



Technical Memorandum 29: Shepard Lane Interchange Section 404(b)(1) Practicability and NEPA Reasonable Alternative Analysis

in support of the
Environmental Impact Statement
and Clean Water Act Section 404 Permit

West Davis Corridor Project

Federal Highway Administration
Utah Department of Transportation



UDOT Project No. S-0067(14)0

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February 20, 2017

Executive Summary

Introduction

The Utah Department of Transportation (UDOT) and the Federal Highway Administration (FHWA) are proposing a project (the West Davis Corridor) to improve regional mobility in Davis and Weber Counties, Utah. These lead agencies, together called the West Davis Corridor (WDC) team, are preparing the West Davis Corridor Final Environmental Impact Statement (EIS), which will evaluate different alternatives for meeting the purpose of the project. At the end of the EIS process, FHWA and UDOT will select a preferred WDC alternative

What is the purpose of this practicability analysis?

The purpose of this analysis is to ensure that the least environmentally damaging practicable alternative—the only project alternative that can be permitted by the Corps of Engineers—is evaluated in detail in the Environmental Impact Statement for the West Davis Corridor Project.

As part of the EIS process, the WDC team is preparing this practicability and National Environmental Policy Act (NEPA) reasonable alternative analysis for the Shepard Lane interchange option to provide information to FHWA and the U.S. Army Corps of Engineers (USACE). For FHWA, this analysis will help FHWA determine whether the Shepard Lane interchange option is a reasonable option to be carried forward for detailed study in the Final EIS. For USACE, this analysis will help USACE ensure, based on Section 404 of the Clean Water Act, that the least environmentally damaging practicable alternative is carried forward for detailed study in the Final EIS.

Section 404(b)(1) Practicability Analysis

After the Draft EIS was published, UDOT began a more detailed evaluation of the Shepard Lane and Glover Lane interchange options in accordance with FHWA's review process for modifying access to the interstate system. UDOT cannot add points of access to, or exits from, an interstate without approval from FHWA. FHWA has an interest in ensuring that the National Interstate Highway System provides the "highest level of service in terms of safety and mobility." FHWA's decision to approve new or revised access points to an interstate highway must be supported by substantiated information justifying and documenting that the proposed designs maintain the safety and performance of the highway system. This information was compiled in a Draft Interstate Access Change Request that evaluated whether the Shepard Lane and Glovers Lane options met FHWA's requirements for access to the interstate system.

In its review, FHWA concluded that the Shepard Lane option could not satisfy all eight policy points of its Interstate Access Policy Statement because the option would adversely affect the safety and operations of Interstate 15 (I-15) and does not meet design standards (See Appendix B, Correspondence). One of the major deficiencies of the Shepard Lane design was that it does not comply with the *Manual on Uniform Traffic Control Devices*, or

MUTCD. The *MUTCD* is the law governing all traffic control devices. It is a federal standard used by highway officials nationwide to install and maintain traffic control devices on all streets and highways open to public travel. The *MUTCD* is published by FHWA under 23 Code of Federal Regulations (CFR), Part 655, Subpart F (UDOT 2011). Noncompliance with the *MUTCD* ultimately can result in loss of federal-aid funds and would be in violation of Utah code and standards.

Because the Shepard Lane option does not meet the *MUTCD* and other design standards, FHWA could not approve the Shepard Lane option. Since this option is no longer available, it is not considered practicable under the USACE Section 404(b)(1) guidelines.

NEPA Reasonable Alternative Analysis

FHWA and UDOT have determined that the Shepard Lane interchange option is not a reasonable option to be carried forward for detailed study in the Final EIS because of the following issues:

1. The interchange would not satisfy all eight policy points of FHWA's Interstate Access Policy Statement, which include meeting minimum design standards required by FHWA and UDOT for safety, operation, and traffic performance.
2. The interchange's cost would be \$50 million more than that of the Shepard Lane interchange option evaluated in the Draft EIS.
3. The interchange would have the following additional impacts compared to the Shepard Lane interchange option evaluated in the Draft EIS:
 - a. The 200 West overpass ramp to I-15 and the Glovers Lane overpass would need to be replaced.
 - b. Four homes east of I-15 near Glovers Lane would need to be acquired.
 - c. The Farmington Creek Trail and Ezra T. Clark Park would be impacted.
 - d. The Lagoon amusement park entrance, two buildings, portions of the parking lot, and a bus dropoff would be impacted.
 - e. Additional freeway support walls would need to be built.

The WDC team's determination was based primarily on the Shepard Lane interchange option not meeting all eight policy points of FHWA's Interstate Access Policy Statement, which requires compliance with minimum design standards for safety, operation, and traffic performance. The WDC team also considered the design with regard to drivers' expectations, the additional property acquisitions (business, residential, and park), and higher cost.

Based on all of these factors, the Shepard Lane interchange option will not be carried forward as a reasonable option in the Final EIS.

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1.0 Introduction

The Utah Department of Transportation (UDOT) and the Federal Highway Administration (FHWA) are proposing a project (the West Davis Corridor) to improve regional mobility in Davis and Weber Counties, Utah. These lead agencies, together called the West Davis Corridor (WDC) team, are preparing the West Davis Corridor Environmental Impact Statement (EIS), which will evaluate different alternatives for meeting the purpose of the project. All of the WDC action alternatives advanced for detailed study in the EIS have a southern interchange with Interstate 15 (I-15) at either Glovers Lane or Shepard Lane in Farmington. See Figure 1 below for a map of the project study area.

