



SALT LAKE CITY COUNCIL

AGENDA

WORK SESSION

September 24, 2019

Tuesday 5:00 PM

Council Work Room
451 South State Street Room 326
Salt Lake City, UT 84111
SLCCouncil.com

5:00 PM Work Session
Or immediately following the 2:00 p.m.
Redevelopment Agency Meeting

6 p.m. Special Limited Formal Meeting (or immediately following the Council Work Session, whichever starts earlier.)

Please note: A general comment period will not be held this day. This is one of the Council's monthly scheduled briefing meetings. However, an action item in a limited formal meeting is scheduled.

[Welcome and review of standards of conduct](#)

In accordance with State Statute, City Ordinance and Salt Lake City Council Policy, one or more Council Members may be connected via speakerphone. After 5:00 p.m., please enter the City & County Building through the main east entrance.

The Work Session is a discussion among Council Members and select presenters. The public is welcome to listen. Items scheduled on the Work Session or Formal Meeting may be moved and / or discussed during a different portion of the Meeting based on circumstance or availability of speakers.

Please note: Dates not identified in the FYI - Project Timeline are either not applicable or will be made available as the agenda item progresses.

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Work Session items

1. **Informational: 900 South Ramp Feasibility Study Update** ~ 5:30 p.m.
30 min.

The Council will be briefed about a study completed by the Transportation Division evaluating the feasibility of modifying the 900 South freeway ramp in the Ballpark Neighborhood to balance the needs of the local community with regional traffic access.

FYI – Project Timeline: (subject to change per Chair direction or Council discussion)

Briefing - Tuesday, September 24, 2019

Set Public Hearing Date -

Hold hearing to accept public comment -

TENTATIVE Council Action -

Standing Items

2. Report and Announcements from the Executive Director

Report of the Executive Director, including a review of Council information items and announcements. The Council may give feedback or staff direction on any item related to City Council business, including but not limited to scheduling items.

3. Report of the Chair and Vice Chair

Report of Chair and Vice Chair.

4. Tentative Closed Session

The Council will consider a motion to enter into Closed Session. A closed meeting described under Section 52-4-205 may be held for specific purposes including, but not limited to:

- a. discussion of the character, professional competence, or physical or mental health of an individual;
- b. strategy sessions to discuss collective bargaining;
- c. strategy sessions to discuss pending or reasonably imminent litigation;
- d. strategy sessions to discuss the purchase, exchange, or lease of real property, including any form of a water right or water shares, if public discussion of the transaction would:
 - (i) disclose the appraisal or estimated value of the property under consideration; or
 - (ii) prevent the public body from completing the transaction on the best possible terms;
- e. strategy sessions to discuss the sale of real property, including any form of a water right or water shares, if:
 - (i) public discussion of the transaction would:
 - (A) disclose the appraisal or estimated value of the property under consideration; or
 - (B) prevent the public body from completing the transaction on the best possible terms;
 - (ii) the public body previously gave public notice that the property would be offered for sale; and
 - (iii) the terms of the sale are publicly disclosed before the public body approves the sale;
- f. discussion regarding deployment of security personnel, devices, or systems; and
- g. investigative proceedings regarding allegations of criminal misconduct.

A closed meeting may also be held for attorney-client matters that are privileged pursuant to Utah Code § 78B-1-137, and for other lawful purposes that satisfy the pertinent requirements of the Utah Open and Public Meetings Act.

CERTIFICATE OF POSTING

On or before 5:00 p.m. on _____, the undersigned, duly appointed City Recorder, does hereby certify that the above notice and agenda was (1) posted on the Utah Public Notice Website created under Utah Code Section 63F-1-701, and (2) a copy of the foregoing provided to The Salt Lake Tribune and/or the Deseret News and to a local media correspondent and any others who have indicated interest.

CINDI L. MANSELL, MMC/CRM
SALT LAKE CITY RECORDER

Final action may be taken in relation to any topic listed on the agenda, including but not limited to adoption, rejection, amendment, addition of conditions and variations of options discussed.

The City & County Building is an accessible facility. People with disabilities may make requests for reasonable accommodation, which may include alternate formats, interpreters, and other auxiliary aids and services. Please make requests at least two business days in advance. To make a request,

please contact the City Council Office at council.comments@slcgov.com, 801-535-7600, or relay service 711.



COUNCIL STAFF REPORT

CITY COUNCIL of SALT LAKE CITY

TO: City Council Members

FROM: Russell Weeks
Senior Policy Analyst

DATE: September 19, 2019

RE: 900 SOUTH RAMP FEASIBILITY STUDY UPDATE

Item Schedule:

Briefing: September 24,
2019

Set Date:

Public Hearing:

Potential Action:

Information Item Only

ISSUE AT-A-GLANCE

Goal of the briefing: To explore and discuss technical aspects of potentially shortening freeway ramps at 900 South Street.

- The Administration contracted with Fehr & Peers Transportation Consultants to conduct the feasibility study of shortening the 900 South freeway ramps at the request of the community living near the ramps. The community would like to see the ramps shortened to tie the community together better.¹
- The Administration makes clear the study is a technical analysis and not a policy document.
- The Utah Department of Transportation owns the 900 South ramp and has no plans to change its current configuration, would not help to pay for any changes, and would not support any scenario that diverts traffic to adjacent ramps.² It might be noted that UDOT rehabilitated the existing ramps in 2017.
- UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan). UTA also “does not plan on abandoning” the rail spur “now or in the foreseeable future,” in part because the agency plans to study the entire TRAX system in the near future.³
- Shortening the ramps was a long-term goal of previous administrations. However, the two scenarios analyzed by Fehr & Peers that involve 400 West Street appear to conflict with more recent master plans pertaining to land-use and transit.



POLICY QUESTIONS

1. Should shortening the freeway ramps continue to be a goal for Salt Lake City?
2. Given the number of City plans that have contemplated different transportation modes and uses along 900 South Street and 400 West Street, how best could shortened freeway ramps be incorporated into those ideas.

ADDITIONAL & BACKGROUND INFORMATION

According to the Administration transmittal,

- On an average weekday, the 900 South Street on/off ramps carry about 32,000 vehicles. That is about 30 percent more traffic than the southbound on-ramp at 1300 South Street and the northbound off-ramp at the same location. (Please see Attachment No. 1)
- Sixty percent of the motorists that use the 900 South on/off ramps are traveling to or from the Downtown and east of Downtown area.⁴ (Please see Attachment No. 2)

Intersections on 900 South Streets and 300 West, 200 West, and West Temple streets currently function at a Level of Service C – “stable operations/acceptable delays,” with no outstanding issues for existing conditions in the ramp study area.⁵ By the year 2040, if the ramps stay as they are, and the City continues with planned improvements to 900 South Street, the level of service at afternoon peak traffic falls to level F at the intersections of 300 West 900 South streets and West Temple 900 South streets. Level F is “forced, unpredictable flows with excessive delays,” according to the study. Peak morning traffic flow would stay at level C at 300 West 900 South Street intersection but fall to Level F at the West Temple and 900 South intersection in the year 2040.⁶

With that in mind, the study concentrated on three potential ways to shorten the 900 South Street freeway ramps:

- Shorten the ramps at in their existing alignment to touch down at 300 West Street. (Please see Attachment No. 3.)
- Realign the freeway ramps to travel north/south along 400 West, and eliminate the current ramp structure. The ramps along 400 West would pass over 900 South and touch down at 800 South, and traffic would access the ramps at the intersection of 400 West/800 South. (Please see Attachment No. 4.)
- Combine the first two ideas to provide ramp access to both 300 West and to 800 South via 400 West.⁷ (Please see Attachment No. 5.)

The study concluded, among other things:

- All three reconfigurations resulted in more street intersections failing or nearing failure than the existing configuration in 2040.
- Data suggested that each of the reconfigurations resulted in shorter vehicle queues in 2040 compared to the existing configuration. However, the study cautioned that the traffic simulation models did not extend further south than the “Spaghetti Bowl” that routes traffic to 2100 South, 1300 South, and 900 South streets. It cautioned that vehicle “queuing may extend further than the length of the model, with future traffic impacting the general purpose traffic lanes on the “circulation/distributor system.”

- That UTA ownership of a currently unused rail line was not a “fatal flaw” to any of the potential reconfigurations, in part because UTA plans to conduct a “*Future of TRAX*” study in late 2019 or 2020 to evaluate potential alignments system-wide for future TRAX connections.⁸

It might be noted that UTA’s use of the rail line is earmarked as a Phase 2 project in the Wasatch Front Regional Council’s Regional Transportation Plan 2019-2050, according to the UTA letter. Phase 2 involves transportation projects scheduled for construction between 2031 and 2040.⁹

Potential Cost Estimates

Here are cost estimates based on Table No. 9 of the Fehr & Peers study.¹⁰

Scenario	2019 Conceptual Cost Estimate	2030 Conceptual Cost Estimate
300 West	\$35,702,000	\$54,547,000
400 West	\$28,793,000	\$44,043,000
Combined Streets	\$38,739,000	\$59,266,000

Other Studies and Master Plans

Shortening the 900 South freeway ramps first was broached officially in the *Gateway Rail Consolidation Study and Implementation Plan Final Report* published in the mid-1990s. The study was done by the Sear-Brown Group and financed by Salt Lake City and the Utah Department of Transportation.

The study was the impetus for shortening freeway viaducts at 400 South, 500 South, and 600 South streets and for developing the under-used land near the longer viaducts into what is now the Gateway area of downtown. (Please see Attachment No. 6.

That was the first phase of the proposed implementation plan. The second phase included “reconstruction of the 900 South viaduct reconfigured to tie into 400 West (Street). Removal of rail access to Newspaper Agency Corporation and Utah Barrel (sites).”¹¹ The plan went on to say shortening the ramps would improve access and visibility to the area and increase the potential to develop the area. The plan noted that UDOT would have design approval of any reconfigured structures.¹² Although the study led to major transportation and land-use changes in the City’s downtown, shortening the 900 South freeway ramps was not among them.

Downtown in Motion (Salt Lake City Downtown Transportation Plan) adopted in 2006, *Salt Lake City Downtown Synopsis Streetcar Report* and *The Downtown Plan* adopted in 2016.

One of the ideas behind reconfiguring the freeway ramps at 400 West Street was to provide a second through street through the downtown. The street had been extended on the north to Beck Street when the Delta Center was built to provide better traffic flow after games and concerts.

However, since the City Council adopted the *Downtown in Motion* plan, 400 West Street has remained a potential location for an extended rail circulation system as far south as 700 South Street.¹³ Extending light-rail or streetcars on 400 West Street either to 400 South Street or 700 South Street remained an option in *The Downtown Plan*.¹⁴ Four-hundred West Street as an option for streetcars also is included in a 2010 *Salt Lake City Downtown Synopsis Streetcar Report* by HDR/Fehr & Peers for the Salt Lake City Redevelopment Agency.¹⁵ In addition, the *Transit Master Plan* adopted in 2017 includes 400 West Street as a part of a “TRAX outer loop of Downtown” that would serve the “Downtown and the emerging southwest quadrant” The loop was included as an unfunded project but supported by the *Transit Master Plan*.¹⁶

The *900 South Ramp Feasibility Study*, outlines a variety of other City plans such as the *Pedestrian and Bicycle Master Plan* adopted in 2015 and the *9 Line Corridor Master Plan* that have recommendations to improve east-west non-motorized traffic and land-uses that would affect traffic flows from shortened freeway ramps.¹⁷

¹ *900 South Ramp Feasibility Study*, Fehr & Peers, August 2019, Page 19.

² Administration Transmittal, Jennifer McGrath, Jon Larsen, Page 1.

³ Administration Transmittal, Jennifer McGrath, Jon Larsen, Page 1; letter UTA Planning Director Laura Hanson, August 22, 2019.

⁴ Transmittal, Page 2.

⁵ *Feasibility Study*, Pages 1-4.

⁶ *Feasibility Study*, Pages 9-10.

⁷ Transmittal, Page 2.

⁸ *Feasibility Study*, Pages 19-20.

⁹ *Wasatch Front Regional Council Regional Transportation Plan 2019-2050*, executive summary, Page 12.

¹⁰ *Feasibility Study*, Page 21.

¹¹ *Gateway Rail Consolidation Study and Implementation Plan Final Report*, executive summary, Sear-Brown Group, Page 2.

¹² *Rail Consolidation Study*, Page 14.

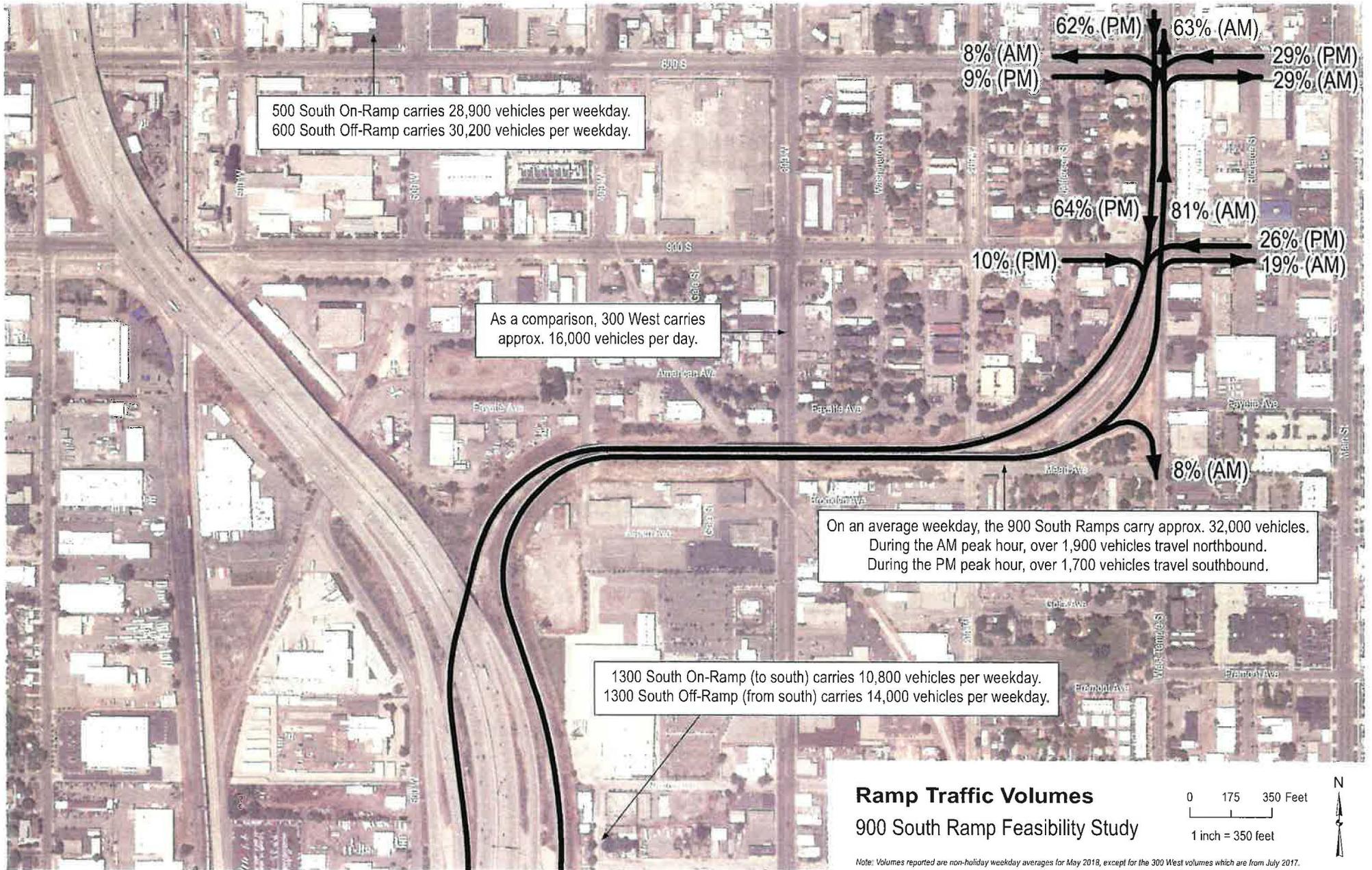
¹³ *Downtown in Motion*, Page 21.

