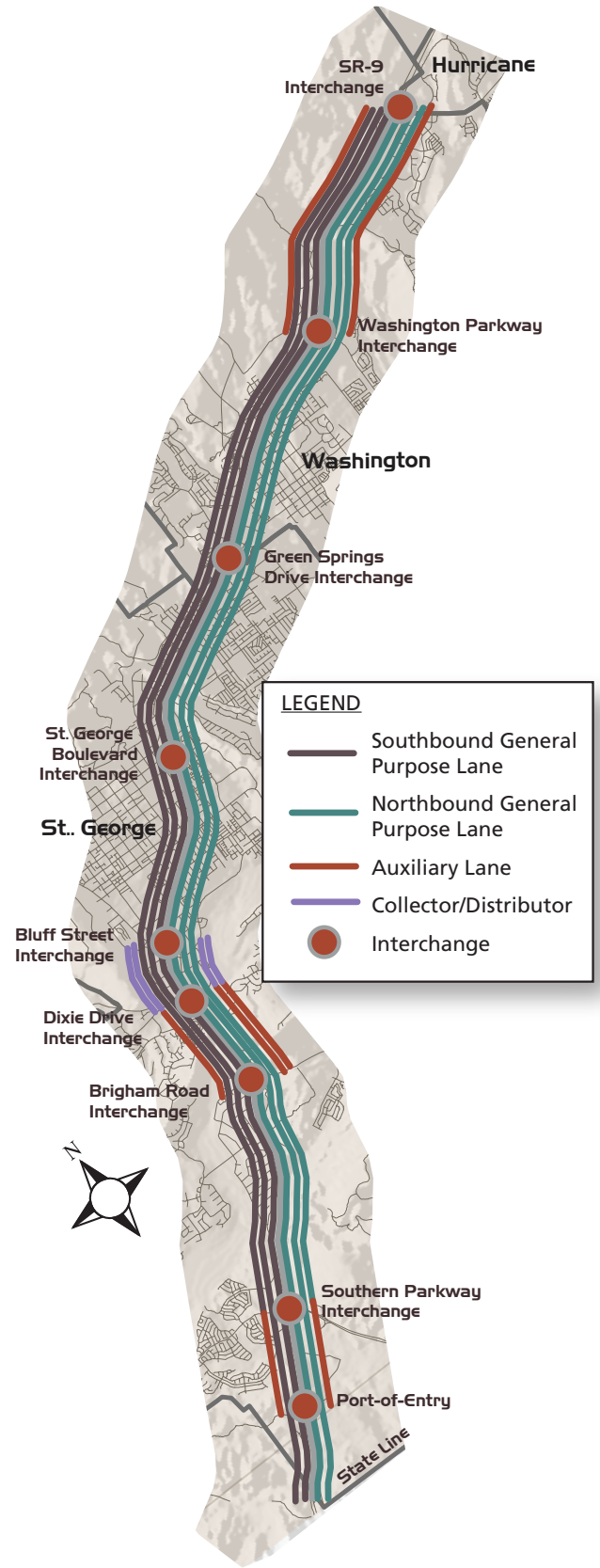


Figure 2-1 Lane Requirements on I-15

Interchange and Cross Street Options

There are eight existing interchanges along the I-15 corridor between MP 0 and MP 16. The interchange options for the I-15 Mainline Widening Alternative are discussed below.