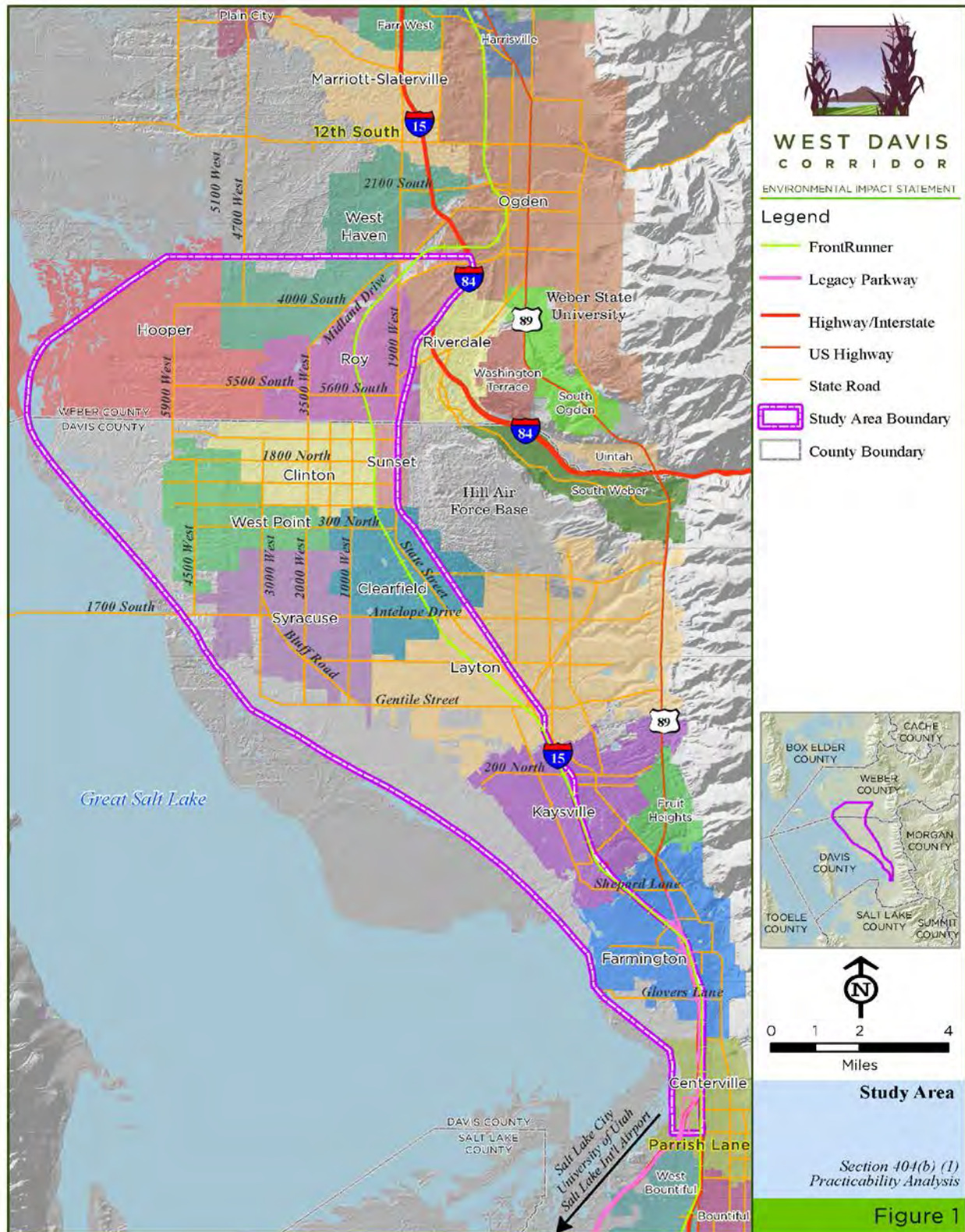
After the Draft EIS was published in May 2013, UDOT began a more detailed evaluation of the Shepard Lane and Glover Lane interchange options in accordance with FHWA's process for modifying access to the interstate system. UDOT cannot add points of access to, or exits from, an interstate without approval from FHWA. FHWA has an interest in ensuring that the National Interstate Highway System provides the "highest level of service in terms of safety and mobility." FHWA's decision to approve new or revised access points to an interstate highway must be supported by substantiated information justifying and documenting that the proposed designs maintain the safety and performance of the highway system. This information was compiled in a Draft Interstate Access Change Request that evaluated whether the Shepard Lane and Glovers Lane options met FHWA's requirements for access to the interstate system (UDOT 2016).

UDOT's analysis of the Shepard Lane and Glovers Lane interchange options also included updated traffic data from the Wasatch Front Regional Council's (WFRC) 2015–2040 Regional Transportation Plan (RTP), which was adopted after the Draft EIS was published in 2013. During this interchange evaluation process, UDOT identified several issues with the Shepard Lane interchange option's adherence to safety standards.