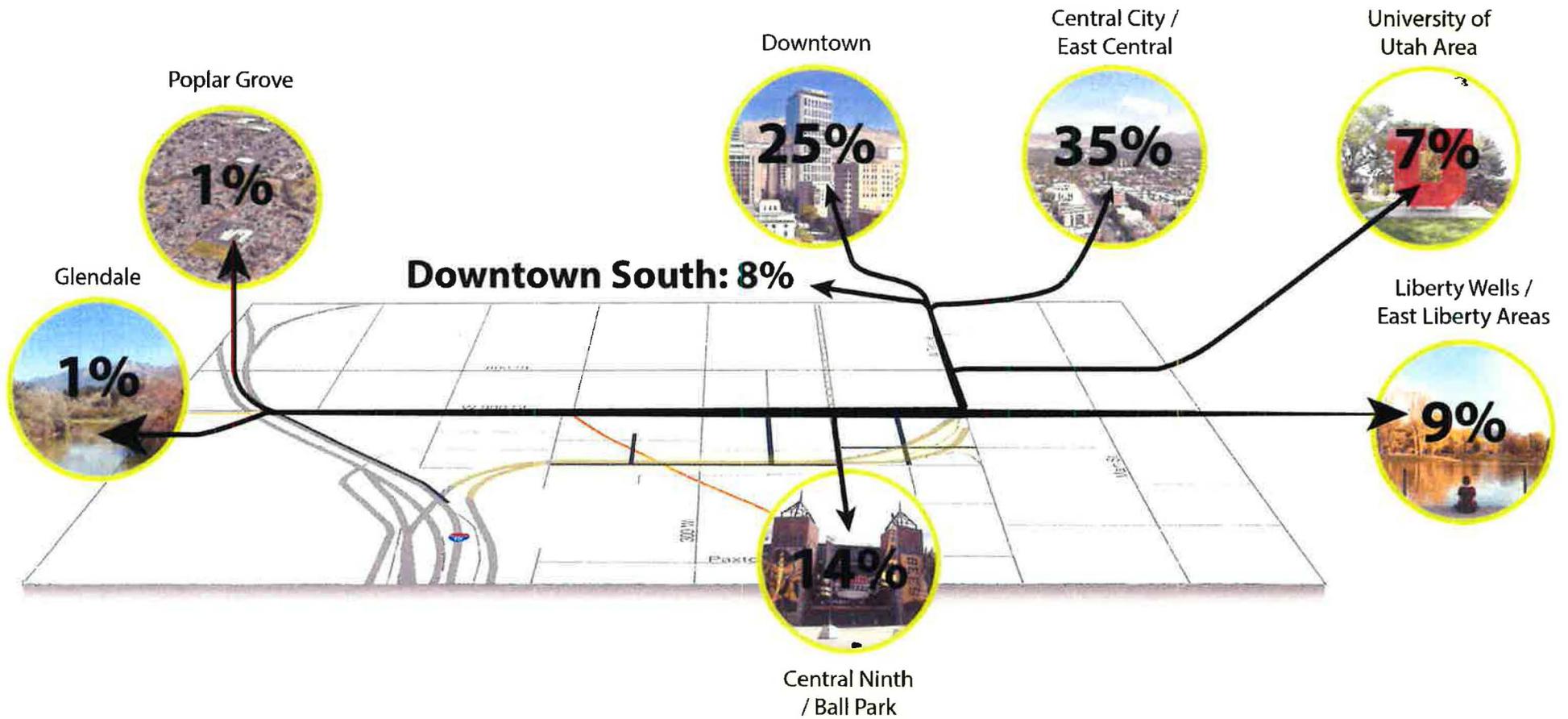
¹⁴ *The Downtown Plan*, Page 83.

¹⁵ *Salt Lake City Downtown Synopsis Streetcar Report*, HDR/Fehr & Peers, October 8, 2010, Page 9.

¹⁶ *Salt Lake City Transit Master Plan*, 2017, Page 3-17.

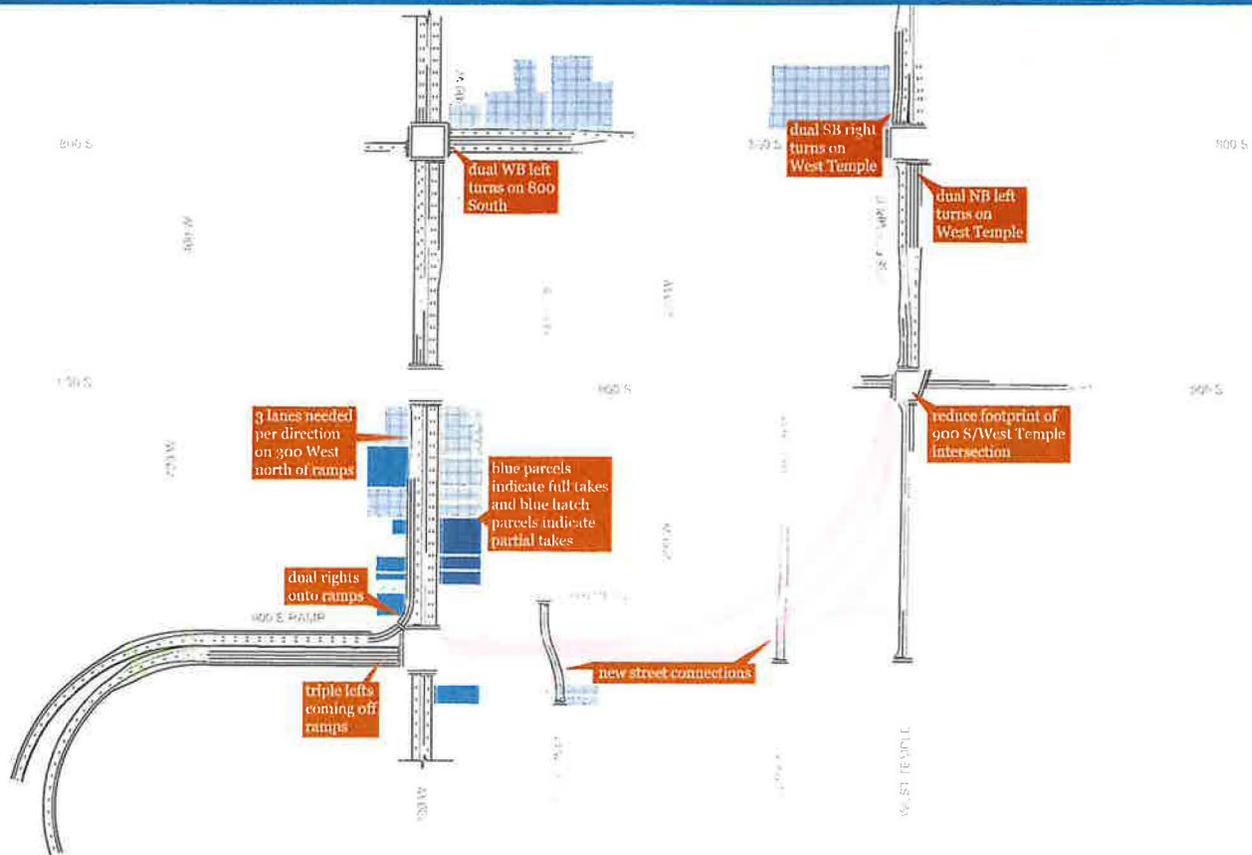
¹⁷ *Feasibility Study*, Pages 5-6.





Scenario A: 300 West

900 South Ramp Feasibility Study



300 West: Shorten ramps to end at 300 West and roughly 1000 South

Neighborhood Improvements



8.1

Net Change in Developable Acres



0.78

New Miles of Sidewalk



-2,180'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



0

Increase in Intersections with PM LOS E/F



-21%

Change in Traffic Served



No

Reduce Off-Ramp Queue Lengths?

Advantages

1. Greatest reduction in overall ramp length
2. Shifts traffic away from Central Ninth District
3. Less intrusion on Granary District than other scenarios (doesn't impact Fleet Block)

Disadvantages

1. Affects UTA's "American Spur" rail alignment (at 300 West)
2. Reduces the likelihood for a successful lane reconfiguration on 300 West, per City plans
3. Off-ramp queues could potentially spill back into freeway collector-distributor lanes

Constructability

23

Partial or Full Takes

\$36M

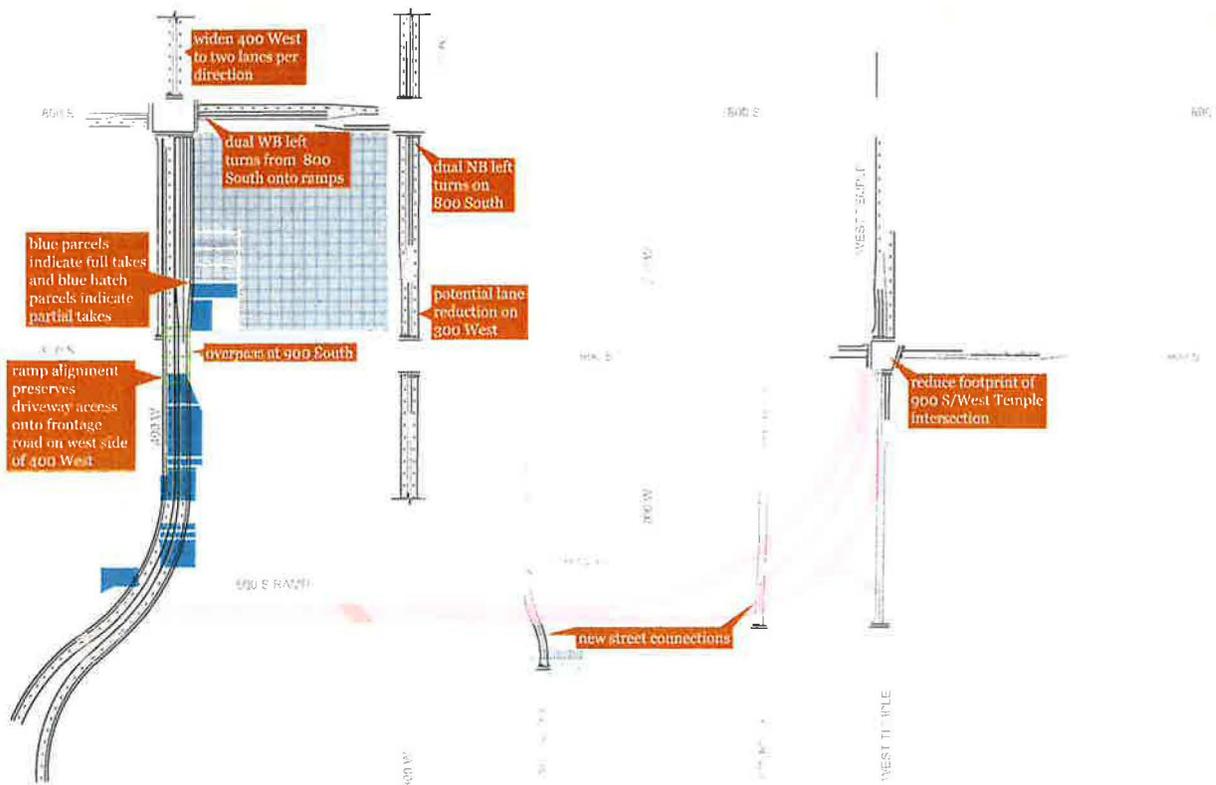
2019 Conceptual Cost

Note:

UDOT owns the 900 South on/off ramp and has no plans to change its current configuration. UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Scenario B: 400 West

900 South Ramp Feasibility Study



400 West: Realign ramps north along 400 West, passing over 900 South to touch down at 800 South

Neighborhood Improvements

 12.0 Net Change in Developable Acres	 0.78 New Miles of Sidewalk	 -1,030' Change in Ramp Length
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2040 PM Peak Hour Traffic Projections (Compared to Baseline)

 1 Increase in Intersections with PM LOS E/F	 -9% Change in Traffic Served	 No Reduce Off-Ramp Queue Lengths?
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Constructability

18 Partial or Full Takes	\$29M 2019 Conceptual Cost
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Advantages

1. Reclaims the most land for potential redevelopment
2. Could potentially accommodate the City's plans for a lane reconfiguration on 300 West
3. Removes all freeway traffic from 900 South and 9 Line Trail crossing

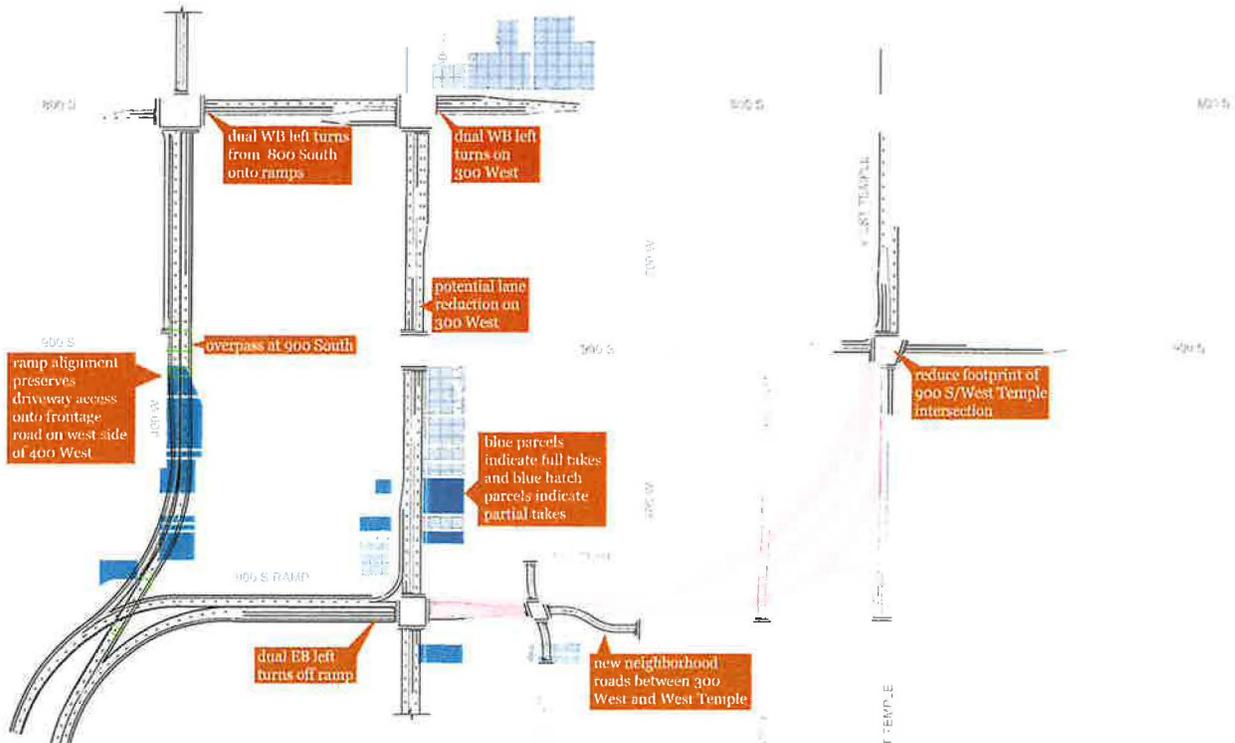
Disadvantages

1. Affects UTA's "American Spur" rail alignment (at 400 West)
2. Impacts access to the west side of the Fleet Block and eliminates northbound access to the driveways on the Artspace Commons Block
3. Off-ramp queues could potentially spill back into freeway collector-distributor lanes

Note:
 UDOT owns the 900 South on/off ramp and has no plans to change its current configuration.
 UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Scenario C: 300/400 West Combination

900 South Ramp Feasibility Study



300/400 West Combination: Combine 300 West and 400 West options, and create a new east-west local road network

Neighborhood Improvements

 6.5 Net Change in Developable Acres	 0.72 New Miles of Sidewalk	 -518' Change in Ramp Length
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2040 PM Peak Hour Traffic Projections (Compared to Baseline)

 2 Increase in Intersections with PM LOS E/F	 +7% Change in Traffic Served	 Yes Reduce Off-Ramp Queue Lengths?
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Constructability

28 Partial or Full Takes	\$39M 2019 Conceptual Cost
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Advantages

1. Most improvement in reducing queues on the ramps
2. Re-establishes east-west street grid between 300 West and West Temple
3. Serves more overall traffic in the study area, even though some individual intersections perform worse than the baseline

Disadvantages

1. Affects UTA's "American Spur" rail alignment, twice (at 300 West and at 400 West)
2. Impacts access to the west side of the Fleet Block and eliminates northbound access to the driveways on the Artspace Commons Block

Note:
 UDOT owns the 900 South on/off ramp and has no plans to change its current configuration.
 UTA owns the rail spur in the project area and has included it in its high rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