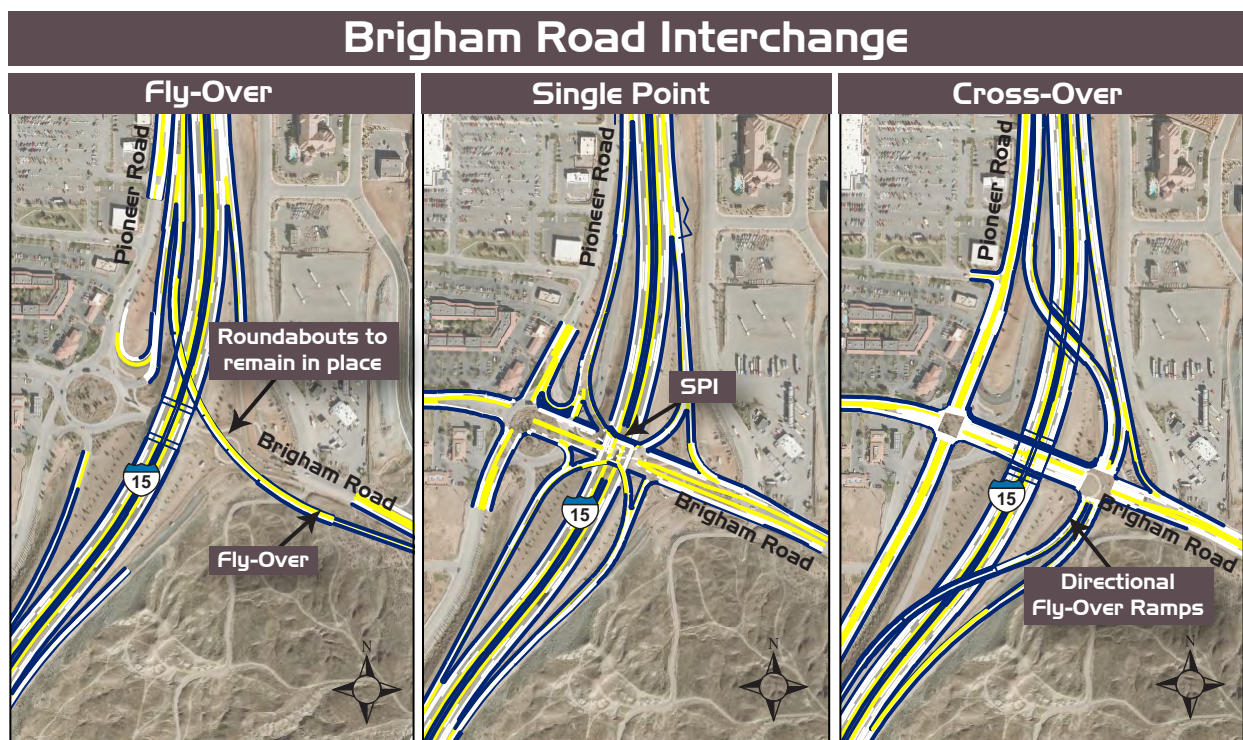
Southern Parkway

By 2040 the Southern Parkway Interchange will operate at LOS D with 42.3 seconds of delay. Assuming planned maintenance and safety activities are implemented, no other improvements would be required at the Southern Parkway Interchange to meet LOS D or better on I-15 in 2040.

Brigham Road

By 2040 the Brigham Road and southbound ramps intersections will operate at LOS F with greater than 100 seconds of delay. To address the projected 2040 travel demand, three options were considered for the Brigham Road Interchange:

- **Fly-Over with Existing Roundabouts:** This option would leave the existing roundabouts in place and construct a new flyover for the southbound to eastbound movement.
- **Single Point Interchange (SPI):** This option would remove the roundabouts and construct a SPI with a new intersection at Pioneer Road and Brigham Road.
- **Cross-Over:** This option would remove the roundabouts and construct cross-over ramps to the east side of I-15, forming a single intersection for all ramp movements.



Dixie Drive

By 2040 the Dixie Drive Interchange will operate at LOS B with 11 seconds of delay. No changes would be required at the Dixie Drive Interchange to meet LOS D or better on I-15 in 2040.