Therefore, the WDC team is preparing this Section 404(b)(1) practicability and National Environmental Policy Act (NEPA) reasonable alternative analysis for the Shepard Lane interchange option to provide information to FHWA and the U.S. Army Corps of Engineers (USACE). For FHWA, this analysis will help FHWA determine whether the Shepard Lane interchange option is a reasonable option to be carried forward for detailed study in the Final EIS. For USACE, this analysis will help USACE ensure, based on the Section 404 of the Clean Water Act, that the least environmentally damaging practicable alternative is carried forward for detailed study in the Final EIS.

Section 1.1 discusses the requirements of the Section 404(b)(1) guidelines of the Clean Water Act. Section 1.2 discusses the requirements of Section 6002 of SAFETEA-LU (the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) that pertain to this practicability analysis.

Figure 1. Study Area



1.1 Requirements of the Clean Water Act

Since USACE makes official determinations under the Section 404(b)(1) guidelines of the Clean Water Act, the WDC team considered the requirements of the Clean Water Act as part of the evaluation of alternatives during the EIS process. The Section 404(b)(1) guidelines state that “no discharge of dredged or fill material [to Section 404–regulated waters] 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” [40 Code of Federal Regulations (CFR) Section 230.10(a)].

USACE must prepare a Section 404(b)(1) practicability analysis in connection with its decision of whether to grant a Clean Water Act permit for the selected WDC alternative. The Section 404(b)(1) guidelines require USACE to consider “practicable” alternatives for avoiding or minimizing harm to waters of the U.S. USACE’s regulations recommend that applicants for individual permits, such as those that would be required for the WDC Project, engage in pre-application consultation with USACE to discuss the level of NEPA review required, the information needed for decision-making, other agency reviews and approvals needed, and the overall process to be followed.

The term *practicable* means “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” The Clean Water Act guidelines create a presumption that practicable avoidance alternatives are available for non-water-dependent projects. Highway and transit projects generally are not water-dependent. This presumption places the burden on the applicant to demonstrate that there are no practicable alternatives that avoid “special aquatic sites.” (With regard to the WDC Project, “special aquatic sites” include wetlands and some wildlife refuges.) The level of analysis and proof required varies depending on the project and the nature of the anticipated effects of the project.

1.2 Requirements of SAFETEA-LU

In addition, Section 6002 of SAFETEA-LU established an environmental review process that must be followed when FHWA prepares an EIS for a highway project. In addition to NEPA compliance, the environmental review process under Section 6002 must include the “process for and completion of any environmental permit, approval, review, or study required for a project under any Federal law other than [NEPA].” Thus, USACE’s permitting actions must be addressed as part of the Section 6002 process. The process requires an “opportunity for involvement” by participating agencies and the public at two milestones: defining the purpose of and need for the project and determining the range of alternatives to be studied.

The lead agencies are also required, as part of the environmental review process, to determine, in collaboration with the participating agencies, the appropriate methodologies to be used and the level of detail required in the analysis of alternatives. The SAFETEA-LU Environmental Review Process Final Guidance says that “collaboration means a cooperative and interactive process. It is not necessary for the lead agency to reach consensus with the

participating agencies on these issues; the lead agency must work cooperatively with the participating agencies and consider their views, but the lead agency remains responsible for decisionmaking.” The FHWA guidance states that the lead agencies should solicit public and agency input regarding what methodologies will be used to evaluate important issues.

2.0 Methodology

This section explains how the WDC team evaluated whether the Shepard Lane interchange option is practicable under the Section 404(b)(1) guidelines and reasonable under NEPA.

2.1 Section 404(b)(1) Practicability Methodology

This section explains how the WDC team evaluated whether the Shepard Lane interchange option is practicable under the Section 404(b)(1) guidelines. The term *practicable* means “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” In working with USACE and the U.S. Environmental Protection Agency (EPA), the WDC team focused this practicability analysis on the logistical constraints of the Shepard Lane interchange. There are no constraints of existing technology that would make the interchange impossible to construct.

There is no definition of *logistics* in the Clean Water Act, nor have USACE or EPA issued guidance defining the term. For this practicability analysis, *logistics* is defined as “the planning, implementation, and coordination of an operation.”

The WDC team evaluated logistics constraints to determine whether the Shepard Lane interchange option could be designed to meet safety standards. Safety logistical constraints were evaluated based on the following two considerations:

1. Whether the proposed interchange could meet capacity requirements (level of service D) in 2040 and meet the overall project purpose and need of reducing delay and congestion in the WDC study area (see Figure 1 on page 2 for a map of the study area)
2. Whether the new interchange could be designed to meet the minimum design standards required by FHWA and UDOT for safety, operation, and traffic performance

2.2 NEPA Reasonable Alternative Methodology

According to NEPA regulations (40 CFR Parts 1500–1508 and 23 CFR Part 771) and guidance from FHWA and the Council on Environmental Quality, there are three primary reasons why an alternative might be determined to be not reasonable and eliminated from further consideration:

1. The alternative does not satisfy the purpose of and need for the project.
2. The alternative is determined to be not practical or feasible from a technical and/or economic standpoint.
3. The alternative substantially duplicates another alternative; that is, it is otherwise reasonable but offers little or no advantage for satisfying the project's purpose, and it has impacts and/or costs that are similar to or greater than those of other, similar alternatives