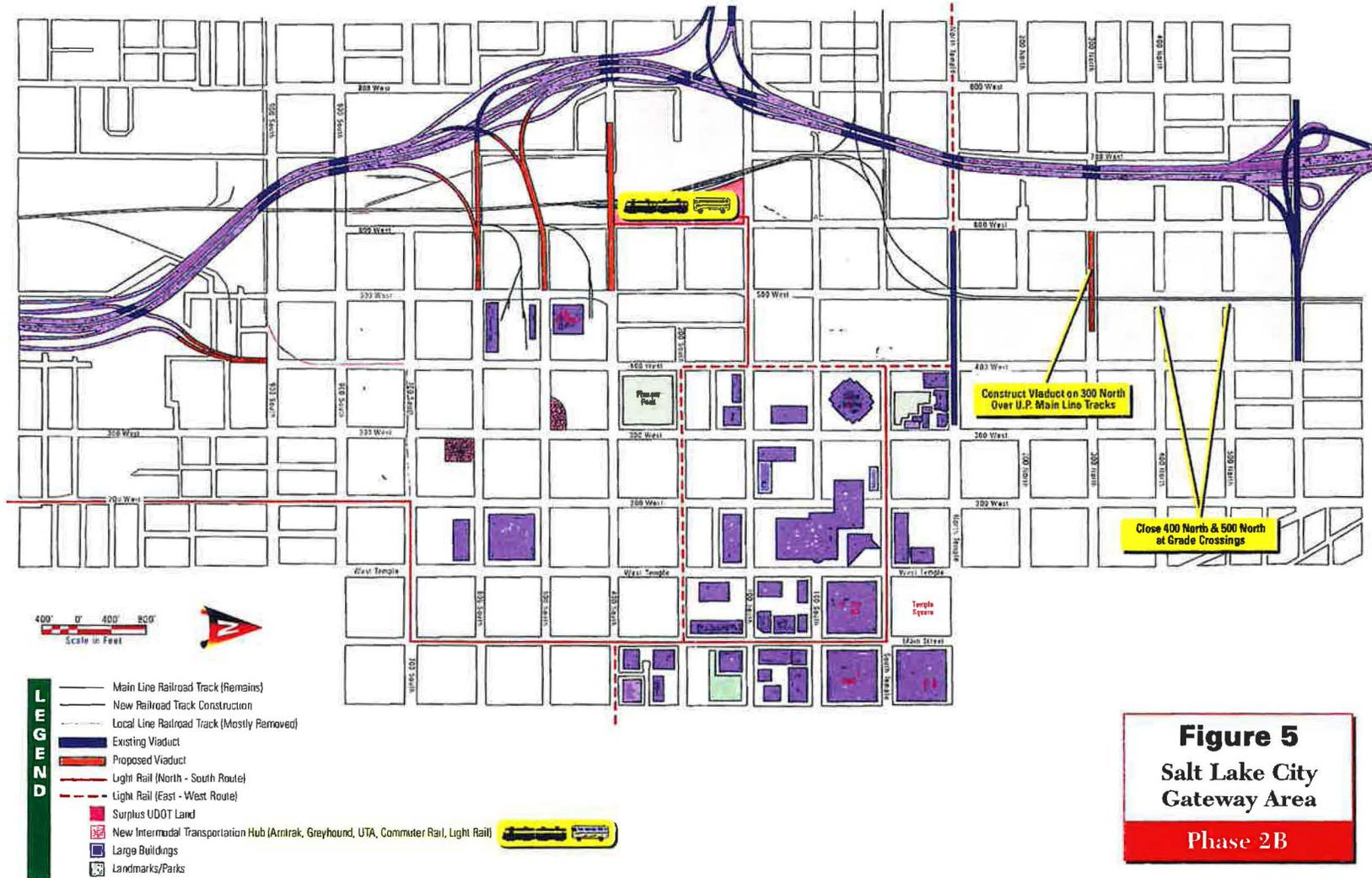


Figure 5
Salt Lake City Gateway Area
Phase 2B



CITY COUNCIL TRANSMITTAL


Patrick Leary, Chief of Staff

Date Received: August 28, 2019
Date sent to Council: August 28, 2019

TO: Salt Lake City Council
Charlie Luke, Chair

DATE: August 23, 2019

FROM: Jennifer McGrath, Interim Director Department of Community & Neighborhoods



SUBJECT: 900 South Ramp Feasibility Study Update

STAFF CONTACT: Jonathan Larsen, Transportation Director, 801-535-6630

DOCUMENT TYPE: Information Only

RECOMMENDATION: N/A

BUDGET IMPACT: None

BACKGROUND/DISCUSSION: The Transportation Division has completed a study that addresses the feasibility of modifying the 900 South freeway ramp in the Ballpark neighborhood to balance the needs of the local community with regional traffic access.

At the onset of the study, two important items were identified that need to be addressed if the City decides to move forward with 900 South ramp modifications:

- UDOT owns the 900 South ramp and has no plans to change its current configuration, would not help to pay for any changes, and would not support any scenario that diverts traffic to adjacent ramps.
- UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

The 900 South Ramp Feasibility Study evaluated a range of alternatives, including removing, relocating, and/or shortening the 900 South ramp (Exhibit 1). Three alternatives were selected by the Steering Committee for a detailed evaluation. The selected alternatives were the ones that best met the project goals, such as neighborhood connectedness, economic impacts, regional transportation, and right-of-way needs, among others. The study provides purely technical review of the alternatives possible for the 900 South freeway ramp in Salt Lake City.



The 900 South on/off ramps provide a connection between Salt Lake City and the regional freeway network. The following is a summary of the amount of traffic that uses the 900 South ramp as compared to other nearby interchanges and roadways (Exhibit 2):

- On an average weekday, the 900 South on/off ramps carry approximately 32,000 vehicles.
- 300 West in the 900 South area carries approximately 16,000 vehicles per day, half as many as the 900 South ramp.
- The 900 South on/off ramps carry approximately 30% more traffic than the 1300 South on-ramp (to the south only) and off-ramp (from the south only).
- The 500 South/600 South on/off ramp couplet carries twice as many vehicles per day as the 900 South ramp.
- 60% of the motorists that use the 900 South on/off ramps are traveling to/from the Downtown and east of Downtown area (refer to Exhibit 3 for a summary of big data used to identify origins and destinations of motorists that use the ramp).

The Steering Committee (comprised of planners and engineers from Transportation Division, Planning Division, RDA, and UDOT) considered as many scenarios as practical before selecting three for a detailed traffic evaluation. The following three scenarios are the ones that best met the project goals and were the focus of much of the study. A “one sheet” for each of these scenarios is included in Exhibit 4 and provides planning level metrics, estimated costs, and an advantage/disadvantage summary.

Scenario A: 300 West – this scenario shortens the ramps in their existing alignment to touch down at 300 West.

Scenario B: 400 West – this scenario realigns the freeway ramps to travel north/south along 400 West, and eliminates the current ramp structure. The ramps along 400 West would pass over 900 South and touch down at 800 South, and traffic would access the ramps at the intersection of 400 West/800 South

Scenario C: 300 West/400 West Combination – this scenario combines Scenarios A and B to provide ramp access to both 300 West and to 800 South via 400 West.

A lengthy brainstorming activity produced numerous scenarios for modifying the ramp in the Ballpark neighborhood, several of these scenarios that are worth noting, but not selected for detailed evaluation, include the following:

Tunnel – this scenario would place the ramps underground along their current alignment, with the entry/exit on West Temple between 800 South and 900 South. The feasibility of this scenario is mostly a civil engineering exercise and did not warrant detailed traffic analysis.

600 West – this scenario would realign the ramps along 600 West to touch down at 800 South. The 400 West scenario was selected over this one as it locates the ramp closer to the origin/destination of most motorists.

Closure – this scenario would close the ramps completely. UDOT strongly indicated this scenario should not be considered an alternative due to the impact to adjacent ramps.



No Build – traffic analysis was conducted for this scenario but additional urban design and placemaking enhancements were not included in the report due to the focus of this study being on technical traffic and engineering issues.

The 900 South Ramp Feasibility Study was largely a technical analysis. The traffic impacts of three ramp alternatives were analyzed in accordance with UDOT standards and compared to the No Build condition. UDOT requires year 2040 traffic volumes to be analyzed at a high-level of detail that requires microsimulation software. A transportation planning and engineering consultant that regularly works with UDOT was selected to assist in conducting the detailed analysis in accordance with all UDOT requirements. UDOT was a part of the Steering Committee and has reviewed the detailed traffic analysis.

The completed study provides a purely technical and transportation-focused review of the 900 South ramp alternatives. The scope of the study was not enough to address related aspects of the ramp alternatives. For example, further work will need to be completed to determine the civil engineering and design specifics. The local roadway network and development potential of the area vacated by relocating the ramps were also not part of this study and would need to be addressed. The Transportation Division is open to continued involvement, analysis, and discussion regarding the 900 South ramp.

PUBLIC PROCESS: None

EXHIBITS:

- 1) 900 South Ramp Feasibility Study report
- 2) Existing traffic volumes in the study area
- 3) Origin-destination summary of motorists that use the 900 South on/off ramp
- 4) "One Sheet" summaries of the three scenarios selected for detailed analysis

MEMORANDUM

Date: August 2019

To: Jeff Gulden, Salt Lake City Transportation

From: Fehr & Peers

Subject: 900 South Ramp Feasibility Study Final Technical Memorandum

UT18-2109

INTRODUCTION

The purpose of this memorandum is to document the feasibility analysis of various interchange ramp configurations for the 900 South I-15 interchange in Salt Lake City, Utah. This memorandum contains four major parts:

1. Discussion of existing 2018 traffic conditions in the study area;
2. Projected 2040 conditions for the current interchange configuration;
3. Description of the interchange scenarios considered for the 900 South ramps; and
4. Discussion of analysis results for a shortlist of three interchange configurations, including traffic operations, planning-level metrics, and conceptual cost estimates.

It should be noted that this memorandum does not recommend a preferred interchange configuration, but presents objective information for the City to use in deciding next steps.

EXISTING 2018 CONDITIONS

PURPOSE

This section presents analysis results of existing conditions of the 900 South freeway ramp area in Salt Lake City, Utah. This section will discuss:

- The existing conditions in the study area
- Planning context of the project

This study analyzes the traffic operations at the following study intersections:

- 300 West / 900 South
- 200 West / 900 South
- West Temple / 900 South
- West Temple / Mead Avenue
- West Temple / 800 South

- 200 West / 800 South
- 300 West / 800 South
- 400 West / 800 South

DATA COLLECTION

Traffic counts at the study intersections were collected to establish a baseline of existing conditions and operations for the area. At the study intersections, AM peak period traffic counts were recorded from 7:00 AM to 9:00 AM and PM peak period traffic counts were recorded from 4:00 PM to 6:00 PM on Wednesday, May 9, 2018.

ANALYSIS METHODOLOGY

Level of Service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst. **Table 1** provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for unsignalized and signalized intersections. The Highway Capacity Manual 2010 (HCM 2010) methodology was used in this study to remain consistent with “state-of-the-practice” professional standards.

TABLE 1 LEVEL OF SERVICE DESCRIPTIONS

LOS	Description	Signalized Intersections	Unsignalized Intersections
		Avg. Delay (sec/veh) ¹	Avg. Delay (sec/veh) ²
A	<i>Free Flow / Insignificant Delay</i> Extremely favorable progression. Individual users are virtually unaffected by others in the traffic stream.	< 10.0	< 10.0
B	<i>Stable Operations / Minimum Delays</i> Good progression. The presence of other users in the traffic stream becomes noticeable.	> 10.0 to 20.0	> 10.0 to 15.0
C	<i>Stable Operations / Acceptable Delays</i> Fair progression. The operation of individual users is affected by interactions with others in the traffic stream	> 20.0 to 35.0	> 15.0 to 25.0
D	<i>Approaching Unstable Flows / Tolerable Delays</i> Marginal progression. Operating conditions are noticeably more constrained.	> 35.0 to 55.0	> 25.0 to 35.0
E	<i>Unstable Operations / Significant Delays Can Occur</i> Poor progression. Operating conditions are at or near capacity.	> 55.0 to 80.0	> 35.0 to 50.0
F	<i>Forced, Unpredictable Flows / Excessive Delays</i> Unacceptable progression with forced or breakdown of operating conditions.	> 80.0	> 50.0

1. Overall intersection LOS and average delay (seconds/vehicle) for all approaches.
2. Worst approach LOS and delay (seconds/vehicle) only.

Source: Fehr & Peers descriptions, based on 2010 Highway Capacity Manual.

LEVEL OF SERVICE ANALYSIS

Using VISSIM simulation software and the HCM 2010 delay thresholds introduced above, the existing AM and PM peak hour LOS were computed for each study intersection. The results of this analysis are reported in **Table 2**.

As shown in **Table 2**, all study intersections operate at LOS C or better for both AM and PM peak hours. It should be noted that though West Temple / 900 South operates at LOS C as an overall intersection for both peak hours, there is some existing delay on the eastbound and westbound approaches (LOS D eastbound in the AM, LOS D westbound in the PM) at the intersection. The eastbound delay in the AM peak hour is primarily caused by the through and left turn movements, while the westbound delay in the PM peak hour is primarily caused by the left turn movement.

TABLE 2 EXISTING 2018 CONDITIONS PEAK HOUR LEVEL OF SERVICE

Intersection				Worst Movement¹			Overall Intersection	
ID	Location	Period	Control	Movement³	Delay (sec/veh)	LOS	Avg. Delay (sec/veh)²	LOS
1	300 West / 900 South	AM	Signal	-	-	-	13	B
		PM		-	-	-	15	B
2	200 West / 900 South	AM	Signal	-	-	-	13	B
		PM		-	-	-	16	B
3	West Temple / 900 South	AM	Signal	-	-	-	31	C
		PM		-	-	-	32	C
4	West Temple / Mead Avenue	AM	Side-Street	EB LT	7	A	-	-
		PM	Stop	EB LT	7	A	-	-
5	West Temple / 800 South	AM	Signal	-	-	-	19	B
		PM		-	-	-	29	C
6	200 West / 800 South	AM	Signal	-	-	-	9	A
		PM		-	-	-	13	B
7	300 West / 800 South	AM	Signal	-	-	-	13	B
		PM		-	-	-	19	B
8	400 West / 800 South	AM	Side-Street	SB TH	10	A	-	-
		PM	Stop	NB TH	11	B	-	-

1. This represents the worst movement LOS and delay (seconds/vehicle) and is only reported for unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds/vehicle).

3. NB=Northbound, SB=Southbound, EB=Eastbound, WB=Westbound, LT=Left-turn, RT=Right-turn, and TH=Through

Source: Fehr & Peers.

TRAFFIC OPERATIONAL ANALYSIS SUMMARY

There are no outstanding issues for the existing conditions at the 900 South ramp study area. It should be noted that the eastbound and westbound approaches at the West Temple / 900 South intersection experience some delay in both AM and PM peak hours.

PLANNING CONTEXT

Several planning documents were reviewed to provide planning context for the 900 South interchange area and the Central Ninth District. These include the 2016 *Downtown Plan*, the 2008 *Downtown in Motion Plan*, the 2018 *Transit Master Plan*, the 2015 *Pedestrian and Bicycle Master Plan*, the 2015 *9 Line Corridor Master Plan*, and the 50% design level plans for the Central Ninth Streetscape Improvement project. The bullet points below summarize the information from these plans relevant to the study area.

In the 2016 Salt Lake City *Downtown Plan*, Central Ninth is one of 10 districts identified throughout the downtown area. The Plan proposes the following projects for Central Ninth near the interchange:

Projects:

- A “Green Loop/Park” along 900 South
- “Viaduct interventions” for the 900 South ramps
- Study alternatives that improve connectivity for the neighborhoods surrounding the ramps, in cooperation with City Hall, residents, business owners, UDOT, and UTA
- “Soften highway edges” along the viaduct
- Improve lighting at the underpasses along the viaduct
- Create a gateway garden near the south side of the viaduct
- Multiple new mid-block pathways in the blocks surrounding the interchange

The 2008 *Downtown in Motion Plan* provides guiding framework for transportation elements in and around Downtown, and while many of the broad goals identified in this plan are still pertinent, there are no specific projects or concepts listed in this plan that are currently relevant to the area around the 900 South ramps. Salt Lake City intends to update its Transportation Master Plan in the near future, which should include recommendations outlined in other City master plans such as the Transit Master Plan and the Bicycle and Pedestrian Master Plan.

The 2018 *Transit Master Plan* identifies 900 South as a “Tier 2” corridor for frequent transit service west of the TRAX station, indicating that it is less of a priority for transit improvements than the section of 900 South east of the TRAX station which is identified as a “Tier 1” corridor. However, a level of Tier 2 signifies an important transit corridor and significant transit investments should be expected in the future. In addition, the 900 South Tier 2 corridor provides one of only several east-west transit connections in the *Transit Master Plan*.

The *9 Line Corridor Master Plan* establishes a vision for a multi-modal corridor along 900 South between Redwood Road and 200 West. In the section of the 9 Line closest to this study area, the proposed trail corridor treatments consist of on-street buffered bike lanes and sidewalks; this recommendation is also reflected in the 2015 *Pedestrian and Bicycle Master Plan*.

The *9 Line Corridor Master Plan* also identified 900 South/200 West as a “9 Line Project Node”, providing example program components such as a “cycle center”; an overhead gateway feature; a branded

intersection using various kinds of pavement treatments; and outdoor dining. Additional specific intersection treatments are proposed in the *9 Line Corridor Master Plan* for the intersections of 900 South/300 West and 900 South/200 West.

The Central Ninth Streetscape Improvement plans show the following changes to 900 South between West Temple and 300 West:

- Reduction to one lane per direction
- Center landscaped medians with angled parking (similar to the 300 South medians downtown)
- Raised mid-block crosswalks
- Shared lanes for cyclists on-street
- Designated bike paths behind the curb, and separate from pedestrian areas

Although the Central Ninth Streetscape Improvement plans are only at a 50% design level, the project has received much scrutiny from multiple City departments and the City's Redevelopment Agency is in the process of securing funding for implementation.

FUTURE 2040 NO BUILD CONDITIONS

PURPOSE

The purpose of the 2040 No Build conditions analysis is to evaluate the study intersections during the peak travel periods of the day under projected 2040 traffic volumes. This analysis provides a baseline condition for the year 2040, which can be used to determine the impacts on ramp alternatives in the future.