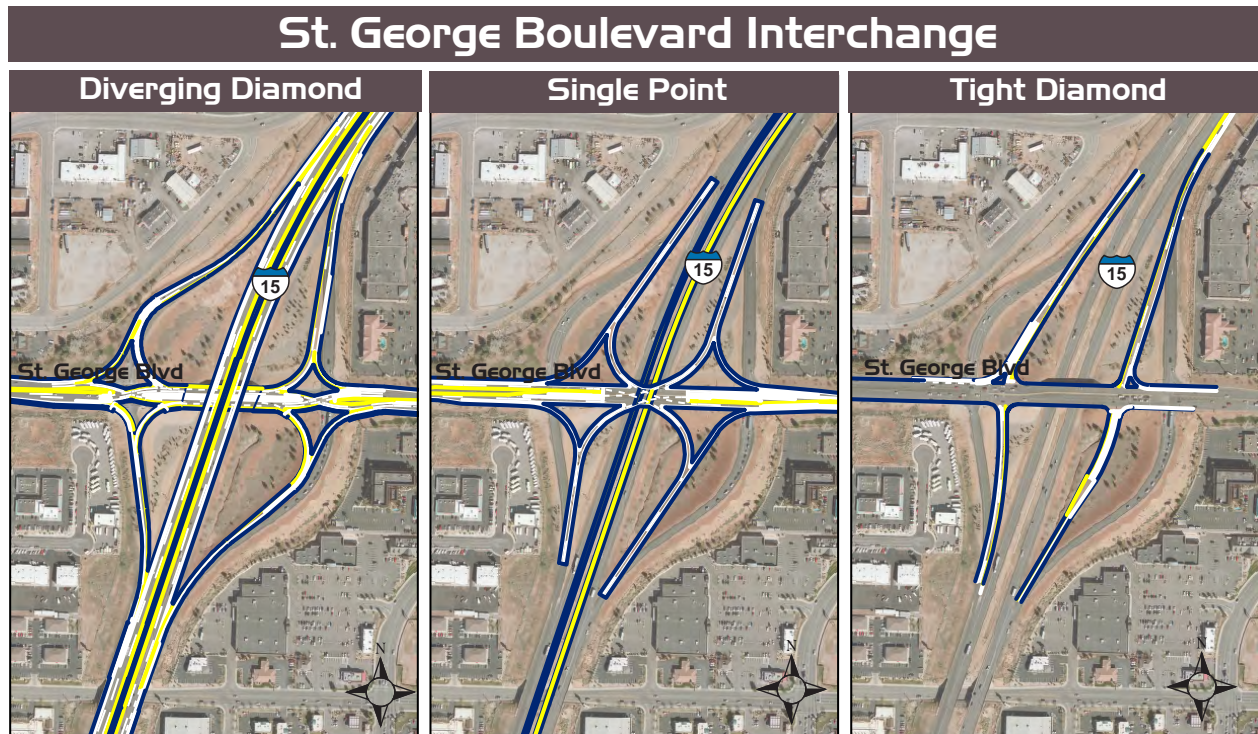
Bluff Street

By 2040 the Bluff Street and northbound and southbound ramps intersections will operate at LOS B with 19.1 and 16.7 seconds of delay. No changes would be required at the Bluff Street Interchange to meet LOS D or better on I-15 in 2040.

St. George Boulevard

By 2040 the St. George Boulevard and northbound ramps intersection will operate at LOS E with 64.9 seconds of delay. To address the projected 2040 travel demand, three options were considered for the St. George Boulevard Interchange:

- **Diverging Diamond Interchange (DDI):** This option would convert the existing diamond interchange to a DDI.
- **Single Point Interchange (SPI):** This option would convert the existing diamond interchange to a SPI.
- **Tight Diamond Interchange:** This option would upgrade the existing diamond interchange to a tight diamond interchange.



Mall Drive

To address the projected 2040 travel demand on the I-15 corridor, the St. George Boulevard Interchange, and the Green Springs Drive Interchange, an option to construct an I-15 overpass at Mall Drive was considered (I-15 over Mall Drive). This option would not provide access to I-15 at Mall Drive.

I-15 Underpass at Mall Drive Option

In addition to the I-15 Overpass at Mall Drive Option, an option that would construct an I-15 underpass at Mall Drive was briefly considered (I-15 under Mall Drive). However, the I-15 Underpass at Mall Drive Option would cause a loss of access for several businesses and residences along Mall Drive, Red Hills Parkway, and Red Cliffs Drive. Therefore, the I-15 Underpass at Mall Drive Option was eliminated from further study.



Green Springs Drive

By 2040 the Green Springs Drive Interchange will operate at LOS F with greater than 100 seconds of delay. This is due to poor operations at the adjacent intersection at Buena Vista/Green Springs Drive. To address the projected 2040 travel demand, improvements to the Buena Vista/Green Springs Drive intersection would be needed. These improvements would include the addition of thru-turns at this intersection.

Move Buena Vista Boulevard Option

In addition to constructing thru-turns at the Buena Vista/Green Springs Drive intersection, an option that would relocate Buena Vista Boulevard further to the west behind the gas station was briefly considered. However, this option would cause several impacts to residences and businesses in the area. Therefore this option was eliminated from further study.