For the analysis of whether the Shepard Lane interchange option is reasonable under NEPA, the WDC team looked at the following four factors (the first two of which are the same as for the Section 404(b)(1) practicability analysis):

1. Whether the proposed interchange could meet capacity requirements (level of service D) in 2040 and meet the overall project purpose and need of reducing delay and congestion in the WDC study area
2. Whether the new interchange could be designed to meet the minimum design standards required by FHWA and UDOT for safety, operation, and traffic performance
3. Whether there would be substantial relocation impacts to residential and business properties
4. Whether the alternative would be cost-prohibitive

3.0 Background on the WDC Interchange Analysis

3.1 System-to-System Interchange Options in the Draft EIS

The WDC Draft EIS was released in May 2013 and included two system-to-system (WDC to I-15) interchange options in Farmington: one at Glovers Lane and one at Shepard Lane. Both interchange options would meet the project's purpose; however, as documented in *Technical Memorandum 19: Traffic Performance and Engineering Design of the Shepard Lane and Glovers Lane Area Alternatives*, UDOT noted several concerns with the Shepard Lane interchange.

1. The interchange would operate within 5–10% of its maximum traffic capacity.
2. The interchange would not meet drivers' expectations for system-to-system interchanges.
3. The interchange signs might not meet standards. The short length of one collector-distributor road might not allow the full spacing of all recommended signs for the major split between freeways. Signing can likely be accomplished, but the limited space might require exceptions to spacing standards.
4. The decision sight distances would be deficient. A few areas would be deficient, but the sight distances could be mitigated and made acceptable with signs: the southbound collector-distributor road to the Shepard Lane exit, the southbound WDC split, the area approaching the Shepard Lane local interchange (northbound and southbound), and the Park Lane to northbound collector-distributor road.
5. The interchange complexity would be difficult for drivers to navigate. Overall, there would be a lot going on in a relatively short segment, with Interstate 15 (I-15), U.S. Highway 89 (US 89), Legacy Parkway, the WDC, and two local interchanges all converging within a 2-mile stretch. Some maneuvers would be more complex than others, and the design simplifies and mitigates some of the complexity. However, the overall driver demands, combined with a relatively short space and heavy traffic, add complexity. The significant curve along I-15 with many existing structures also contributes to this complexity.
6. The interchange would increase the risk of vehicles hitting existing bridges. There is already some risk because of the minimal extra space under several existing Legacy Parkway/US 89 bridges. Also, these bridges are very large.
7. The interchange would not provide an independent bypass route. WDC access from and to I-15 does not require Legacy. WDC access from and to Legacy does not require I-15. Bypass routes include collector-distributor roads separated from mainline, but close parallel proximity curtails independence.
8. The transportation performance of the interchange would be lower than that of the Glovers Lane interchange. The Glovers Lane interchange would perform better than the Shepard Lane interchange for every measure, having higher speeds, reduced travel times, and substantially less delay.

9. The interchange would require relocating two existing rail lines: the Utah Transit Authority (UTA) FrontRunner commuter-rail line and a freight rail line.

Figure A-1 in Appendix A, Figures, shows the design of the Shepard Lane interchange option. The Shepard Lane interchange option would provide a collector-distributor road in both the northbound and southbound directions. Connections for traffic movements between I-15, Legacy Parkway, and the WDC would be full system connections. Local connections to and from Shepard Lane and Park Lane would also be provided. Existing railroad tracks would be shifted to the west to allow necessary ramps in the southbound direction.

As shown in Figure A-1, the Shepard Lane interchange would be constructed at the intersection of three existing major roads: I-15, Legacy Parkway, and US 89. In addition, this location includes one existing local interchange, Park Lane, and a planned future local interchange, Shepard Lane. Additionally, the interchange location includes two rail lines (one used for freight and one used for commuter traffic) and includes one commuter-rail station.

The Glovers Lane interchange option evaluated in the Draft EIS did not have any of these capacity or safety issues.

3.2 Evaluation of System-to-System Interchange Options after the Draft EIS

Modifications after the Draft EIS. After the Draft EIS was published in May 2013, WFRC released a new RTP and travel demand model in 2015. The WDC team decided that all travel demand modeling conducted for the Final EIS would be updated using the new model (version 8.1; the Draft EIS modeling used version 7).

The updated modeling showed that the Glovers Lane interchange in the Final EIS would meet the purpose and need criteria, but several of the WDC team's concerns about the Shepard Lane interchange during the Draft EIS evaluation were further highlighted:

- The interchange would exceed capacity and cause level of service F conditions on I-15 and US 89.
- The transportation performance of the interchange would be further reduced.

To determine whether the Shepard Lane interchange could be modified to address the capacity issue and the failure conditions on I-15 and US 89 the WDC team modified the Shepard Lane interchange design to meet the capacity and level of service requirements and improve signing issues within the constraints of the existing interstate system. However, the interchange design still would not meet the signing standards and would cause additional impacts (see Figure A-2 in Appendix A, Figures).