TRAFFIC VOLUMES

Future projected volumes from the Wasatch Front Regional Council (WFRC) Travel Demand Model were initially used to derive annual growth rates. However, the base volumes at the study area were not consistent with Annual Average Daily Traffic (AADT) data provided by the Utah Department of Transportation (UDOT). Mainly, the base volumes shown in the WFRC Travel Demand Model on 900 South were significantly lower than the reported AADT.

The 2040 No Build traffic volumes were instead derived from historical AADT data provided by UDOT and from roadway counts provided by Salt Lake City at the following locations:

- 900 South between 200 West and West Temple (provided by Salt Lake City)
- 900 South between West Temple and Main Street (provided by Salt Lake City)
- 900 South between West Temple and State Street (provided by UDOT)
- 800 South (provided by UDOT)
- 300 West (provided by UDOT)
- West Temple (provided by UDOT)
- Main Street (provided by UDOT)

- 600 South (provided by UDOT)
- 500 South (provided by UDOT)

Average annual volume percent changes were calculated for the locations listed above from 2012 to 2017, and growth rates were derived for three roadway types: City arterial/collector, 900 South ramp related, and City collector/TRAX (primarily for 200 West). The following annual growth rates were derived for the different roadway types:

- 1.4% - City arterial/collector (300 West, 900 South west of West Temple)
- 3.1% - 900 South Ramp Related (900 South on/off ramp, West Temple, 900 South east of West Temple)
- 1.0% - City collector/TRAX (200 West)

ROADWAY GEOMETRY

The following assumptions were made for roadway geometry changes to the study area in 2040:

- The Central Ninth Streetscape Improvement plans were assumed to be in place for 2040 No Build conditions. This plan reduces travel lanes from two lanes in each direction to one lane in each direction between 200 West and West Temple on 900 South. Two travel lanes in each direction were assumed to the east of West Temple. It also utilizes the existing median space to include angled on-street parking, while providing wide sidewalks for pedestrian and off-street bicycle facilities. An overview of the plans is shown below in **Figure 1**.
- A dual left turn lane was assumed for the westbound left-turn movement at the West Temple / 900 South intersection. A northbound right-turn overlap phase was also assumed to be installed at this signalized intersection. These geometric and signal timing changes were assumed in the baseline based on direction from both Salt Lake City and UDOT, who indicated that the changes have previously been discussed and are likely to occur in the future. This roadway geometry assumption is shown below in **Figure 2**.
- An exclusive right turn lane was assumed for the eastbound right movement at the West Temple / 900 South intersection. Although this turn lane is not shown in the Central Ninth Streetscape Improvement plans, it was identified as a probable modification by Salt Lake City Transportation Division. This roadway geometry assumption is shown below in **Figure 2**.

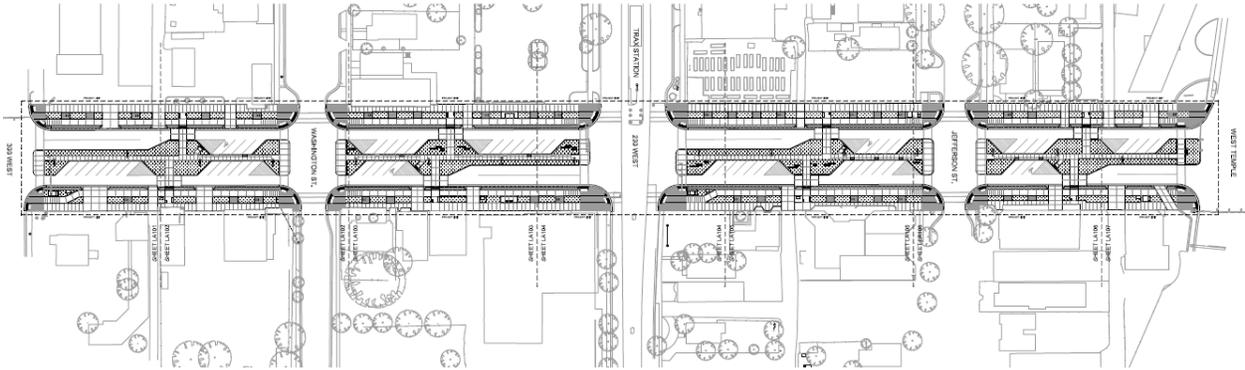


Figure 1 Central Ninth Streetscape Improvement Plans

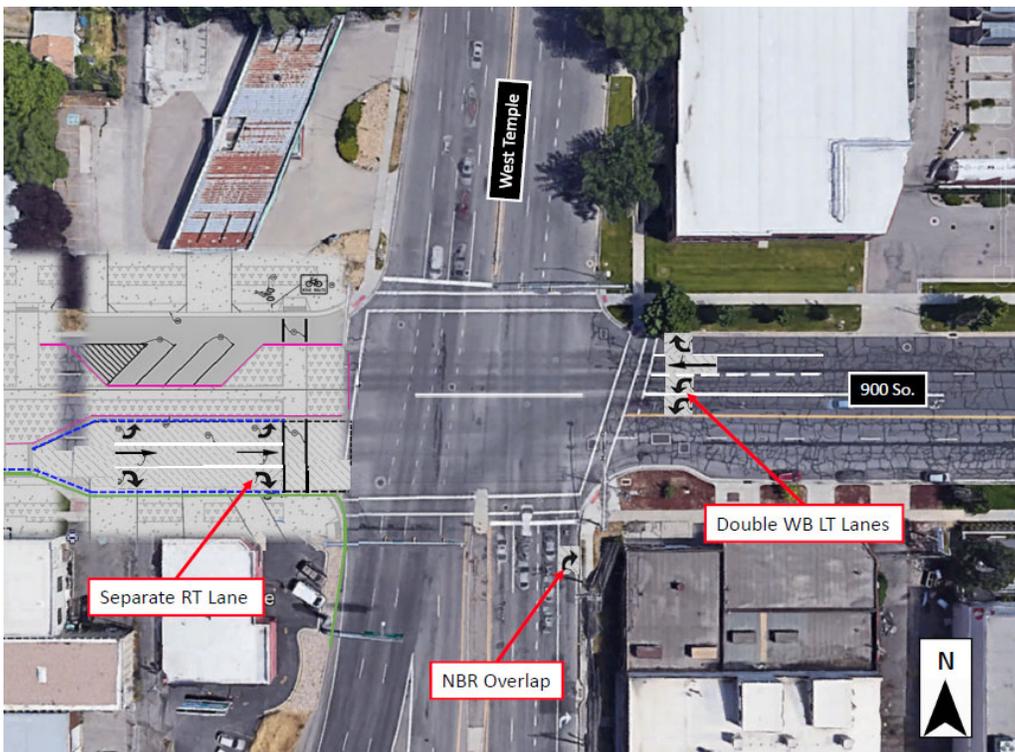


Figure 2 West Temple/900 South Roadway Geometry Assumptions

MODEL ASSUMPTIONS

The following VISSIM model assumptions were made for the 2040 No Build conditions:

- The Central Ninth Streetscape Improvement plans include angled on-street parking. It was assumed for the VISSIM model that the posted speed on 900 South would be reduced due to vehicles entering/exiting parking spots. The posted speed modeled in the VISSIM model was assumed to be 20 mph. This was based on travel time data collection that was performed on 300 South in Salt Lake City, as part of this project on July 10, 2018. The 300 South corridor has angled on-street parking and is similar to what is expected with implementation of the Central Ninth Streetscape Improvement plans.
- Vehicles travelling on 900 South being stopped by on-street parking maneuvers were simulated in the VISSIM model. From the data collection performed on 300 South, the maneuver time was measured to be between 10 and 15 seconds. The frequency of the parking maneuvers was modelled to randomly occur once per parking space cluster (group of adjacent angled parking spaces) in the peak hour.

LEVEL OF SERVICE ANALYSIS

Using VISSIM simulation software and the HCM 2010 delay thresholds introduced above, the 2040 background AM and PM peak hour LOS were computed for each study intersection. The results of this analysis are reported in **Table 3**.

During the PM peak hour, the intersections of 300 West/900 South and West Temple/900 South are projected to operate at LOS F. The significant delay at the 300 West/900 South intersection is caused by the southbound left and eastbound through vehicles waiting for the excessive queues on 900 South east of the intersection to clear up. The West Temple/900 South intersection is also projected to operate at LOS F conditions in the AM peak hour. The significant delay is caused by a combination of an increase in demand volume by expected future growth, and the reduction in capacity on 900 South due to the Central Ninth Streetscape Improvement project. It should be noted that the demand volume being served by the VISSIM model is around 70-80%, meaning about 20-30% of the demand volume cannot get into the roadway network in the model due to congestion. In the AM peak hour, there is significant congestion on the 900 South off ramp, and the demand volumes are being bottlenecked by the West Temple / 900 South intersection. In the PM peak hour, 900 South west of West Temple experiences significant congestion, lowering the demand volumes being served. Therefore, the delay shown in **Table 3** is likely an understatement of the delay experienced in the study area due to low demand volumes being served.

TABLE 3 2040 NO BUILD CONDITIONS PEAK HOUR LEVEL OF SERVICE

ID	Intersection			Worst Movement ¹			Overall Intersection	
	Location	Period	Control	Movement ³	Delay (sec/veh)	LOS	Avg. Delay (sec/veh) ²	LOS
1	300 West / 900 South	AM	Signal	-	-	-	22	C
		PM		-	-	-	180	F
2	200 West / 900 South	AM	Signal	-	-	-	24	C
		PM		-	-	-	65	E
3	West Temple / 900 South	AM	Signal	-	-	-	142	F
		PM		-	-	-	143	F
4	West Temple / Mead Avenue	AM	Side-Street	EB TH	9	A	-	-
		PM	Stop	WB RT	10	A	-	-
5	West Temple / 800 South	AM	Signal	-	-	-	34	C
		PM		-	-	-	146	F
6	200 West / 800 South	AM	Signal	-	-	-	13	B
		PM		-	-	-	49	D
7	300 West / 800 South	AM	Signal	-	-	-	19	B
		PM		-	-	-	84	F
8	400 West / 800 South	AM	Side-Street	SB TH	12	B	-	-
		PM	Stop	SB TH	13	B	-	-

1. This represents the worst movement LOS and delay (seconds/vehicle) and is only reported for unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds/vehicle).

3. NB=Northbound, SB=Southbound, EB=Eastbound, WB=Westbound, LT=Left-turn, RT=Right-turn, and TH=Through
Source: Fehr & Peers.

TRAFFIC OPERATIONAL ANALYSIS SUMMARY

In 2040 No Build conditions, the congestion on 900 South increases due to a combination of an increase in demand volumes by future growth and reduction in capacity on the roadway due to the Central Ninth Streetscape Improvement project planned for the future. The 2040 No Build conditions serve as a basis for comparing proposed alternatives in the study area.

INTERCHANGE SCENARIOS

This section outlines interchange scenarios discussed in an internal project team workshop on September 6th, 2018 and with the project's Steering Committee on September 25th, 2018. The tables below identify seven scenarios that were moved forward for consideration with the project's Steering Committee, as well as six scenarios that were discussed by the consulting team and the Salt Lake City project manager but were deemed unsuitable and were removed from further consideration.

TABLE 4 SCENARIOS REVIEWED WITH STEERING COMMITTEE

Description	Opportunities	Constraints	Notes
<p><i>Scenario 1: Underground alignment to West Temple between 800/900 South</i></p>	<p>Allows for restoration of the street grid and reclamation of land in blocks east of I-15. Improves current operational problems with the interchange at 900 South and West Temple.</p>	<p>High level of cost, potential conflicts with underground utilities and water table. Underground alignment would also need to pass under TRAX at least once, possibly twice. Maintenance of underground alignment would be challenging for UDOT. Curves within the underground portion present a safety concern – potential of congestion in tunnel not being visible to approaching traffic. Reclaimed land would be retained by UDOT and would not be available for economic development.</p>	<p>Project would open-cut and cover the alignment, rather than boring a tunnel. Portals to underground portion would be near 500 West/1000 South and at approximately 850 South West Temple. Steering Committee agreed not to move this scenario further because it does not meet community redevelopment goals, it presents significant maintenance and safety concerns, utility conflicts will likely be major, and it comes with a very high cost.</p>
<p><i>Scenario 2: Extend ramps above ground to West Temple north of 900 South</i></p>	<p>Reduces potential congestion on 900 South related to interchange traffic. Utilizes most of existing ramps and current ROW alignment.</p>	<p>Introduces a new overpass at 900 South, which is intended to be a multi-modal business corridor. Does not create more ground for redevelopment. Would need to reconfigure West Temple south of where ramp touches down – could potentially close West Temple to through traffic on the block from 800 S to 900 S to allow for the new ramp connection, or have frontage roads connecting to West Temple south of the ramps.</p>	<p>Ramps would touch down between 800/900 South on West Temple. Steering Committee determined that this scenario does not meet community development or connectivity goals, and agreed not to evaluate it further.</p>

<p><i>Scenario 3: Shorten ramps to end at 300 West</i></p>	<p>Could reduce potential congestion on 900 South related to interchange traffic. Allows for restoration of the street grid and reclamation of land in blocks east of 300 West.</p>	<p>Impacts future possible TRAX alignment – crossing at 300 West would need to be elevated or realigned. Forces more left turns for ramp traffic that is headed downtown, without a connection further east to West Temple. Salt Lake City is planning a lane reconfiguration on 300 West north of 900 South, and the reduced roadway may not have enough capacity to manage ramp traffic.</p>	<p>Scenario 3 would have a T-intersection where the ramps terminate at 300 West. Freeway traffic would not continue eastward from 300 West. Steering Committee agreed to analyze this scenario further.</p>
<p><i>Scenario 4: Realign ramps along 400 West to 800 South</i></p>	<p>Reduces potential congestion on 900 South related to interchange traffic. Allows for restoration of the street grid and reclamation of land in blocks east of 400 West. Opens more land for redevelopment than 300 West scenario. Directs people north towards downtown, rather than forcing more left turns for downtown-based traffic. Improves freeway access for traffic to/from the Poplar Grove/Glendale neighborhoods.</p>	<p>Impacts future possible TRAX alignment on 400 West. Moves ramp traffic further away (further west) from downtown, which is a primary destination for much of the 900 South ramp traffic. Likely to impact NB/SB traffic on 400 West – would need to reconfigure 400 West to either close to through traffic, or design frontage roads to allow access under the new ramp. Shifts impact of freeway interchange from Central Ninth District to Granary District, which is also experiencing revitalization. Potential loss of access to new project at Aspen and 400 West, in addition to impacts to other development on 400 West (unless a road was built in the reclaimed land between 400 West and 300 West).</p>	<p>Ramps would bridge over 900 South and touch down at 800 South. Red Butte Creek runs in a large culvert underneath 900 South and is fairly close to the surface. This means that 900 South cannot be depressed to help maintain proper vehicle clearance requirements for the ramp overpass. Bridge would need to stay high enough to meet clearance requirements at 900 South, but still be able to be at grade by 800 South. Initial assessments indicate that this is possible within grade requirements but need to verify. Steering Committee agreed to analyze this scenario further.</p>

<p><i>Scenario 5: Realign ramps along 600 West to 800 South</i></p>	<p>Reduces potential congestion on 900 South related to interchange traffic. Allows for restoration of the street grid and reclamation of land in blocks east of approx. 450 West. Improves freeway access for traffic to/from the Poplar Grove/Glendale neighborhoods. Maintains right-of-way impacts closer to I-15 footprint, less impact to neighboring development. Does not impact future potential TRAX lines.</p>	<p>Introduces traffic onto 800 South adjacent to FrontRunner crossing. Moves ramp traffic further away (further west) from downtown, which is a primary destination for much of the 900 South ramp traffic. 600 West is the least effective of the scenarios in taking traffic where it wants to go.</p>	<p>Ramps would bridge over 900 South and touch down at 800 South. Same issues from Scenario 4 related to grade and clearance apply to Scenario 5. Bridge would be needed at 500 West also. Steering Committee agreed to remove this scenario from further analysis because it takes drivers farther away from where they want to go, and it doesn't connect to a major north-south arterial. The 400 West scenario achieves similar goals for the study area and has the opportunity to be more functional since 400 West has more capacity and continues north of downtown to Beck Street (600 West ends at 550 North). The group opted to study 400 West instead of 600 West. (A scenario to connect the ramps to 800 South at 500 West was not selected for a similar reason.)</p>
<p><i>Scenario 6: Close the ramps (Refer to Exhibit C for more information from UDOT regarding a ramp closure scenario.)</i></p>	<p>Reduces potential congestion on 900 South related to interchange traffic. Allows for restoration of the street grid and reclamation of land in blocks east of I-15.</p>	<p>Traffic will be diverted onto adjacent interchanges at 500 South, 600 South, 1300 South and potentially I-215 at Foothill. When 900 South ramps were closed for construction in August 2017, traffic at the 600 South off-ramps increased by 10% and traffic at the 1300 South off-ramps increased by 50%. Eliminates freeway access for the neighborhood residents and businesses.</p>	<p>Steering Committee agreed that the costs and impacts of this scenario likely outweighed the benefits, and that other scenarios under consideration could provide a similar level of benefit while avoiding the impact to adjacent interchanges. This scenario was therefore removed from further consideration.</p>

<i>Scenario 7: Do Nothing/No Build Scenario</i>	Minimal new costs incurred. Scenario would include minor operational changes to the off-ramps to improve weaving patterns.	Does not meet connectivity and redevelopment goals for the study. Does not address traffic congestion introduced by Central Ninth Streetscape project.	Scenarios selected for further consideration will be compared to this scenario.
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In summary, the Steering Committee agreed to analyze the 300 West and 400 West scenarios in comparison to the “No Build” scenario. In addition, the Steering Committee wanted to evaluate a combined 300 West/400 West scenario, where the alignment would extend beyond 300 West as a two-lane road to West Temple. The 300 West, 400 West, and 300/400 West combined scenarios were analyzed in VISSIM traffic microsimulation software to evaluate their operational impacts as well as constructability issues for each scenario. The table below identifies scenarios that were discussed by the internal project team in early September, but discarded before the September 25th meeting with the Steering Committee.