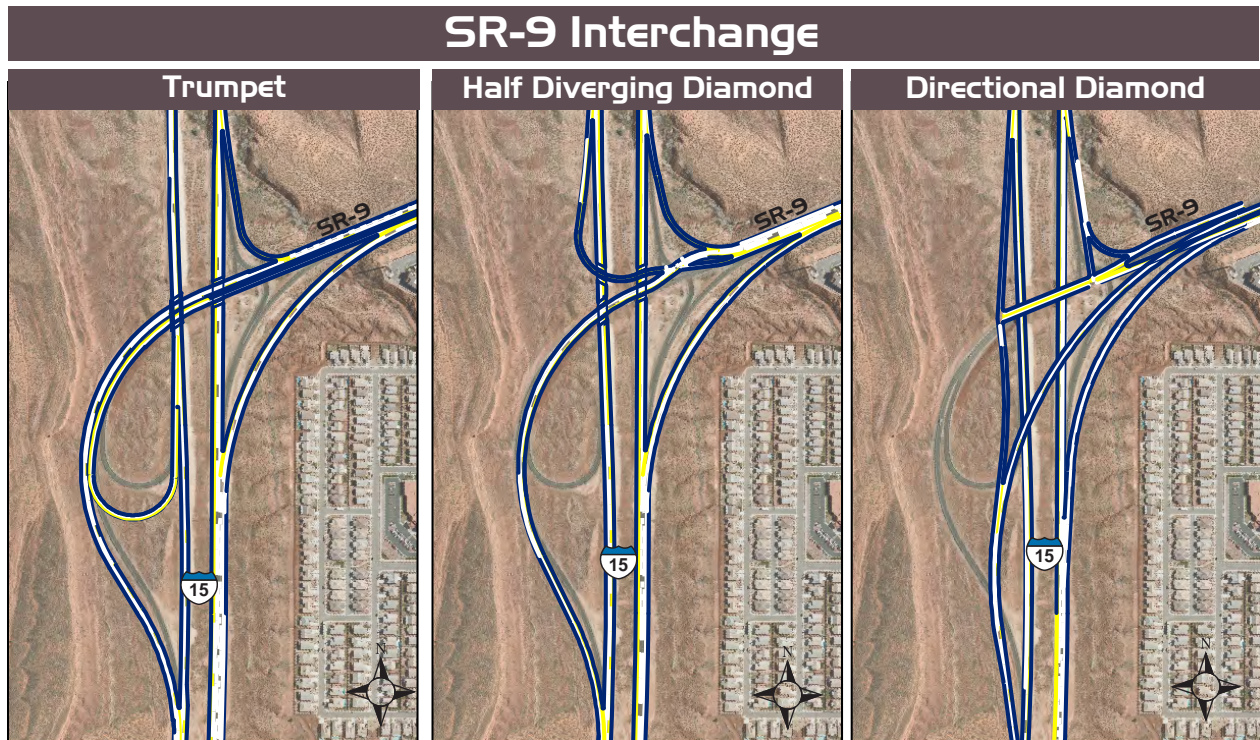
Washington Parkway

By 2040 the Washington Parkway and northbound ramps intersection will operate at LOS C with 21.0 seconds of delay and the Washington Parkway and southbound ramps intersection will operate at LOS B with 14.5 seconds of delay. Assuming planned maintenance and safety activities are implemented, no other improvements would be required at the Washington Parkway Interchange to meet LOS D or better on I-15 in 2040.

SR-9

By 2040 the SR-9 Interchange will operate at LOS F. To address the projected 2040 travel demand on the I-15 corridor and at the SR-9 Interchange three options were considered:

- **Trumpet Layout:** This option would maintain the existing trumpet layout but would improve the southbound exit deceleration coming into the loop ramp, increase the size of the loop ramp, and add additional lanes to the ramps.
- **Half Diverging Diamond Interchange:** This option would eliminate the loop ramp and convert the existing interchange to a half diverging diamond interchange.
- **Directional Diamond Interchange:** This option would convert the existing layout to a directional diamond interchange.



2.2 ALTERNATIVES ANALYSIS CRITERIA

Several different criteria and measures of effectiveness were used to analyze the operations and feasibility of the alternatives and options in order to arrive at a recommended alternative. These are discussed in the following paragraphs.

2.2.1 PURPOSE AND NEED

The alternatives identified as possible solutions for the transportation needs of the area were evaluated for their ability to meet the purpose and need for the study area: i.e., to address the projected 2040 travel demand by providing LOS D or better on the I-15 corridor between MP 0 and MP 16.

Level 1 - Preliminary Traffic Analysis

The Level 1 Preliminary Traffic Analysis used the Highway Capacity Methodology (HCM) and the Highway Capacity Software (HCS) traffic modeling software to determine if alternatives met the Purpose and Need for the I-15 mainline. The alternatives were measured against the following measure of effectiveness:

- Provide LOS D or better for the I-15 mainline corridor between MP 0 and MP 16

What is the purpose of Highway Capacity Software (HCS)?

HCS is a traffic analysis software package that uses traffic volumes, roadway geometry, and vehicle speed parameters to measure lane occupancy and vehicle density to determine LOS.

Level 2 - Detailed Traffic Analysis

The Purpose & Need (Level 2 – Detailed Traffic Analysis) consisted of a more detailed traffic analysis that analyzed individual interchanges and the interstate/interchange system as a whole. For this analysis, Synchro, SimTraffic, and VISSIM microscopic traffic simulation software were used. These software packages provide a better system-wide analysis than HCS and were used to determine if the I-15 Mainline Alternative and interchange options met the Purpose and Need. The alternatives and options were measured against the following measures of effectiveness:

- Provide LOS D or better for the I-15 mainline corridor between MP 0 and MP 16
- Provide LOS D or better for all movements on ramp intersections for interchanges on I-15 between MP 0 and MP 16