After the modifications the Shepard Lane interchange option still had the following issues:

1. The interchange would violate *Utah MUTCD* signing standards (see Section 4.1, Signing Standards). Overall, 32 signing violations were noted.
2. The interchange would not meet drivers' typical expectations for similar interchanges.
3. The interchange would not meet state and federal standards for left exits, lane balance, and curve radius.
4. The interchange, being in close proximity to the US 89/Legacy Parkway/I-15 interchange, would require extensive weaving, increasing the potential for crashes.
5. The interchange's cost would be \$50 million more than the Shepard Lane interchange option evaluated in the Draft EIS.
6. The interchange would have the following additional impacts compared to the Shepard Lane interchange option evaluated in the Draft EIS:
 - a. The 200 West overpass ramp to I-15 and the Glovers Lane overpass would need to be replaced.
 - b. Four homes east of I-15 near Glovers Lane would need to be acquired.
 - c. The Farmington Creek Trail and Ezra T. Clark Park would be impacted.
 - d. The Lagoon amusement park entrance, two buildings, the parking lot, and a bus dropoff would be impacted.
 - e. Additional freeway support walls would need to be built.

FHWA Interstate Modification Process. With the updated Shepard Lane interchange design, UDOT began a more detailed evaluation of the Shepard Lane and Glover Lane interchange options in accordance with FHWA's review process for modifying access to the interstate system. UDOT cannot add points of access to, or exits from, an interstate without approval from FHWA. FHWA has an interest in ensuring that the National Interstate Highway System provides "the highest level of service in terms of safety and mobility." FHWA's decision to approve new or revised access points to an interstate highway must be supported by substantiated information justifying and documenting that the proposed designs maintain the safety and performance of the highway system. In preparing this information for FHWA, the UDOT Traffic and Safety Division performed a detailed review of interstate signing in September 2016 (see Appendix B, Correspondence). This review identified the following issues regarding the Shepard Lane interchange:

- The proposed interchange geometry would not allow signs to be placed in general conformance with the *Utah Manual on Uniform Traffic Control Devices for Streets and Highways (Utah MUTCD; UDOT 2000)*. For more information about this standard, see Section 4.1, Signing Standards.
- Two northbound system interchanges on I-15—US 89 and the northbound collector-distributor/WDC—are too close to provide conforming and effective signs.

- Violation of signing standards include:
 - Advance guide sign location and configuration in the northbound and southbound directions (I-15, Legacy Parkway, Shepard Lane, and the WDC).
 - The required amount of legend (the number of words/messages) included on a single sign would be excessive.
 - The required ½ mile and 1 mile distances for advance signs are not met for two exits (WDC and Shepard Lane).
 - Mixing of city and street name on legends for advance guide signs
 - Drivers' expectations would be violated with left exits and closely spaced exits.
- There is insufficient space to inform drivers on the northbound I-15 mainline how to navigate through the northbound collector-distributor road weaving section.
- The signs would not convey a clear, simple meaning and would cause information overload for drivers.
- With the large number of signs required to provide proper driver information and guidance, the 800-foot minimum spacing between signs could not be achieved. (In addition to the interchange guide signs, other additional signs would be required, including service signs, truck restriction signs for Legacy Parkway, variable message signs, logo signs, regulatory signs, warning signs, supplemental guides, and destination signs.)
- Exit number would be inconsistent.
- Signage for the frontage road north of Shepard Lane would be problematic since the road would be accessed from the freeway entrance ramp.
- Overall, the signs required for the Shepard Lane interchange design would not meet the minimum standards of the *Utah MUTCD*.

The review of the Glovers Lane interchange by the UDOT Traffic and Safety Division found that the interchange could be signed in conformance with the *Utah MUTCD*.

4.0 Section 404(b)(1) Practicability Analysis

UDOT submitted an Interstate Access Change Request (IACR) to FHWA in December 2016 in support of the EIS for the WDC Project. The IACR was prepared in accordance with the FHWA Utah Division's *Interstate Access Change Request Guidance Document* (April 2015). The primary focus of the IACR was an analysis of the eight policy points of FHWA's Interstate Access Policy Statement, as revised on August 18, 2009. The analysis in the IACR showed that the proposed Shepard Lane interchange option does not comply with Policy Points 3 (Operations and Safety) and 4 (Full Access/Standards Compliance) because it would adversely affect the safety and operations of I-15 and does not meet design standards.

- **Policy Point 3.** The safety analysis showed that the proposed Shepard Lane interchange would have a significant adverse impact on the safety and operations of I-15. This impact would be due to the interchange being located within ½ mile of the US 89 and Legacy Parkway system-to-system interchanges and the Park Lane and Shepard Lane local interchanges. This configuration results in a very complex interchange design that violates state and federal standards and guidance. The design would require design waivers; would violate driver expectancy, interchange spacing, and lane balance; would require extensive weaving; and would not conform to all of the standards and guidance of the Utah *Manual on Uniform Traffic Control Devices* (*Utah MUTCD*) signing standards (see Section 4.1, Interstate Signing Standards).
- **Policy Point 4.** The Shepard Lane interchange would provide system-to-system connections for three of five movements with directional ramps and collector-distributor roads. The two non-system movements would be provided through a local interchange and a signalized, local street network. The standards compliance review showed that the interchange design does not meet all state and federal standards.