TABLE 5 SCENARIOS DISCARDED BY PROJECT TEAM

Description	Reason for Elimination
<i>Helix scenario for on/off ramps, situated near 1000 South and 600 West</i>	Complicated and costly, considerable ROW needed, and other alternatives serve the study purpose better and with less impact.
<i>Loop ramps near 1000 South and 600 West</i>	Complicated and costly, considerable ROW needed, and other alternatives serve the study purpose better and with less impact.
<i>Realign ramps along 600 West and touch down at 900 South</i>	Directing freeway traffic to 900 South is inconsistent with the City’s desired vision for this corridor as a local-business, pedestrian friendly area. The team preferred the 600 West alignment that moved freeway access to 800 South instead.
<i>Realign ramps along 400 West and touch down at 900 South</i>	Directing freeway traffic to 900 South is inconsistent with the City’s desired vision for this corridor as a local-business, pedestrian friendly area. The team preferred the 400 West alignment that moved freeway access to 800 South instead.
<i>800 South/900 South couplets</i>	Freeway access on 900 South is inconsistent with the city’s vision for the corridor.

ANALYSIS OF INTERCHANGE SCENARIOS

This section presents analysis results for the three interchange scenarios that were selected by the project’s Steering Committee for more detailed analysis. These include:

- Scenario A, 300 West: Shorten the current interchange ramps to terminate in a signal at 300 West;
- Scenario B, 400 West: Realign the ramps north/south along 400 West, passing over 900 South and terminating in a signal at 400 West/800 South; and
- Scenario C: A combination of Scenario A and Scenario B

Maps of Scenarios A, B, and C are provided in Exhibit A to this memorandum. The following analysis components are included in this section:

- Traffic operational analysis results, including intersection level of service for the AM and PM peak hours, and the percent of network demand served
- Planning metrics, including the net change in the number of intersections, new developable acres, new miles of sidewalk, and consistency with planning document goals
- Conceptual cost estimates based on high-level conceptual layouts

DESCRIPTION OF INTERCHANGE SCENARIOS

The three interchange scenarios are described in more detail below. All scenarios assumed that the Central Ninth Streetscape plans would be implemented, reducing it to one lane per direction between 300 West and West Temple. This shifted emphasis for traffic to 800 South, since the reduced capacity and speeds on 900 South make it less attractive for freeway-bound traffic.

Scenario A: This scenario shortens the ramps in their existing alignment to touch down at 300 West. This scenario requires three lanes per direction in both the northbound and southbound directions on 300 West, which conflicts with Salt Lake City's potential lane reconfiguration plans on 300 West. Important intersection configurations for Scenario A include:

- Three eastbound left turn lanes where the ramps touch down at 300 West, for traffic attempting to exit the ramps and travel north on 300 West;
- Two southbound free-right turn lanes on 300 West at the ramps, for traffic attempting to enter onto the ramps (the third southbound lane would terminate in a turn lane at the ramps, and 300 West could be two lanes southbound on the far side of the ramps);
- One northbound left turn lanes at the ramp's intersection with 300 West, to accommodate traffic attempting to enter onto the ramps;
- Reduction of lanes on southbound West Temple, and reconfiguration of the current 900 South/West Temple intersection to represent a more standard intersection template, with one lane of traffic continuing southbound on West Temple south of 900 South;
- Addition of dual southbound right turns and dual northbound left turns at the 800 South/West Temple intersection, to accommodate traffic using 800 South to access the freeway ramps; and
- Addition of dual westbound left turn lanes at 800 South/300 West, for traffic using 800 South to access the ramps on 300 West.

Scenario B: This scenario realigns the freeway ramps to travel north/south along 400 West, and eliminates the current ramp structure. The ramps along 400 West would pass over 900 South and touch down at 800 South, and traffic would access the ramps at the intersection of 400 West/800 South. Important configurations for Scenario B include:

- Closure of access to the Fleet Block property south of 800 South and east of 400 West, due to the presence of the ramps (driveways to the developed property at the Artspace Commons Block, on the west side of 400 West, would be retained via a one-way southbound frontage road);
- Two through lanes northbound on 400 West from the ramp (requiring widening of 400 West north of 800 South from one lane per direction to two lanes);
- Two right turn lanes northbound from the 400 West ramps to 800 South;
- One shared through/right turn lane eastbound on 800 South onto the 400 West ramps;
- Two left turn lanes westbound on 800 South onto the 400 West ramps;
- Reduction of lanes on southbound West Temple, and reconfiguration of the current 900 South/West Temple intersection to represent a more standard intersection template, with one lane of traffic continuing southbound on West Temple south of 900 South;
- Accommodation of the City's proposed lane reconfiguration on 300 West; and
- Two left turn lanes northbound from 300 West to 800 South.

Scenario C: This scenario combines Scenarios A and B to provide ramp access to both 300 West and to 800 South via 400 West. Scenario C also includes construction of a network of local roads between 300 West and West Temple, where the current ramps would be removed, in order to improve walkability and roadway connectivity in that area. Important configurations for Scenario C include:

- Accommodation of the City's proposed lane reconfiguration on 300 West;
- Closure of access to the Fleet Block property south of 800 South and east of 400 West, due to the presence of the ramps (driveways to the developed property at the Artspace Commons Block, on the west side of 400 West, would be retained via a one-way southbound frontage road);
- One shared through/right turn lane eastbound on 800 South onto the 400 West ramps;
- Two left turn lanes westbound on 800 South onto the 400 West ramps;
- Reduction of lanes on southbound West Temple, and reconfiguration of the current 900 South/West Temple intersection to represent a more standard intersection template, with two lanes of traffic continuing southbound on West Temple south of 900 South; and
- Two left turn lanes westbound on 800 South to 300 West.

TRAFFIC OPERATIONAL ANALYSIS RESULTS

This section compares VISSIM analysis results for the three interchange scenarios to the 2040 No-Build configuration discussed earlier in this memorandum. Tables 6 and 7 present the following information:

- Network percent demand served, meaning the percent of cars in the traffic simulation model that entered into the model's roadway network and made it out the other side (a higher percent demand served means that fewer cars are getting bogged down in traffic);
- Off-ramp queue lengths, indicating how far back cars are stacking on the ramps while they wait to enter the roadway network;
- The number of intersections with failing or near-failing level of service, based on average vehicle delay; and
- Identified bottleneck intersections for each scenario, where traffic jams were occurring in the traffic simulation model.

TABLE 6 OPERATIONAL ANALYSIS RESULTS (2040 CONDITIONS)

AM Peak Hour

Metrics	Scenarios			
	No Build	Scenario A 300 West	Scenario B 400 West	Scenario C Combined
<i>Network Percent Demand Served</i>	83%	85%	92%	89%
<i>Off-ramp Queue – West Temple¹</i>	5,025 ft. ³	-	-	-
<i>Off-ramp Queue – 300 West¹</i>	-	4,200 ft. ³	-	3,975 ft.
<i>Off-ramp Queue – 400 West¹</i>	-	-	4,575 ft.	2,700 ft.
<i>Number of Intersections with LOS E-F</i>	1	3	2	4
<i>Bottleneck Intersection Locations²</i>	900 S/W. Temp. NBT	800 S/W. Temp. NBL	800 S/300 W EBT	800 S/300 W EBT
		800 S/300 W WBL	900 S/W. Temp. WBT	800 S/W. Temp. WBL
		800 S/300 W NBR		

PM Peak Hour

Metrics	Alternatives			
	No Build	Scenario A 300 West	Scenario B 400 West	Scenario C Combined
<i>Network Percent Demand Served</i>	84%	63%	75%	91%
<i>Off-ramp Queue – West Temple¹</i>	5,025 ft. ³	-	-	-
<i>Off-ramp Queue – 300 West¹</i>	-	4,200 ft. ³	-	800 ft.
<i>Off-ramp Queue – 400 West¹</i>	-	-	5,000 ft. ³	775 ft.
<i>Number of Intersections with LOS E-F</i>	5	5	6	7
<i>Bottleneck Intersection Locations²</i>	900 S/W. Temp. WBL	800 S/W. Temp. SBR, NBL	800 S/300 W EBT, WBL	800 S/300 W NBT, EBT, WBL
	900 S/300W SBL, NBR, EBT	800 S/300W WBL, NBT	800 S/W. Temp. NBL, WBL	900 S/300 W SBL, EBT
			900 S/300 W SBL	

1. Average Maximum Queue, rounded up to nearest 25 ft.

2. NB=Northbound, SB=Southbound, EB=Eastbound, WB=Westbound, T=Thru, L=Left-turn, R=Right-turn

3. Exceeds available storage length (potential queue spillback to 1300 S Exit)

Table 7 below provides average vehicle delay percent demand served (PDS) for each intersection in the traffic simulation model for 2040 conditions.

TABLE 7 INTERSECTION LEVEL ANALYSIS RESULTS (2040 CONDITIONS)

AM PEAK HOUR RESULTS								
Intersection	No Build		Scenario A 300 West		Scenario B 400 West		Scenario C Combined	
	Delay	PDS	Delay	PDS	Delay	PDS	Delay	PDS
300 W / 900 S	22	98%	54	76%	30	100%	44	87%
200 W / 900 S	24	95%	42	90%	38	92%	39	91%
W Temp / 900 S	142	73%	79	88%	57	84%	56	92%
W. Temp / Mead	1	79%	1	97%	1	97%	1	97%
W. Temp / 800 S	34	75%	85	80%	39	73%	196	68%
200 W / 800 S	13	88%	47	80%	30	59%	35	59%
300 W / 800 S	19	97%	54	78%	44	85%	51	75%
400 W / 800 S	1	95%	1	100%	96	67%	222	69%
300 W / I-15 Ramp	-	-	126	72%	-	-	180	73%
Network	163	83%	225	85%	140	92%	261	89%
PM PEAK HOUR RESULTS								
Intersection	No Build		Scenario A 300 West		Scenario B 400 West		Scenario C Combined	
	Delay	PDS	Delay	PDS	Delay	PDS	Delay	PDS
300 W / 900 S	180	83%	162	58%	146	66%	83	79%
200 W / 900 S	65	75%	84	55%	50	63%	60	83%
W Temp / 900 S	143	81%	173	47%	141	67%	38	92%
W. Temp / Mead	1	86%	9	98%	1	97%	1	98%
W. Temp / 800 S	146	82%	269	54%	137	71%	169	84%
200 W / 800 S	49	79%	54	54%	73	64%	75	80%
300 W / 800 S	84	89%	49	61%	93	64%	105	81%
400 W / 800 S	2	89%	2	91%	182	68%	93	84%
300 W / I-15 Ramp	-	-	266	54%	-	-	89	80%
Network	251	84%	506	63%	396	75%	208	91%

Note: Red boxes denote higher delay/lower demand served than the No Build Scenario.

Readers should note some key takeaways from the information contained in Tables 6 and 7 above. First, Scenarios A, B, and C all have more intersections failing or nearing failure than the No Build configuration. The intended purpose of this ramp feasibility study was not to “solve” traffic operational problems at the current interchange, which functions fairly well in both the near and projected long term future; rather, this study was in response to requests from the community to explore scenarios for shortening the 900 South ramps and reducing their dividing impact on the community below. As a result, scenarios that shorten the ramps move ramp traffic farther away from their desired destinations, which are downtown Salt Lake City and points east of downtown. Traffic then becomes funneled through a series of

intersections as it attempts to reach the destinations, forcing a number of turning movements along the way.

Second, the data suggests that off-ramp queues are shorter for each of the build alternatives compared to the no-build alternative. Traffic simulation models indicated that, in both peak commute hours in 2040, traffic exiting the 900 South ramps in their current alignment would stretch back nearly one mile. Scenarios A and B offer modest improvements on this queuing, while conditions are significantly improved in Scenario C. However, the traffic simulation models for all scenarios did not extend further south than the current diversion point where the 900 South ramps leave the circulator/distributor facility that services 900 South, 1300 South, and 2100 South; moreover, in the Scenario A and B models, the worst queue lengths extended to the end of the visible model area. This suggests that queuing may actually extend further than the length of the model, with future traffic impacting the general purpose lanes on the circulator/distributor system.

If the City wishes to explore these scenarios further, the modeling effort should be expanded to evaluate the potential impacts of the ramp configurations on the circulator/distributor system; it should also consider the potential diversion of traffic to other I-15 ramps and the operational impacts on those ramps. It should be noted that, for Scenario C, the back of the worst queue lengths were visible and could be verified; this is logical because the traffic in Scenario C is being split between both the 300 West and 400 West access points.

Readers should also note that Scenarios A, B, and C all impact a UTA-owned rail corridor which crosses 300 West at approximately 1025 South (near Brooklyn Avenue). During the course of the study, Salt Lake City and UTA representatives indicated that there have been some discussions involving the use of this rail corridor (known as the "American Spur") to re-route TRAX more directly to Salt Lake Central Station. However, neither the City nor UTA has concrete plans for the alignment at this time; UTA intends to conduct a "Future of TRAX" study in late 2019 or 2020 to evaluate this and other potential alignments for future TRAX connections. The project team decided early in the evaluation process that the American Spur conflicts should not be considered a "fatal flaw" for the purpose of this analysis, since most (if not all) scenarios for shortening the ramps would have an impact on the rail corridor. A letter from UTA stating their position on this corridor is attached as Exhibit B to this technical memorandum.

PLANNING METRICS RESULTS

The project team evaluated Scenarios A, B, and C compared to the No Build Scenario to determine their performance on several planning-level metrics:

- Change in ramp length;
- Net new developable acres, which takes into account:
 - Acres gained as a result of eliminating or shortening the current ramps;
 - Acres lost through full or partial takes of property to accommodate new configurations; and

- New miles of sidewalk due to improved connectivity.

The results for each Scenario (as compared to the no-build Scenario) are shown in Table 8 below.

TABLE 8 PLANNING METRICS

Scenario	Change in Ramp Length	Net Developable Acres	New Miles of Sidewalk
<i>Scenario A, 300 West</i>	-2,180'	8.1	0.78
<i>Scenario B, 400 West</i>	-1,030'	12.0	0.78
<i>Scenario C, Combined</i>	-518	6.5	0.72

CONCEPTUAL COST ESTIMATES

Conceptual cost estimates were prepared by UDOT, based on high-level conceptual layouts of scenarios A, B, and C, prepared by Jacobs Engineering. The layouts are provided in Exhibit A attached to this memorandum along with summary information for each scenario. Strip or total takes were estimated based on the layouts, with right-of-way costs based on information from the Salt Lake County Assessor's office. UDOT's Conceptual Cost Estimates are summarized in Table 9 below, and are attached as Exhibit C to this memorandum. UDOT has also prepared memorandums regarding their position on the interchange scenarios, which are also included in Exhibit C. Additional project team meeting notes are included in Exhibit D.