2.2.2 INTERCHANGE DESIGN ANALYSIS

Design analysis is a measure of highway safety, the ability to meet applicable federal and state design standards, and satisfy driver expectancy. A design analysis was conducted by evaluating the crash history along the corridor and verifying that the design of each alternative met the latest American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the Utah Department of Transportation (UDOT) design criteria. Interchange options were measured against the following measures of effectiveness:

- Meet AASHTO and UDOT standards
- Meet FHWA 13 critical design criteria
- Meet driver expectancy

2.2.3 INTERCHANGE ENVIRONMENTAL ANALYSIS

Potential effects on existing environmental resources were used to measure the comparative impacts of the proposed interchange options. Interchange options were measured against the following criteria:

- **Threatened and Endangered Species**
 - Plants (Holmgren Milk-vetch and Dwarf Bear Claw Poppy): Measure acres of impacts to suitable habitat and designated critical habitat and number of individual plant impacts
 - Desert Tortoise: Measure acres of impacts to designated critical habitat
- **Cultural Resources**
 - Identify number of “adverse” effects
- **Section 4(f)**
 - Quantify number of non-*de minimis* uses
- **Wetlands and Waters of the U.S.**
 - Measure acreage and linear impacts

For more information on Threatened & Endangered Species, cultural resources, Section 4(f) resources, and wetlands and Waters of the U.S. see Chapter 3.

2.2.4 INTERCHANGE PHASING ANALYSIS

The ability to deliver the proposed project in multiple phases may be necessary in some instances to satisfy a funding or logistical constraint. For example, constructing a diamond interchange may be done through widening the existing bridge; whereas, constructing a SPUI interchange would require a total reconstruction at a much higher cost. Additionally, interchange improvements may be needed before a mainline widening is necessary and, therefore, a project that allows for the construction of the two separate elements would be beneficial.

2.2.5 COST

The cost of an alternative was not used as a specific screening criterion, but it was taken into consideration during the development of alternatives and options. One of the goals of the project, as described in Chapter 1, is to provide a transportation facility on I-15 between MP 0 and MP 16 that will meet current design standards set by UDOT and AASHTO, using as much of the existing infrastructure as practicable. This goal was implemented as the project team developed alternatives. By implementing this goal, cost savings were built into alternatives and options. A preliminary cost estimate for each interchange option was prepared and includes costs for construction, engineering, right-of-way, utility relocations, and mitigation.

2.3 ALTERNATIVES ANALYSIS

2.3.1 I-15 MAINLINE WIDENING ALTERNATIVE

The I-15 Mainline Widening Alternative provides LOS D or better for the I-15 mainline corridor between MP 0 and MP 16 based on the Level 1 - Preliminary Traffic Analysis; therefore, this alternative meets the Purpose and Need and will move forward for further study in this EA.

Several interchange design options were developed, as part of the I-15 Mainline Widening Alternative, for Brigham Road, St. George Boulevard, and SR-9. The interchange options were evaluated based on the criteria discussed in the previous section.

Brigham Road Interchange

See Table 2-2 for a summary of the interchange options analysis at Brigham Road.




Table 2-2 Brigham Road Interchange Options Analysis

Measure of Effectiveness		Interchange Options		
		Fly-Over	Single Point	Cross-Over
Purpose and Need (Level 2)	Provide LOS D or better for I-15 mainline	Yes	Yes	Yes
	Provide LOS D or better for all movements on ramp intersections	Yes	Yes	Yes
Operations Analysis	Meet AASHTO and UDOT standards	Yes	Yes	Yes
	Meet FHWA 13 critical design criteria	Yes	Yes	Yes
	Meet driver expectancy	Yes	Yes	No
Environmental Analysis	Threatened & Endangered Species (Plants) • Acres of Critical Habitat • No. of Individual Plants Impacted	<ul style="list-style-type: none"> • 0-acres • 0-plants 	<ul style="list-style-type: none"> • 0-acres • 0-plants 	<ul style="list-style-type: none"> • 0-acres • 0-plants
	Threatened & Endangered Species (Desert Tortoise) • Acres of Critical Habitat	<ul style="list-style-type: none"> • 0-acres 	<ul style="list-style-type: none"> • 0-acres 	<ul style="list-style-type: none"> • 0-acres
	Cultural Resources • Number of Adverse Effects to Eligible Resources	0	0	0
	Section 4(f) • Number of non- <i>de minimis</i> uses	0	0	0
	Wetlands and Waters of the U.S. • Acres and/or linear feet	0	0	0
Phasing	Project can be phased	Yes	No	Marginal
Cost Estimate	Measured in dollars, used as a comparative assessment when all other factors are equal (includes costs for construction, engineering, right-of-way, utility relocations, and mitigation)	\$30 M – \$40 M	\$25 M – \$35M	\$50 M – \$60 M

St. George Boulevard Interchange

See Table 2-3 for a summary of the interchange options analysis at St. George Boulevard.