4.1 Interstate Signing Standards

4.1.1 Signing Regulations

The *Manual on Uniform Traffic Control Devices*, or *MUTCD*, defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public travel. The *MUTCD* is published by the FHWA under 23 Code of Federal Regulations (CFR), Part 655, Subpart F.

The *MUTCD*, which has been administered by FHWA since 1971, is a compilation of national standards for all traffic control devices, including road markings, highway signs, and traffic signals. It is updated periodically to accommodate the nation's changing transportation needs and address new safety technologies, traffic control tools and traffic management techniques.

The *MUTCD* is approved by the Federal Highway Administrator as the National Standard in accordance with Title 23 U.S. Code, Sections 109(d), 114(a), 217, 315, and 402(a), 23 CFR 655, and 49 CFR 1.48(b)(8), 1.48(b)(33), and 1.48(c)(2). On December 16, 2009, a final rule

adopting the 2009 Edition of the *MUTCD* was published in the Federal Register with an effective date of January 15, 2010. FHWA has also approved the *Utah MUTCD* as adopted in Utah Administrative Code R920-1 for the selection, design, and placement of traffic control devices. For new highways such as WDC, the *MUTCD* notes:

23 CFR §655.603 Standards (d)(2) New or reconstructed highways. Federal-aid projects for the construction, reconstruction, resurfacing, restoration, or rehabilitation of streets and highways shall not be opened to the public for unrestricted use until all appropriate traffic control devices, either temporary or permanent, are installed and functioning properly. Both temporary and permanent devices shall conform to the *MUTCD*.

The traffic-control devices (TCD) are critical for the safe and efficient transportation of people and goods. The *MUTCD*, by setting minimum standards and providing guidance, ensures the uniformity of TCDs across the nation. The use of uniform TCDs (messages, location, size, shapes, and colors) helps reduce crashes and congestion and improves the efficiency of the surface transportation system. Uniformity also helps reduce the cost of TCDs through standardization. The information in the *MUTCD* is the result of years of practical experience, research, and/or the *MUTCD* experimentation process. This effort ensures that TCDs are visible, recognizable, understandable, and necessary. Key points of the *MUTCD* are as follows:

- The *MUTCD* contains the national standards governing all TCDs. All public agencies and owners of private roads open to public travel across the nation rely on the *MUTCD* to bring uniformity to the roadway. The *MUTCD* plays a critical role in improving the safety and mobility of all road users.
- The *MUTCD* is the law governing all TCDs. Non-compliance with the *MUTCD* ultimately can result in loss of federal-aid funds as well as significant increase in tort liability.
- Uniformity of TCDs is critical in highway safety and mobility as well as in cutting capital and maintenance costs of TCDs for public agencies and manufacturers.

4.1.2 Signing Evaluation

The Shepard Lane interchange is not in substantial conformance with the *Utah MUTCD*. A review of the current interstate signing plans identified 32 violations. The deficiencies are primarily due to the excessive number of destinations in close proximity to the WDC and US 89/Legacy Parkway system-to-system interchanges and the Park Lane and Shepard Lane local interchanges. Additionally, advance signing for destinations served by the collector-distributor roads is deficient due to the short length of these roads and sign placement constraints caused by the adjacent US 89/Legacy Parkway system-to-system interchange.

As stated in Section 3.2, Evaluation of System-to-System Interchange Options After the Draft EIS, the UDOT Traffic and Safety Division's review of the Shepard Lane interchange option found that the interchange would be in violation of *Utah MUTCD* standards. The signing standards could not be met because of the close proximity of the I-15, US 89, Legacy

Parkway, and Park Lane interchanges to the proposed WDC Shepard Lane interchange. FHWA's review also found that the Shepard Lane interchange option would violate *MUTCD* standards. FHWA found significant concerns regarding the Shepard Lane interchange including compliance with State and Federal standards, compliance with *MUTCD* standards, and left-hand exit and lane balance issues violate driver expectancy. FHWA concluded that the Shepard Lane alternative is not acceptable for engineering and operations reasons (See Appendix B, Correspondence).

4.2 Other Standards

Driver Expectancy

The proposed Shepard Lane interchange design requires multiple movements that are not typically expected by drivers at system-to-system interchanges. These movements include:

- A left exit from the southbound collector-distributor to Shepard Lane (which is also the system-to-system connection from I-15 to northbound WDC).
- A left exit from southbound WDC to Shepard Lane (which is the system-to-system connection to northbound I-15).
- Southbound vehicles on I-15 heading to Park Lane must exit 1.9 miles in advance, north of Shepard Lane.
- Northbound vehicles on I-15 heading to Shepard Lane must make as many as three lane changes within 0.5 mile to make the exit. Advance guide signs from I-15 cannot communicate this to drivers.
- Northbound vehicles from Legacy Parkway heading to the WDC must make as many as two lane changes within 2,000 feet to make the exit. To help mitigate this, a 0.5-mile advance guide sign has been included to help drivers start this maneuver early.
- Northbound vehicles from Park Lane to the WDC must make as many as three lane changes within 0.6 mile to make the exit. Signing for two of these lane changes cannot be placed until a point 2,000 feet in advance of the exit.