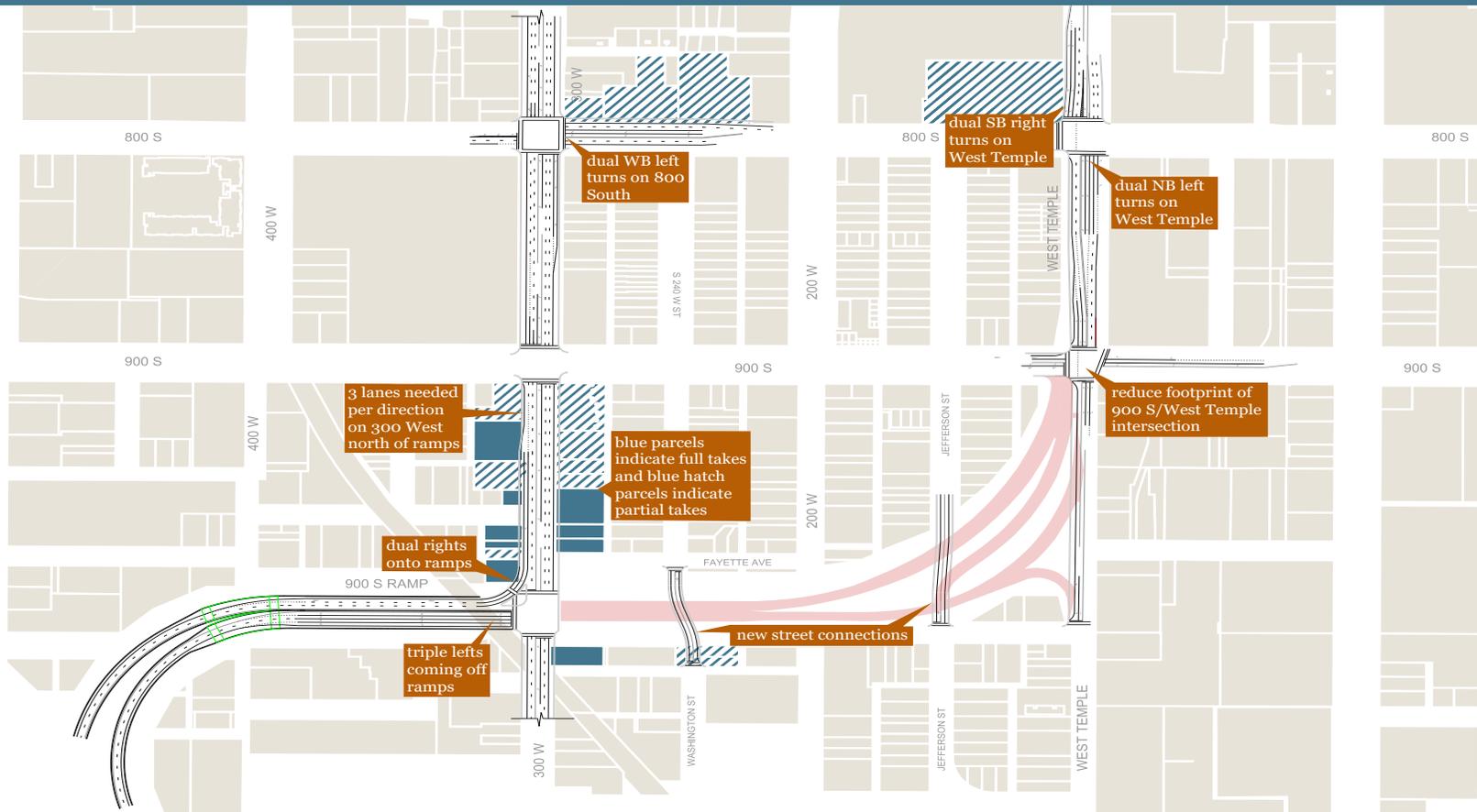
TABLE 9 CONCEPTUAL COST ESTIMATES

Scenario	2019 Conceptual Cost Estimate	2030 Conceptual Cost Estimate
<i>Scenario A, 300 West</i>	\$35,702,000	\$54,547,000
<i>Scenario B, 400 West</i>	\$28,793,000	\$44,043,000
<i>Scenario C, Combined</i>	\$38,739,000	\$59,266,000

Exhibit A: Conceptual Scenario Layouts

Scenario A: 300 West

900 South Ramp Feasibility Study



300 West: Shorten ramps to end at 300 West and roughly 1000 South

Neighborhood Improvements



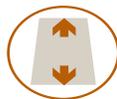
8.1

Net Change in Developable Acres



0.78

New Miles of Sidewalk



-2,180'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



0

Increase in Intersections with PM LOS E/F



-21%

Change in Traffic Served



No

Reduce Off-Ramp Queue Lengths?

Advantages

1. Greatest reduction in overall ramp length
2. Shifts traffic away from Central Ninth District
3. Less intrusion on Granary District than other scenarios (doesn't impact Fleet Block)

Disadvantages

1. Affects UTA's "American Spur" rail alignment (at 300 West)
2. Reduces the likelihood for a successful lane reconfiguration on 300 West, per City plans
3. Off-ramp queues could potentially spill back into freeway collector-distributor lanes

Constructability

23

Partial or Full Takes

\$36M

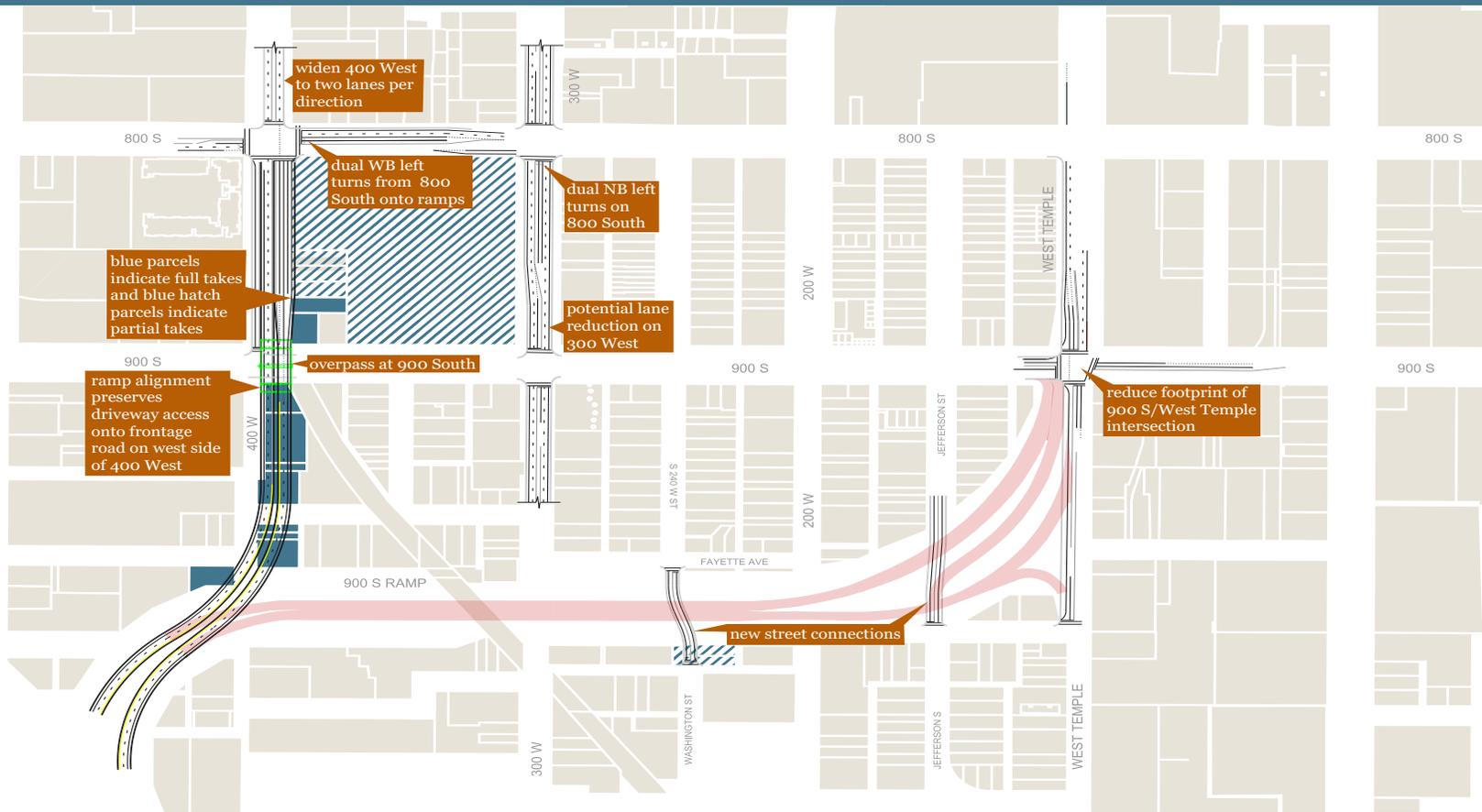
2019 Conceptual Cost

Note:

UDOT owns the 900 South on/off ramp and has no plans to change its current configuration. UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Scenario B: 400 West

900 South Ramp Feasibility Study



400 West: Realign ramps north along 400 West, passing over 900 South to touch down at 800 South

Neighborhood Improvements



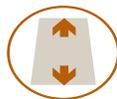
12.0

Net Change in Developable Acres



0.78

New Miles of Sidewalk



-1,030'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



1

Increase in Intersections with PM LOS E/F



-9%

Change in Traffic Served



No

Reduce Off-Ramp Queue Lengths?

Constructability

18

Partial or Full Takes

\$29M

2019 Conceptual Cost

Advantages

1. Reclaims the most land for potential redevelopment
2. Could potentially accommodate the City's plans for a lane reconfiguration on 300 West
3. Removes all freeway traffic from 900 South and 9 Line Trail crossing

Disadvantages

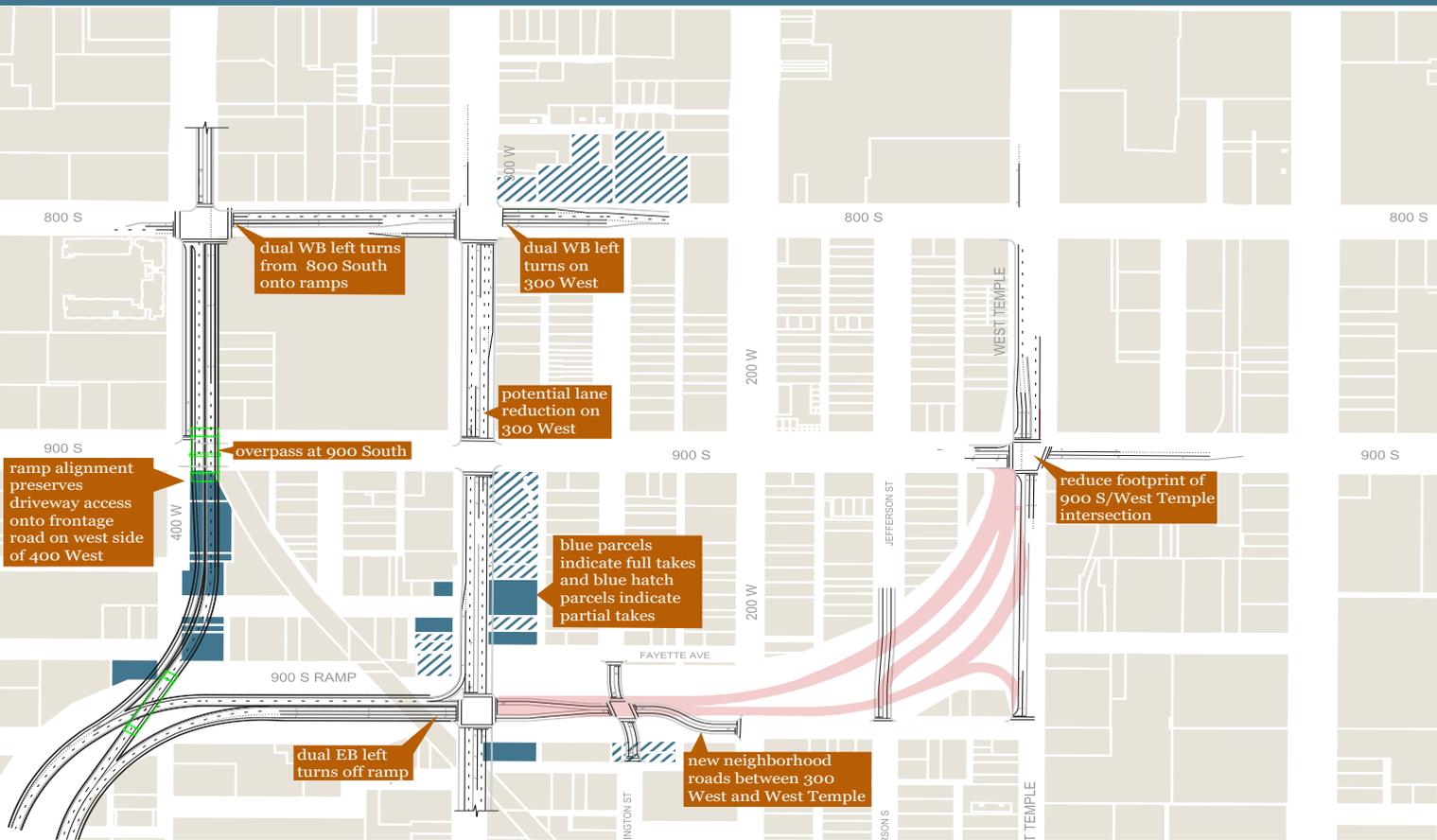
1. Affects UTA's "American Spur" rail alignment (at 400 West)
2. Impacts access to the west side of the Fleet Block and eliminates northbound access to the driveways on the Artspace Commons Block
3. Off-ramp queues could potentially spill back into freeway collector-distributor lanes

Note:
 UDOT owns the 900 South on/off ramp and has no plans to change its current configuration.
 UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Scenario C: 300/400 West Combination



900 South Ramp Feasibility Study



300/400 West Combination: Combine 300 West and 400 West options, and create a new east-west local road network

Neighborhood Improvements



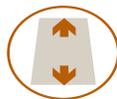
6.5

Net Change in Developable Acres



0.72

New Miles of Sidewalk



-518'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



2

Increase in Intersections with PM LOS E/F



+7%

Change in Traffic Served



Yes

Reduce Off-Ramp Queue Lengths?

Constructability

28

Partial or Full Takes

\$39M

2019 Conceptual Cost

Advantages

1. Most improvement in reducing queues on the ramps
2. Re-establishes east-west street grid between 300 West and West Temple
3. Serves more overall traffic in the study area, even though some individual intersections perform worse than the baseline

Disadvantages

1. Affects UTA's "American Spur" rail alignment, twice (at 300 West and at 400 West)
2. Impacts access to the west side of the Fleet Block and eliminates northbound access to the driveways on the Artspace Commons Block

Note:
 UDOT owns the 900 South on/off ramp and has no plans to change its current configuration.
 UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Exhibit B: UTA letter regarding rail spur

August 22, 2019

Mr. Jonathon Larsen
Director of Transportation
Salt Lake City
349 South 200 East, Ste 150
Salt Lake City, UT 84111

Dear Mr. Larsen:

Re: Utah Transit Authority's (UTA) use of the Paxton railroad spur corridor property

Thank you for the opportunity to comment on the status of UTA-owned rail corridor spur, referred to in a number of ways: the Paxton American spur, the American spur, or the Ballpark spur. UTA purchased the right-of-way as part of railroad corridor purchase for the original North-South Line in 1993. A graphic is provided below to indicate the general location of the property in question. It extends from approximately 1300 South and 200 West to 800 South and 400 West.

UTA understands that Salt Lake City engaged a consultant to evaluate the impacts of a number of alternatives that would revise the roadway structure and traffic movement surrounding the ramp to the 900 South interchange on Interstate 15. While UTA did not participate directly in the study, we have been told that each alternative would require the abandonment of the Paxton spur.

UTA reserves the right to preserve all of its rail corridor properties for potential future public transit service, even if temporarily used for another purpose. A future light rail transit project has been planned for this particular length of corridor in the Wasatch Front Regional Council's Regional Transportation Plan 2019-2050 (RTP). The RTP is the result of a regional planning process which includes municipal and agency outreach, scenario development, and technical analyses. The Green TRAX Line Reconfiguration is currently a Phase 2 project on the RTP. Additionally, UTA will be analyzing the entire TRAX system in an upcoming study and will assume the Paxton spur as an available corridor for future use.

Because the right-of-way was purchased with federal funds, any disposition would require concurrence from the Federal Transit Administration. UTA does not plan on abandoning the Paxton spur now or in the foreseeable future.