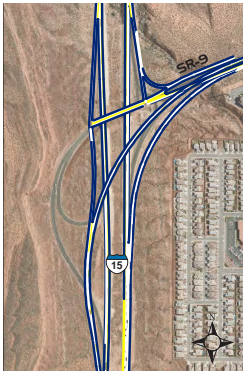
Table 2-3 St. George Boulevard Interchange Options Analysis

Measure of Effectiveness		Interchange Options		
		Diverging Diamond	Single Point	Tight Diamond
				
Purpose and Need (Level 2)	Provide LOS D or better for I-15 mainline	Yes	Yes	Yes
	Provide LOS D or better for all movements on ramp intersections	Yes	Yes	Yes
Operations Analysis	Meet AASHTO and UDOT standards	Yes	Yes	Yes
	Meet FHWA 13 critical design criteria	Yes	Yes	Yes
	Meet driver expectancy	Yes	Yes	Yes
Environmental Analysis	Threatened & Endangered Species (Plants) • Acres of Critical Habitat • No. of Individual Plants Impacted	• 0-acres • 0-plants	• 0-acres • 0-plants	• 0-acres • 0-plants
	Threatened & Endangered Species (Desert Tortoise) • Acres of Critical Habitat	• 0-acres	• 0-acres	• 0-acres
	Cultural Resources • Number of Adverse Effects to Eligible Resources	0	0	0
	Section 4(f) • Number of non- <i>de minimis</i> uses	0	0	0
	Wetlands and Waters of the U.S. • Acres and/or linear feet	0	0	0
Phasing	Project can be phased	Yes	No	Yes
Cost Estimate	Measured in dollars, used as a comparative assessment when all other factors are equal (includes costs for construction, engineering, right-of-way, utility relocations, and mitigation)	\$15 M – \$25 M	\$30 M – \$40 M	\$15 M – \$25 M

SR-9 Interchange

See Table 2-4 for a summary of the interchange options analysis at SR-9.

Table 2-4 St. SR-9 Interchange Options Analysis

Measure of Effectiveness		Interchange Options		
		Trumpet	Half Diverging Diamond	Directional Diamond
				
Purpose and Need (Level 2)	Provide LOS D or better for I-15 main-line	Yes	Yes	Yes
	Provide LOS D or better for all movements on ramp intersections	Yes	Yes	Yes
Operations Analysis	Meet AASHTO and UDOT standards	Yes	Yes	Yes
	Meet FHWA 13 critical design criteria	Yes	Yes	Yes
	Meet driver expectancy	Yes	No	Marginal
Environmental Analysis	Threatened & Endangered Species (Plants) • Acres of Critical Habitat • No. of Individual Plants Impacted	<ul style="list-style-type: none"> • 0-acres • 0-plants 	<ul style="list-style-type: none"> • 0-acres • 0-plants 	<ul style="list-style-type: none"> • 0-acres • 0-plants
	Threatened & Endangered Species (Desert Tortoise) • Acres of Critical Habitat	• 0.2-acres (does not include impacts as a result of cut and fill lines)	• 0.5-acres (does not include impacts as a result of cut and fill lines)	• 0.1-acres (Does not include impacts as a result of cut and fill lines)
	Cultural Resources • Number of Adverse Effects to Eligible Resources	7	7	7
	Section 4(f) • Number of non- <i>de minimis</i> uses	0	0	0
	Wetlands and Waters of the U.S. • Acres and/or linear feet	260-ft/0.03-acres	260-ft/0.03-acres	260-ft/0.03-acres
Phasing	Project can be phased	Yes	No	Yes
Cost Estimate	Measured in dollars, used as a comparative assessment when all other factors are equal (includes costs for construction, engineering, right-of-way, utility relocations, and mitigation)	\$35 M – \$45 M	\$40 M – \$50 M	\$55 M – \$65 M

2.3.2 SUMMARY OF INTERCHANGE OPTIONS ANALYSIS

Brigham Road Interchange

At Brigham Road, the alternatives analysis indicated that all interchange options were essentially equal in terms of the alternatives analysis criteria. The **SPI Option** was selected for the following reasons:

- The SPI Option provided for slightly better interchange driver expectancy than all other options. In addition, the SPI Option would also provide for better I-15 corridor driver expectancy because it would be similar to all other interchanges along the I-15 corridor.
- The current Brigham Road Interchange provides for roundabouts at the ramp intersections. UDOT has received several complaints about this interchange configuration from the public about the roundabouts being confusing. The SPI Option would eliminate the roundabouts and alleviate these public concerns.
- The SPI Option would accommodate heavy truck movements better than all other options.