Considering the above atypical and unexpected movements, the Shepard Lane interchange design does not fully comply with guidance for driver expectancy.

Proximity to Adjacent Interchanges

The Shepard Lane interchange would be located less than 0.5 mile north of the US 89/Legacy Parkway system-to-system interchange and would be between two local interchanges (Park Lane and Shepard Lane) that are spaced 1.2 miles apart. This essentially places three interchanges within the limits of the Shepard Lane system-to-system interchange. In this location, room is not available for directional ramps that would allow for conventional merge and diverge areas.

To accommodate traffic to and from the various interchanges, the Shepard Lane interchange must rely on collector-distributor roads that provide less than 0.5 mile for system-to-system and local interchange movements. This would result in a very constrained and complex interchange and would require extensive weaving with a high potential for vehicle conflicts. The Shepard Lane interchange location does not comply with American Association of State Highway and Transportation Officials (AASHTO) and FHWA guidance of at least 1 mile of spacing between interchanges.

Lane Balance

The Shepard Lane interchange conforms to lane balance requirements on all on- and off-ramps to and from I-15. The southbound collector-distributor road also meets lane balance requirements. However, the northbound collector-distributor road does not meet lane balance requirements at the WDC/I-15 split because its four lanes split into two for the WDC and two for I-15. In order to conform to requirements, the collector-distributor road would need to be only three lanes; however, it would not then be able to accommodate traffic volumes. Because of this deficiency, vehicles would need to make additional lane changes to reach their destination, thereby increasing the potential for vehicle conflicts.

Weaving and Potential for Crashes

The Shepard Lane interchange uses collector-distributor roads to provide the various movements among I-15, Legacy Parkway, the WDC, Park Lane, and the future Shepard Lane local interchange. Consequently, each collector-distributor road becomes a weaving section that must accommodate numerous lane changes.

During the PM peak hour, 4,451 lane changes are predicted to occur on the collector-distributor road. This averages to 1.2 lane changes per second. Note that the number of vehicles in this weaving section (4,850) is actually higher than the number of vehicles on mainline I-15 (4,630). The complexity of the weaving section, combined with the high volume of traffic and the high number of lane changes, demonstrate a high potential for crashes. Since this collector-distributor road is a critical common link among I-15, Legacy Parkway, and the WDC, there would be a high potential for shutting down or severely restricting each of these corridors.

4.3 Section 404(b)(1) Practicability Summary

Because the Shepard Lane interchange option does not comply with FHWA Interstate Access Policy Points 3 (Operations and Safety) and 4 (Full Access/Standards Compliance) including *MUTCD* standards, FHWA could not approve the Shepard Lane option. Since this interchange option is no longer available, it is not considered practicable under the USACE Section 404(b)(1) guidelines.

5.0 NEPA Reasonable Alternative Analysis

5.1 FHWA IACR

See Section 4.0, Section 404(b)(1) Practicability Analysis, for the analysis of the Shepard Lane interchange option with regard to the analysis of the eight policy points of FHWA's Interstate Access Policy Statement, as revised on August 18, 2009. The analysis in the IACR showed that the proposed Shepard Lane interchange option does not comply with Policy Points 3 (Operations and Safety) and 4 (Full Access/Standards Compliance) because it would adversely affect the safety and operations of I-15 and does not meet design standards.

5.2 Impacts

The modified Shepard Lane interchange option (see Section 3.2, Evaluation of System-to-System Interchange Options after the Draft EIS) would have the following additional impacts compared to the Shepard Lane interchange option evaluated in the Draft EIS:

1. The 200 West overpass ramp to I-15 and the Glovers Lane overpass would need to be replaced.
2. Four homes east of I-15 near Glovers Lane would need to be acquired.
3. The Farmington Creek Trail and Ezra T. Clark Park would be impacted. Both are Section 4(f) resources.
4. The Lagoon amusement park entrance, two buildings, the parking lot, and a bus dropoff would be impacted.
5. Additional freeway support walls would need to be built.

5.3 Cost

As a result of the additional impacts and changes to the Shepard Lane interchange to meet capacity and level of service requirements, the interchange's cost would be \$50 million more than the Shepard Lane interchange option evaluated in the Draft EIS.

5.4 NEPA Reasonable Alternative Summary

The WDC team has determined that the Shepard Lane interchange option is not a reasonable option and will not be carried forward for detailed study in the Final EIS. This determination was based primarily on the Shepard Lane interchange option not complying with FHWA Interstate Access Policy Points 3 (Operations and Safety) and 4 (Full Access/Standards Compliance) because it would adversely affect the safety and operations of I-15 and does not meet design standards. Additionally, the Shepard Lane option did not comply with other standards as stated in Section 4.2, Other Standards. The WDC team also considered the Shepard Lane option's additional property acquisitions (business, residential, and park) and higher cost.

Based on all of these factors, the Shepard Lane interchange option is not considered a reasonable alternative and will not be carried forward for detailed evaluation in the Final EIS.



6.0 References

HDR Engineering, Inc.

- 2013 Technical Memorandum 19: Traffic Performance and Engineering Design of Shepard Land and Glovers Lane Area Alternatives.