Sincerely,



Laura A. Hanson, Director of Planning

Exhibit C: UDOT Cost Estimate and Memorandums

PIN: PROJECT # PROJECT NAME:
Cost Estimate - Concept Level

Prepared By:

Date

Proposed Project Scope:

Approximate Route Reference Mile Post (BEGIN) =		(END) =	
Project Length =	0.000	miles	ft
Current FY Year (July-June) =	2018		
Assumed Construction FY Year =	2030		
Construction Items Inflation Factor =	1.56	12 yrs for inflation	
Assumed Yearly Inflation for Engineering Services (PE and CE) (%/yr) =	3.0%		
Assumed Yearly Inflation for Right of Way (%/yr) =	3.0%		
Items not Estimated (% of Construction) =	30.0%		
Preliminary Engineering (% of Construction + Incentives) =	8.0%		
Construction Engineering (% of Construction + Incentives) =	10.0%		

Construction Items	300 W Cost	400 W Cost	300 W + 400 W	Remarks	
Public Information Services	\$75,000	\$75,000	\$75,000		
Roadway and Drainage	\$6,383,372	\$4,941,221	\$8,580,843		
Traffic and Safety	\$0				
Structures	\$7,911,512	\$6,186,440	\$7,703,912		
Environmental Mitigation	\$2,000,000	\$2,000,000	\$2,000,000		
ITS	\$0				
	Subtotal	\$16,369,884	\$13,202,661	\$18,359,755	
	Items not Estimated (30%)	\$4,910,965	\$3,960,798	\$5,507,927	
	Construction Subtotal	\$21,280,849	\$17,163,459	\$23,867,682	
P.E. Cost	P.E. Subtotal	\$1,722,468	\$1,393,077	\$1,929,415	8%
C.E. Cost	C.E. Subtotal	\$2,153,085	\$1,741,346	\$2,411,768	10%
Right of Way	Right of Way Subtotal	\$5,205,836	\$3,811,188	\$4,936,764	
Utilities	Utilities Subtotal	\$3,000,000	\$3,000,000	\$3,000,000	
Incentives	Incentives Subtotal	\$250,000	\$250,000	\$250,000	
Miscellaneous	Miscellaneous Subtotal	\$0			

Cost Estimate (ePM screen 505)	300 W	400 W	300 W + 400 W
P.E.	\$1,722,000	\$1,393,000	\$1,929,000
Right of Way	\$5,206,000	\$3,811,000	\$4,937,000
Utilities	\$3,000,000	\$3,000,000	\$3,000,000
Construction	\$21,281,000	\$17,163,000	\$23,868,000
C.E.	\$2,153,000	\$1,741,000	\$2,412,000
Incentives	\$250,000	\$0	\$250,000
Aesthetics	0.75% \$160,000	0.75% \$129,000	0.75% \$179,000
Change Order Contingency	9.00% \$1,930,000	9.00% \$1,556,000	9.00% \$2,164,000
UDOT Oversight	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0
TOTAL	\$35,702,000	\$28,793,000	\$38,739,000
2030 TOTAL	\$54,547,000	2030 TOTAL \$44,043,000.00	2030 TOTAL \$59,266,000.00

Project Assumptions/Risks

- | | |
|--|---|
| <p>1 Used quantities provided for major items and added supporting items as part of the pavement section.</p> <p>2 Items not estimated at 30% as that was the value provided</p> <p>Major warning is these numbers do not include Utility estimates.</p> <p>3 Due to existing rail, possible aged public utilities there is no way to estimate without a clear picture of possible impacts.</p> <p>4 Used provided ROW quantities and costs - the quantities and costs appear lower than expected.</p> <p>5 2030 inflation value used.</p> <p>6</p> <p>7</p> | <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> |
|--|---|

Inflation

PIN: PROJECT # PROJECT NAME:

Year	Rate	Recommended Rate	Cumulative Inflation Factor
2018	5.5%	0.0%	1.00
2019	5.5%	5.5%	1.06
2020	4.5%	4.5%	1.10
2021	4.0%	4.0%	1.15
2022	3.5%	3.5%	1.19
2023	3.5%	3.5%	1.23
2024	3.5%	3.5%	1.27
2025	3.5%	3.5%	1.32
2026	3.5%	3.5%	1.36
2027	3.5%	3.5%	1.41
2028	3.5%	3.5%	1.46
2029	3.5%	3.5%	1.51
2030	3.5%	3.5%	1.56
2031	3.5%	3.5%	1.62
2032	3.5%	3.5%	1.67
2033	3.5%	3.5%	1.73
2034	3.5%	3.5%	1.79
2035	3.5%	3.5%	1.86
2036	3.5%	3.5%	1.92
2037	3.5%	3.5%	1.99
2038	3.5%	3.5%	2.06
2039	3.5%	3.5%	2.13
2040	3.5%	3.5%	2.20
2041	3.5%	3.5%	2.28
2042	3.5%	3.5%	2.36
2043	3.5%	3.5%	2.44
2044	3.5%	3.5%	2.53
2045	3.5%	3.5%	2.62
2046	3.5%	3.5%	2.71
2047	3.5%	3.5%	2.80

Please contact UDOT Estimate Support with any questions (801-965-4708).

Roadway and Drainage

PIN: PROJECT # PROJECT NAME:

Item #	Item	Quantity	Units	Price	Cost	Remarks
Roadway						
015017010	Mobilization	1	lump	\$1,000,000.00	\$1,000,000.00	Usually 7-10% of construction
015547005	Traffic Control	1	lump	\$300,000.00	\$300,000.00	Usually 3-5% of construction
01557001*	Maintenance of Traffic	1	Lump	\$200,000.00	\$200,000.00	Usually 1% of construction
015727020	Dust Control and Watering	3,079	1000 gallon			
020567005	Borrow (Plan Quantity)	0	cubic yard			
020567010	Borrow	0	ton			
020567015	Granular Borrow (Plan Quantity)	13,721	cubic yard			
020567020	Granular Borrow	26,304	ton	\$25.00	\$657,592.24	
020567025	Granular Backfill Borrow (Plan Quantity)	0	cubic yard			
022217015	Remove Bridge		each			
022217080	Remove Fence		foot			
022217095	Remove Pipe		foot			
022317010	Clearing and Grubbing		lump			
023167020	Roadway Excavation (Plan Quantity)	46,608	cubic yard	\$18.00	\$838,944.00	
027217010	Untreated Base Course	8,521	ton	\$27.00	\$230,064.66	
027217020	Untreated Base Course (Plan Quantity)	4,574	cubic yard			
027357010	Micro-Surfacing	0	square yard			
02737001*	Asphalt Pavement Soft Spot Repair - Type A		sq yd			
02737002*	Asphalt Pavement Soft Spot Repair - Type B		sq yd			
027417050	HMA - 1/2 Inch	9,138	ton	\$78.00	\$712,792.94	
027487010	Liquid Asphalt MC-70 or MC-250	55	ton	\$350.00	\$19,286.94	Prime Coat
027487040	Emulsified Asphalt CSS-1	24	ton	\$450.00	\$10,805.51	Tack Coat
027527020	Portland Cement Concrete Pavement 9 inch Thick	0	square yard			
027767025	Concrete Curb and Gutter Type B1	7,527	foot	\$24.00	\$180,648.00	
027767010	Concrete Sidewalk	33,150	square foot	\$10.00	\$331,500.00	
027857020	Chip Seal Coat, Type II	0	square yard			
027857060	Emulsified Asphalt LMCRS-2	0	ton			Chip Seal Emulsion
027857075	Emulsified Asphalt HFMS-2P	0	ton			Flush Coat
027867010	Open Graded Surface Course	1,389	ton	\$65.00	\$90,303.16	
027867020	Asphalt Binder PG 64-34	85	ton	\$1.00	\$84.75	OGSC Binder
027877020	Bonded Wearing Course - Type B	0	square yard			
#N/A	Barrier	5,409	ft	\$150.00	\$811,350.00	
#N/A	Signalized Intersection	4	each	\$250,000.00	\$1,000,000.00	
Roadway Subtotal					\$6,383,372	
Drainage						
023737010	Loose Riprap		cubic yard			
026107386	Drainage Pipe - 18 inch, Smooth, Leak-Resistant		foot			
026107388	Drainage Pipe - 24 inch, Smooth, Leak-Resistant		foot			
026107391	Drainage Pipe - 36 inch, Smooth, Leak-Resistant		foot			
026337130	Concrete Drainage Structure 5 ft to 7 ft deep - CB 9		each			
Drainage Subtotal					\$0	
PI						
015407010	Public Information Services	1	lump	\$75,000.00	\$75,000	Usually 0.25% of construction

Roadway and Drainage

PIN: PROJECT # PROJECT NAME:

Item #	Item	Quantity	Units	Price	Cost	Remarks
Roadway						
015017010	Mobilization	1	lump	\$850,000.00	\$850,000.00	Usually 7-10% of construction
015547005	Traffic Control	1	lump	\$200,000.00	\$200,000.00	Usually 3-5% of construction
01557001*	Maintenance of Traffic	1	Lump	\$150,000.00	\$150,000.00	Usually 1% of construction
015727020	Dust Control and Watering	3,079	1000 gallon			
020567005	Borrow (Plan Quantity)	0	cubic yard			
020567010	Borrow	0	ton			
020567015	Granular Borrow (Plan Quantity)	14,909	cubic yard	\$0.00	\$0.00	
020567020	Granular Borrow	28,581	ton	\$25.00		
020567025	Granular Backfill Borrow (Plan Quantity)	0	cubic yard	\$0.00	\$0.00	
022217015	Remove Bridge		each	\$0.00		
022217080	Remove Fence		foot	\$0.00		
022217095	Remove Pipe		foot	\$0.00		
022317010	Clearing and Grubbing		lump	\$0.00		
023167020	Roadway Excavation (Plan Quantity)	7,582	cubic yard	\$18.00	\$136,476.00	
027217010	Untreated Base Course	9,259	ton	\$27.00	\$249,985.72	
027217020	Untreated Base Course (Plan Quantity)	4,970	cubic yard	\$0.00	\$0.00	
027357010	Micro-Surfacing	0	square yard	\$0.00	\$0.00	
02737001*	Asphalt Pavement Soft Spot Repair - Type A		sq yd	\$0.00		
02737002*	Asphalt Pavement Soft Spot Repair - Type B		sq yd	\$0.00		
027417050	HMA - 1/2 Inch	9,930	ton	\$78.00	\$774,512.93	
027487010	Liquid Asphalt MC-70 or MC-250	60	ton	\$350.00	\$20,956.97	Prime Coat
027487040	Emulsified Asphalt CSS-1	26	ton	\$450.00	\$11,741.14	Tack Coat
027527020	Portland Cement Concrete Pavement 9 inch Thick	0	square yard	\$0.00	\$0.00	
027767025	Concrete Curb and Gutter Type B1	6,286	foot	\$24.00	\$150,864.00	
027767010	Concrete Sidewalk	29,117	square foot	\$10.00	\$291,170.00	
027857020	Chip Seal Coat, Type II	0	square yard	\$0.00	\$0.00	
027857060	Emulsified Asphalt LMCRS-2	0	ton	\$0.00	\$0.00	Chip Seal Emulsion
027857075	Emulsified Asphalt HFMS-2P	0	ton	\$0.00	\$0.00	Flush Coat
027867010	Open Graded Surface Course	1,510	ton	\$65.00	\$98,122.42	
027867020	Asphalt Binder PG 64-34	92	ton	\$1.00	\$92.08	OGSC Binder
027877020	Bonded Wearing Course - Type B	0	square yard	\$0.00		
#N/A	Barrier	8,382	ft	\$150.00	\$1,257,300.00	
#N/A	Signalized Intersection	3	each	\$250,000.00	\$750,000.00	
Roadway Subtotal					\$4,941,221	
Drainage						
023737010	Loose Riprap		cubic yard			
026107386	Drainage Pipe - 18 inch, Smooth, Leak-Resistant		foot			
026107388	Drainage Pipe - 24 inch, Smooth, Leak-Resistant		foot			
026107391	Drainage Pipe - 36 inch, Smooth, Leak-Resistant		foot			
026337130	Concrete Drainage Structure 5 ft to 7 ft deep - CB 9		each			
Drainage Subtotal					\$0	
PI						
015407010	Public Information Services	1	lump		\$75,000	Usually 0.25% of construction

Roadway and Drainage

PIN: PROJECT # PROJECT NAME:

Item #	Item	Quantity	Units	Price	Cost	Remarks
Roadway						
015017010	Mobilization	1	lump	\$1,100,000.00	\$1,100,000.00	Usually 7-10% of construction
015547005	Traffic Control	1	lump	\$325,000.00	\$325,000.00	Usually 3-5% of construction
01557001*	Maintenance of Traffic	1	Lump	\$250,000.00	\$250,000.00	Usually 1% of construction
015727020	Dust Control and Watering	3,079	1000 gallon			
020567005	Borrow (Plan Quantity)	0	cubic yard			
020567010	Borrow	0	ton			
020567015	Granular Borrow (Plan Quantity)	23,552	cubic yard	\$0.00	\$0.00	
020567020	Granular Borrow	45,148	ton	\$25.00		
020567025	Granular Backfill Borrow (Plan Quantity)	0	cubic yard	\$0.00	\$0.00	
022217015	Remove Bridge		each	\$0.00		
022217080	Remove Fence		foot	\$0.00		
022217095	Remove Pipe		foot	\$0.00		
022317010	Clearing and Grubbing		lump	\$0.00		
023167020	Roadway Excavation (Plan Quantity)	90,126	cubic yard	\$18.00	\$1,622,268.00	
027217010	Untreated Base Course	14,625	ton	\$27.00	\$394,888.00	
027217020	Untreated Base Course (Plan Quantity)	7,851	cubic yard	\$0.00	\$0.00	
027357010	Micro-Surfacing	0	square yard	\$0.00	\$0.00	
02737001*	Asphalt Pavement Soft Spot Repair - Type A		sq yd	\$0.00		
02737002*	Asphalt Pavement Soft Spot Repair - Type B		sq yd	\$0.00		
027417050	HMA - 1/2 Inch	15,685	ton	\$78.00	\$1,223,453.32	
027487010	Liquid Asphalt MC-70 or MC-250	95	ton	\$350.00	\$33,104.52	Prime Coat
027487040	Emulsified Asphalt CSS-1	41	ton	\$450.00	\$18,546.81	Tack Coat
027527020	Portland Cement Concrete Pavement 9 inch Thick	0	square yard	\$0.00	\$0.00	
027767025	Concrete Curb and Gutter Type B1	8,821	foot	\$24.00	\$211,704.00	
027767010	Concrete Sidewalk	40,938	square foot	\$10.00	\$409,380.00	
027857020	Chip Seal Coat, Type II	0	square yard	\$0.00	\$0.00	
027857060	Emulsified Asphalt LMCRS-2	0	ton	\$0.00	\$0.00	Chip Seal Emulsion
027857075	Emulsified Asphalt HFMS-2P	0	ton	\$0.00	\$0.00	Flush Coat
027867010	Open Graded Surface Course	2,385	ton	\$65.00	\$154,998.31	
027867020	Asphalt Binder PG 64-34	145	ton	\$1.00		OGSC Binder
027877020	Bonded Wearing Course - Type B	0	square yard	\$0.00		
#N/A	Barrier	12,250	ft	\$150.00	\$1,837,500.00	
029617020	Rotomilling - 1 Inch	4	square yard	\$250,000.00	\$1,000,000.00	
Roadway Subtotal					\$8,580,843	
Drainage						
023737010	Loose Riprap		cubic yard			
026107386	Drainage Pipe - 18 inch, Smooth, Leak-Resistant		foot			
026107388	Drainage Pipe - 24 inch, Smooth, Leak-Resistant		foot			
026107391	Drainage Pipe - 36 inch, Smooth, Leak-Resistant		foot			
026337130	Concrete Drainage Structure 5 ft to 7 ft deep - CB 9		each			
Drainage Subtotal					\$0	
PI						
015407010	Public Information Services	1	lump		\$75,000	Usually 0.25% of construction

Structures

PIN: PROJECT # PROJECT NAME:

Item #	Item	Quantity	Units	Price	Cost	Remarks
Bridges						
	Remove Existing	140,132	yd3	\$16.00	\$2,242,112.00	
			sq ft			
	New Structure	18,898	sq ft	\$300.00	\$5,669,400.00	Assumed LxW (deck area)
Walls						
	Retaining Wall		sq ft			Assumed LxH (wall area)
Sign Structures						
	Overhead Sign Structure	1	Lump			
028917265	Remove Overhead Sign	1	Lump			
	Remove Existing Overhead Sign Structure	1	Lump			
Hydraulics						
	Extend Box Culvert		ft			
	New Box Culvert	1	Lump			
Geotech						
	Geotech Report	1	Lump			
	Drilling	1	Lump			
Structures Subtotal					\$7,911,512	

Structures

PIN: PROJECT # PROJECT NAME:

Item #	Item	Quantity	Units	Price	Cost	Remarks
Bridges						
	Remove Existing	186,740	yd3	\$16.00	\$2,987,840.00	
	New Structure	10,662	sq ft	\$300.00	\$3,198,600.00	Assumed LxW (deck area)
Walls						
	Retaining Wall		sq ft			Assumed LxH (wall area)
Sign Structures						
	Overhead Sign Structure	1	Lump			
028917265	Remove Overhead Sign	1	Lump			
	Remove Existing Overhead Sign Structure	1	Lump			
Hydraulics						
	Extend Box Culvert		ft			
	New Box Culvert	1	Lump			
Geotech						
	Geotech Report	1	Lump			
	Drilling	1	Lump			
Structures Subtotal					\$6,186,440	

Structures

PIN: PROJECT # PROJECT NAME:

Item #	Item	Quantity	Units	Price	Cost	Remarks
Bridges						
	Remove Bridge	140,132	yd3	\$16.00	\$2,242,112.00	Assumed LxW (deck area)
	New Bridge	18,206	sq ft	\$300.00	\$5,461,800.00	
Walls						
	Retaining Wall		sq ft			Assumed LxH (wall area)
Sign Structures						
	Overhead Sign Structure	1	Lump			
028917265	Remove Overhead Sign	1	Lump			
	Remove Existing Overhead Sign Structure	1	Lump			
Hydraulics						
	Extend Box Culvert		ft			
	New Box Culvert	1	Lump			
Geotech						
	Geotech Report	1	Lump			
	Drilling	1	Lump			
Structures Subtotal					\$7,703,912	



State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

JASON E. DAVIS, P.E.
Deputy Director of Engineering and Operations

TERIANNE S. NEWELL, P.E.
Deputy Director of Planning and Investment

Dear Mr. Larson,

We appreciate the opportunity to collaborate with Salt Lake City staff in the 900 South ramps study this past year. Since this a very high level evaluation, we know that the actual cost for all three studied options cannot be accurately assessed without a more in depth design level cost estimate. It is our opinion that the actual quantities of all construction related items would be much higher.