The Fly-Over Option and the Cross-Over Option were eliminated because they did not provide the advantages as described for the SPI Option.

St. George Boulevard Interchange

At St. George Boulevard, the alternatives analysis indicated that all interchange options were essentially equal in terms of the alternatives analysis criteria. The **Diverging Diamond Option** was selected for the following reasons:

- The DDI Option can be phased.
- The DDI option meets the goal of the project to use as much of the existing infrastructure as practicable by utilizing the existing structure (see Chapter 1 for goals). Also, the DDI can be constructed with the existing bridge size.
- The DDI Option provides better traffic operations and performance than the Tight Diamond Option, and is comparable to the Single Point Option.

The Single Point Option and the Tight Diamond Option were eliminated because they did not provide the advantages as described for the Diverging Diamond Option.

SR-9 Interchange

At SR-9, the alternatives analysis indicated that all interchange options were essentially equal in terms of the alternatives analysis criteria. The **Trumpet Option** was selected for the following reasons:

- The Trumpet Option can be phased.
- The Trumpet Option meets the goal of the project to use as much of the existing infrastructure as practicable by closely matching the existing design layout/footprint.
- The Trumpet Option provides for free-flowing movements in all directions, which results in better traffic operations and performance as compared to all other options.
- The Trumpet Option provides for better safety since all conflicts are removed.

The Half Diverging Diamond Option and the Directional Diamond Option were eliminated because they did not provide the advantages as described for the Trumpet Option.

2.4 ALTERNATIVES SELECTED FOR DETAILED STUDY

The No-action Alternative and the I-15 Mainline Widening Alternative with the SPI Option at Brigham Road, the DDI Option at St. George Boulevard, and the Trumpet Option at SR-9 have been selected for further study.

2.4.1 NO-ACTION ALTERNATIVE

Under the No-action Alternative, no general roadway capacity improvements would be implemented in the study area. However, the No-action Alternative does assume that general maintenance and minor roadway and safety improvements needed to preserve the safe and efficient operation of the facility would be implemented. These would include activities such as pavement preservation, roadway shoulder widening, slope flattening, guardrail and cable barrier installations, clear zone improvements, and intersection timing and striping modifications. Some of these routine maintenance projects would include re-striping the southbound to eastbound movement on the Southern Parkway Interchange for three left-turn lanes and re-striping the Washington Parkway Interchange to add dual left-turn lanes and additional right-turn lanes on the ramp terminals.

Why was the No-action Alternative selected for detailed study?

The No-action Alternative satisfies the NEPA “no-action” requirement and will be used as a baseline to compare impacts of build alternatives.

The No-action Alternative assumes all other improvements planned by others to other roadway facilities near the study area, per the DMPO RTP and other local transportation plans, would be implemented. Some of these improvements would include:

- Bluff Street (SR-18) – Widen from Sunset Parkway to Main Street
- Construct Northern Washington Parkway from I-15 to SR-18
- Washington Parkway – Increase capacity between I-15 and Telegraph Street
- Western Corridor, from I-15 (MP 2) to Old Highway 91
- Pedestrian underpass at 400 South in St. George
- Overpass at 400 East in St. George
- Completion of the Southern Parkway between SR-9 and I-15

All of these activities would likely have some environmental impact. Detailed effects of these activities, to be performed by others, would be evaluated as part of the NEPA process for these particular projects. General effects associated with the No-action Alternative are discussed in Chapter 3: Affected Environment and Environmental Consequences.

2.4.2 I-15 MAINLINE WIDENING ALTERNATIVE

The I-15 Mainline Widening Alternative (see Volume 2 for detailed figures) includes:

- Constructing one additional general purpose lane on I-15 in both the northbound and southbound directions between Southern Parkway and SR-9
- Constructing auxiliary lanes between the Port-of-Entry and Southern Parkway, between Brigham Road and Dixie Drive, and between Washington Parkway and SR-9
- Removing the existing roundabouts and constructing a SPI at the Brigham Road Interchange
- Replacing the I-15 bridges over the Virgin River
- Converting the existing diamond interchange to a diverging diamond interchange at the St. George Boulevard Interchange
- Constructing an I-15 overpass at Mall Drive
- Re-configuring the Red Hills Parkway/Green Springs Drive intersection to a thru-turn configuration
- Improving the SR-9 Interchange by improving the southbound exit deceleration coming into the loop ramp, upgrading the loop ramp geometry, creating a three lane exit ramp northbound, creating a two lane entrance ramp southbound, and creating additional lanes on SR-9 between the I-15 Interchange and the Coral Canyon Interchange.