[UDOT] Utah Department of Transportation

- 2011 Utah Manual on Uniform Traffic Control Devices for Streets and Highways.
www.udot.utah.gov/main/uconowner.gf?n=12281504735606387. December.
- 2016 Draft Interstate Access Change Request in Support, West Davis Corridor Project.
November 9.

Appendix A. Figures

Figure A-1. Draft EIS Shepard Lane Interchange Option

West Davis



Figure A-2. Shepard Lane Design Modifications after the Draft EIS





Appendix B. Correspondence

Memorandum

Utah Department of Transportation
September 15, 2016

To: Randy Jefferies, PE
West Davis Corridor Project Manager

From: Glenn Blackwelder, PE, PTOE *GB*
Operations Engineer, Division of Traffic and Safety

Re: Review of Proposed Interchange Locations, West Davis Corridor

This memo provides an update to the signing review which was initially conducted by the UDOT Division of Traffic and Safety in August 2014. This review has been done in conjunction with the Draft Interchange Access Change Request to FHWA for the Shepard Lane and Glovers Lane interchange alternatives of the West Davis Corridor project. The findings are summarized below:

Shepard Lane Interchange Alternative

The following concerns and issues have been identified:

- The proposed interchange geometry does not allow signing to be placed in general conformance with the Utah Manual on Uniform Traffic Control Devices, 2009 Edition (MUTCD).
- There are two north bound system interchanges on I-15 (US 89 and the Collector Distributer (NB CD)/West Davis Corridor) that are too close to provide for conforming and effective signing.
- Violation of sign standards include:
 - Advance guide sign location and configuration in the northbound and southbound directions (I-15, Legacy Parkway, West Davis Corridor, and Shepard Lane)
 - Required amount of words/messages on numerous sign displays would be excessive
 - Required ½ mile and 1 mile distances for advance guide signs are not met for two exits (West Davis Corridor, Shepard Lane)
 - Mixing of city and street name on legends for advance guide signs
 - Driver expectancy is violated with numerous left exits and closely spaced exits
- There is insufficient space to inform motorists on the northbound I-15 mainline on how to navigate through the NB CD road weaving section
- The signing would not convey a clear, simple meaning, and would cause information overload for drivers
- With the large number of signs required to provide proper motorist information and guidance and numerous overpass structures that inhibit visibility, the 800 feet minimum spacing between all needed signs will not be achieved (in addition to the interchange guide signs, there are other additional required signs including service signs, truck restrictions signing for Legacy Highway, Variable Message Signs, logo signs, regulatory signs, warning signs, and supplemental guides, destination signs, etc.)
- Exit numbering would be inconsistent

- The northbound and southbound exits would have different suffixes (A, B, C or C, B, A) exit numbers for the same destinations (West Davis Corridor and Park Lane)
- Signing for the frontage road north of Shepard Lane will be problematic since it is accessed from the freeway on-ramp

Overall, the requirements for signing within the Shepard Lane Interchange design will not meet the minimum standards of the Utah MUTCD.

Additional safety concerns noted regarding the Shepard Lane Interchange Design include:

- Weaving and operation of the NB CD road is a concern
- Speed differential between vehicles on the NB CD road due to vehicles entering at different speeds from the I-15 off-ramp, the Legacy Highway off-ramp, and the Park Lane on-ramp

Glovers Lane Interchange Alternative

Minor concerns that were initially noted have been addressed. One remaining concern (which is not a violation) is that, just as for Shepard Lane interchange signing, the exit numbers for the West Davis Corridor from I-15 will be different in the northbound and southbound directions.

The Glovers Lane interchange alternative can be signed in conformance with the Utah MUTCD.




U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

Subject: **ACTION:** Utah, Interstate Access Change
Request, I-15 at West Davis Corridor, Davis
County

Date: February 7, 2017

From: Gloria M. Shepherd 
Acting Executive Director

In Reply Refer To:
HIPA-20

To: Ivan Marrero
Division Administrator
Salt Lake City, UT

We reviewed the Interstate Access Change Request (IACR) and supporting documentation submitted on December 15, 2016, for construction of a new interchange for the southern connection of the proposed West Davis Corridor at I-15. Two interchange alternatives, Glovers Lane and Shepard Lane, are detailed separately in the IACR to determine engineering and operational acceptability.

Based on our engineering and operations review, the Glovers Lane interchange alternative is acceptable. Significant concerns regarding the Shepard Lane interchange alternative were identified, including: compliance with State standards, Federal standards, and the Manual on Uniform Traffic Control Devices; several left-hand exits and lane balance issues violate driver expectancy; and short and complex weaving sections contribute to an increased risk for crashes. These issues support our determination that the Shepard Lane alternative is not acceptable for engineering and operational reasons.

A draft EIS was released in May 2013 and the final environmental impact statement is scheduled to be completed in 2017. Final approval of the Glovers Lane interchange alternative may be given after the NEPA process has concluded, provided that the scope and design of the proposed project is consistent with the Glovers Lane alternative as described in the IACR of December 15, 2016, and the approved environmental document. This approval is subject to reevaluation if significant changes occur in the final design or if the construction is delayed (as specified in 23 CFR 771.129).

Should you have any questions, please contact Ms. Elizabeth Hilton at 512-536-5970.