Construction Phasing

The I-15, MP 0 to MP 16 project is anticipated to be constructed in phases as funding becomes available. Some improvements could occur within five years, while other improvements could happen over the next 15 to 20 years.

Phase 1

Based on anticipated traffic needs, some of the earliest improvements (**Phase 1: 2012–2020**) could include:

- St. George Boulevard Interchange reconstruction
- Additional general purpose lanes on I-15 between St. George Boulevard and Green Springs Drive
- I-15 overpass at Mall Drive
- Thru-turns at Green Springs Drive
- Improvements to the SR-9 Interchange

Phase 2

Intermediate improvements (**Phase 2: 2020–2030**) could include:

- Brigham Road Interchange reconstruction
- Replacement of the I-15 bridges over the Virgin River
- Auxiliary lanes and additional general purpose lanes between Brigham Road and Dixie Drive
- Additional general purpose lanes on I-15 between Bluff Street and St. George Boulevard
- Additional general purpose lanes on I-15 between Green Springs Drive and SR-9

Phase 3

Improvements that would need to occur after Phase 1 and Phase 2 improvements, but before 2040 (**Phase 3: 2030–2040**) include:

- Auxiliary lanes between the Port-of-Entry and Southern Parkway
- Additional general purpose lanes on I-15 between Southern Parkway and Brigham Road
- Southbound auxiliary lane on I-15 between SR-9 and Washington Parkway
- Final improvements to the SR-9 Interchange

Cost

A preliminary cost estimate was prepared for the Preferred Alternative and included costs for construction, engineering, right-of-way, utility relocations, and mitigation (see Table 2-5).

Table 2-5 Preliminary Cost Estimate

Improvement	Cost (\$M)
Phase 1	
St. George Boulevard interchange reconstruction	20.7
Additional general purpose lanes on I-15 between St. George Boulevard and Green Springs Drive and I-15 overpass at Mall Drive	73.6
Thru-turns at Green Springs Drive	3.4
Initial SR-9 Interchange improvements	31.3
Phase 1 Total:	129
Phase 2	
Brigham Road Interchange reconstruction	31.4
Auxiliary lanes and additional general purpose lanes between Brigham Road and Dixie Drive and Virgin River Bridge replacements	50.9
Additional general purpose lanes on I-15 between Bluff Street and St. George Boulevard and between Green Springs Drive and SR-9	190.5
Phase 2 Total:	272.8
Phase 3	
Additional general purpose lanes on I-15 between Southern Parkway and Brigham Road and auxiliary lanes between the Port-of-Entry and Southern Parkway	78.8
Final improvements to SR-9 Interchange and southbound auxiliary lane on I-15 between SR-9 and Washington Parkway	12
Phase 3 Total:	90.8
TOTAL:	492.6

Design Exceptions

The Preferred Alternative would require the following design exceptions (see Appendix A for the Design Exception/Design Waiver from UDOT Standards):

- The Preferred Alternative would maintain the existing deficient vertical clearances at the following locations in order to avoid reconstructing otherwise structurally sufficient bridges:
 - I-15 bridge over 700 South in St. George
 - I-15 bridge over 100 South in St. George
 - St. George Boulevard Bridge under I-15 in St. George
 - I-15 bridge over Washington Main Street in Washington City
- The Preferred Alternative would maintain the existing deficient vertical grades (flatter than 0.3%) in some locations. The UDOT Standard is 0.3% minimum.
- The Preferred Alternative would match existing deficient superelevation rates in some locations.
- The Preferred Alternative would match the existing deficient vertical alignment at approximately MP 0.

Related Actions by Others

There are several projects in the study area that are related to the I-15 MP 0 to MP 16 project but are not part of the I-15 Mainline Widening Alternative. These projects would not be required for the I-15 Mainline Widening Alternative to operate, nor would the I-15 Mainline Widening Alternative be required for the operation of the related projects. All of these activities would likely have some environmental impact. Detailed effects of these activities, to be performed by others, would be evaluated as part of the NEPA process. These projects include:

- Constructing a pedestrian underpass at 400 South in St. George
- Constructing an overpass at 400 East in St. George
- Improving the intersections at 1000 East and River Road on St. George Boulevard
- Improving the intersection at Telegraph Street on Green Springs Drive
- Converting the existing roundabout on the east side of the Washington Parkway Interchange to a signalized intersection

2.5 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

UDOT has identified the I-15 Mainline Widening Alternative with the SPI Option at Brigham Road, the DDI Option at St. George Boulevard, and the Trumpet Option at SR-9 as the alternative which best meets the project purpose and need and includes measures to minimize impacts to environmental resources. Therefore, UDOT has selected the I-15 Mainline Widening Alternative as their Preferred Alternative.