- (1) There was not a subsurface utility engineering level survey for the relocation of existing utilities, the cost would most likely be significantly higher.
- (2) The right of way acquisition cost likely would be higher because the new ramps alignments will alter existing accesses of various properties. Total takes, business relocations and litigation will be inevitable and may be much costlier than shown in these estimates.
- (3) The three studied options were based on the assumption that UTA will abandon the Trax line on 400 West. UTA has indicated they do have a plan in place to develop the Trax line in the future. The actual cost of relocating the ramps would become prohibiting with the Trax Line remaining in place and the benefits of rerouting traffic to 400 West and 300 West will no longer be viable due to geometry complication.
- (4) Another option that could be evaluated further is renovating the existing ramps by new landscape features that creates a more welcoming and city gateway appearance, which will be beneficial to the surrounding redevelopments.

As the city planning staff shared with us the many redevelopment plans within the area, it is clear that the traffic volume accessing Salt Lake City through the 900 South ramps and the adjacent interchanges will continue to rise. UDOT is committed to work with Salt Lake City to identify the best and most viable option to improve mobility and safety with the 900 South ramps.

Regards,

Peter Tang, P.E.
Region 2 Traffic & Safety

Memorandum

UTAH DEPARTMENT OF TRANSPORTATION

DATE: June 7, 2019
TO: Jeff Gulden, PE, PTOE
Salt Lake City Traffic Engineer

FROM: Grant Farnsworth, PE, PTOE
Region 2 Planning Manager

SUBJECT: I-15 & 900 South Ramp Closure Analysis

Introduction

A traffic study is currently evaluating interchange alternatives at 900 South. One of the alternative is to close 900 South completely. This alternative was temporarily in place during the reconstruction of the 900 South ramp bridges. This evaluation is to capture the traffic impacts of closing the 900 South ramp for 2017 summer conditions. The construction closure was from July 27 to September 4 2017.

The data for the analysis is taken from anonymized probe data source. The probe data samples were high in all count periods to provide a high confidence in the results. The impacts to the surrounding roadway network were primarily towards downtown Salt Lake City in the morning commute and both towards and away downtown in the evening commute. This is due to the higher volumes on the 900 South off ramp in the morning and both the off and on ramp in the evening as shown in Figure 1.

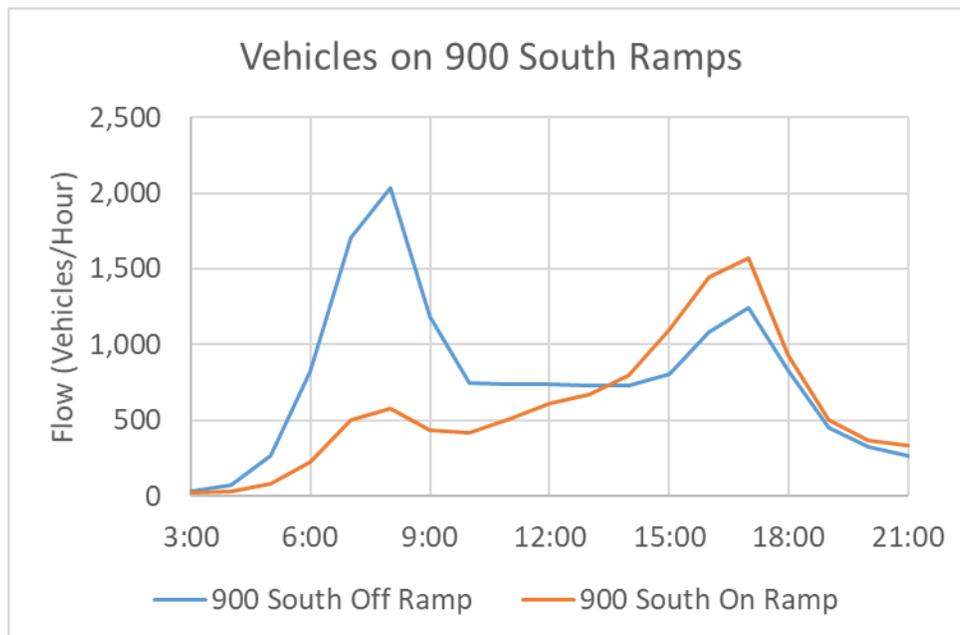


Figure 1: Time of Day 900 South Ramp Volumes

Interstate Impacts

The closure of the 900 South off ramp affects I-15 Northbound operations due to the increased amount of vehicles exiting at 600 South. The travel time delays on I-15 are shown on Figure 2. Figure 3 shows a traffic map of a typical morning during construction.

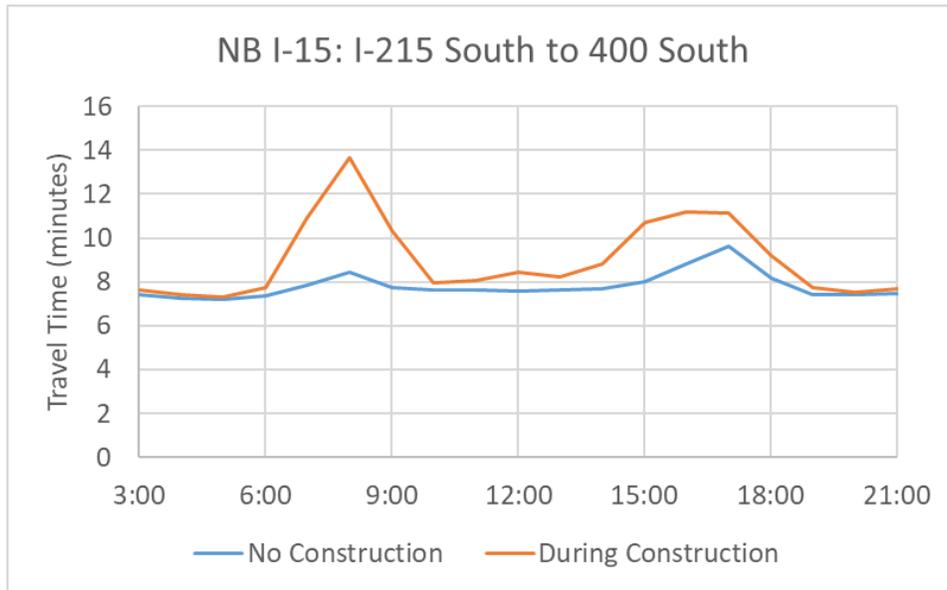


Figure 2: Travel Time Northbound I-15: I-215 South to 400 South

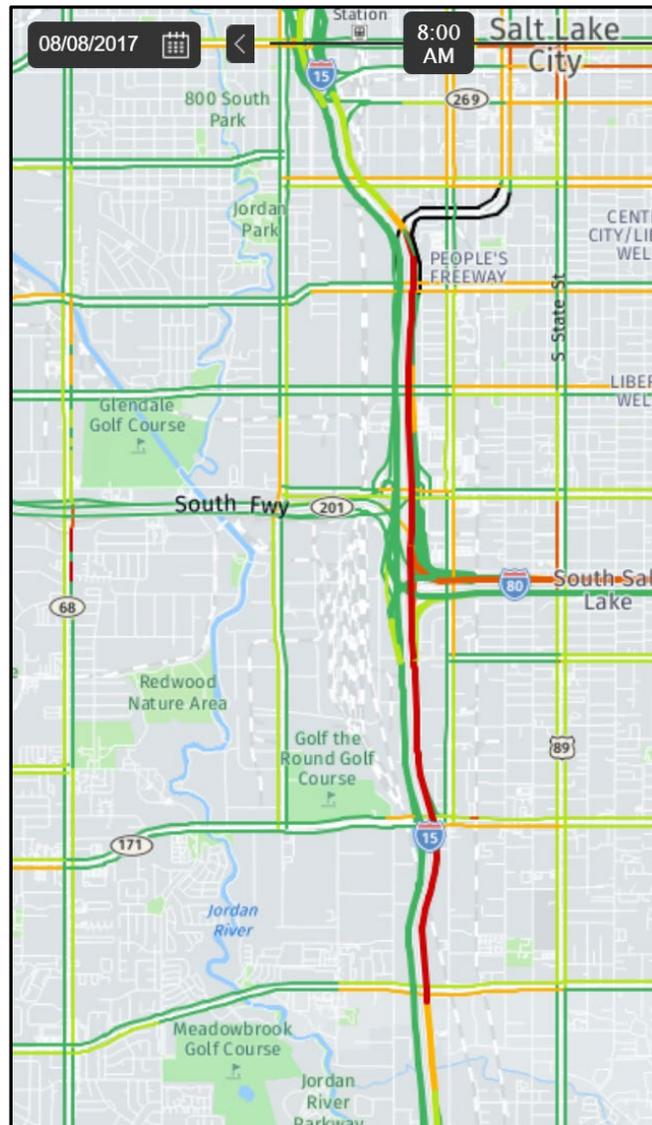


Figure 3: Typical Morning Traffic Congestion during a 900 South Closure

Surface Street Impacts

The state and local street network were also impacted by the 900 South construction. One of the primary detour routes for vehicles entering I-15 was 500 South. The travel time delays for westbound 500 South are shown on Figure 4. Figure 5 shows a traffic map of a typical afternoon during construction.

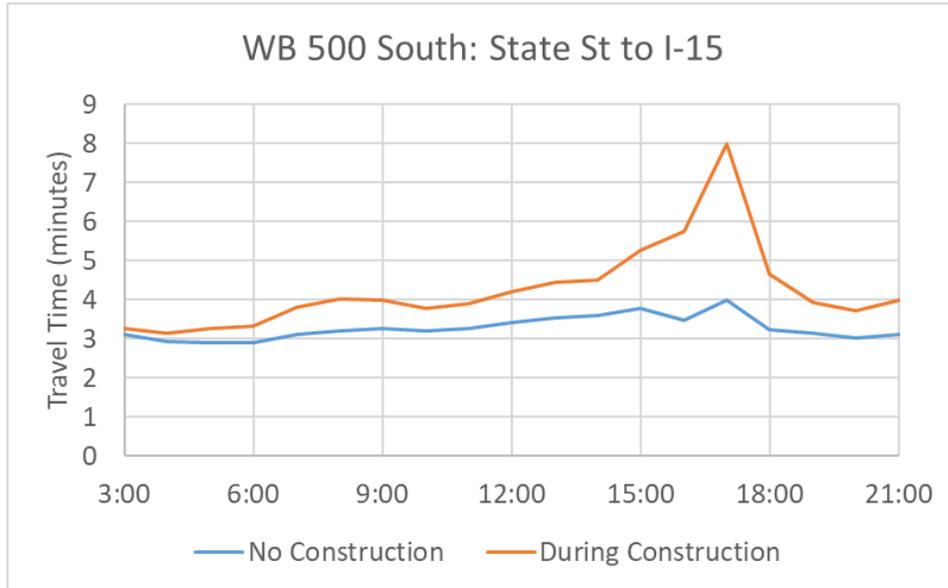


Figure 4: Travel Time Westbound 500 South: State Street to I-15

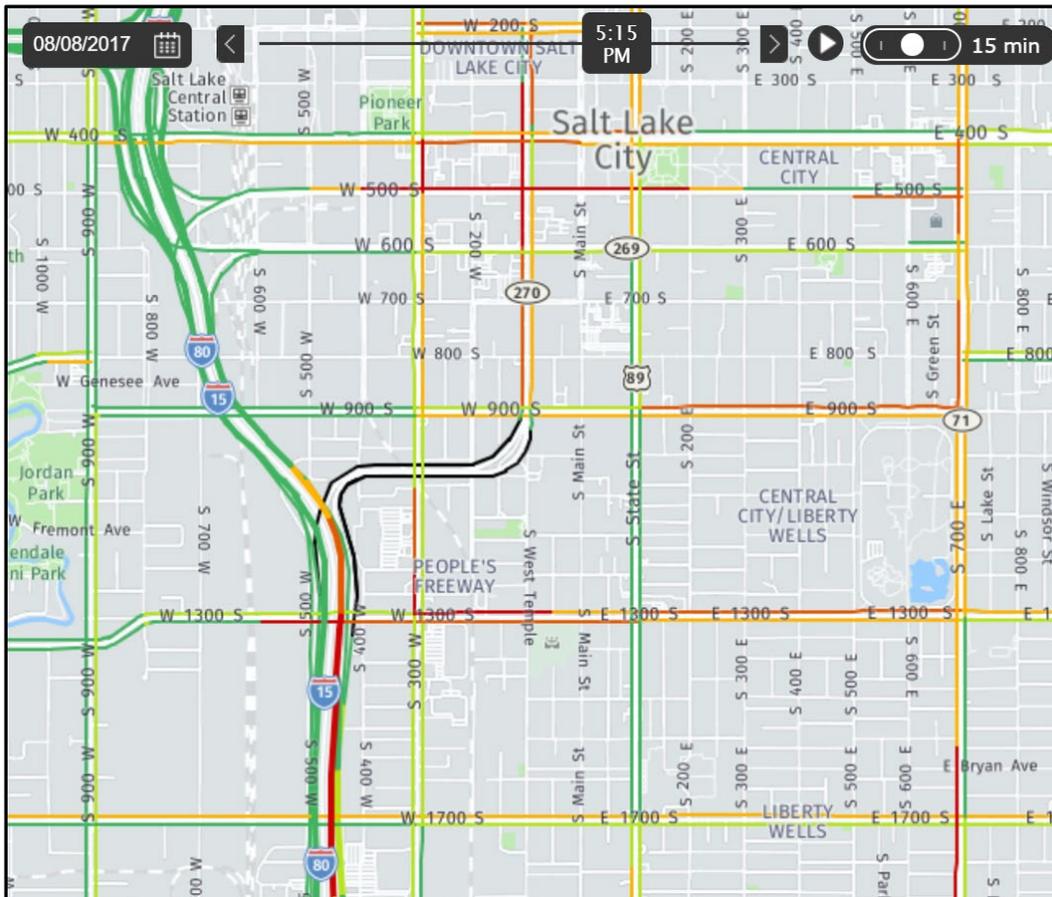


Figure 5: Typical Afternoon Traffic Congestion during a 900 South Closure

Summary

The 900 South closure had significant impacts to I-15 and the surface street network in Salt Lake City. The westbound 500 South travel time from State Street to I-15 increased by 5 minutes. The I-15 northbound travel time from I-215 South to 400 South increased by 6 minutes in the morning and 3 minutes in the afternoon. The forecasted growth in volumes in future years would enlarge the duration of the delays and intensify their impact.

Exhibit D: Project Team Meeting Notes

900 South Ramps Feasibility Study
Meeting Minutes



Meeting: Kickoff Meeting

Date & Time: May 31 2018, 3PM-4PM

Location: Salt Lake City Transportation Conference Room, 1st Floor

Attendees: Jeff Gulden, Kevin Young, Kort Utley, JP Goates, Brad Palmer, Peter Tang, Maria Vyas, Seishi Yamagata, Jason Phillips, Adam Pocock

1. Introductions and project background
 - a. Jeff provided some background about the project. Kevin mentioned that the City has been talking about changes to this interchange for 20 years.
 - b. JP will be moving to the RDA within two weeks; the Planning Division will need to identify a new representative.
2. Review scope and schedule
 - a. The project team reviewed the scope and schedule.
 - b. Peter asked about the degree to which adjacent interchanges would be studied; Maria responded that they will be evaluated at a high level using the travel demand model when the future interchange options are analyzed, rather than at a microsimulation level.
3. Opportunities, constraints, and issues
 - a. Fehr & Peers will purchase Streetlight data for this project, and can capture travel patterns to a few areas outside the immediate interchange area. What locations might be the most important in understanding how this interchange functions?
 - i. We may not be able to get all of these so listed in order of importance:
 1. U of U/Research Park
 2. Downtown CBD
 3. North of 600 South, from 300 West to State Street
 4. South of 600 South, from 300 West to State Street
 5. Liberty Park area – from State Street to 700 East
 - ii. Fehr & Peers will create a map outlining the zones for Jeff to approve prior to purchasing the data
 - b. Central Ninth District: the RDA has design drawings for roadway, streetscape, and utility improvements between West Temple and 300 West.
 - i. City Council has appropriated funding for these improvements, given some conditions: that maintenance gets funded also, and that Rocky Mountain Power will bury the overhead power lines (among other conditions that were not discussed).

900 South Ramps Feasibility Study
Meeting Minutes

- ii. The RDA is trying to foster support for local business nodes such as those in the Central Ninth, putting infrastructure in place to encourage private investment.
 - iii. Spy Hop is coming into the neighborhood, in addition to several new businesses.
 - iv. More new residential is getting built in the area also.
 - v. The RDA went through a neighborhood visioning process, and the goals that were established through that process for 900 South were to “narrow it up, slow it down, and make it pretty”. The plans that have been developed are reflecting those goals. Another goal was to provide more on-street parking for businesses.
 - vi. The sentiment coming out of the visioning process is that 900 South shouldn’t be viewed as a commuter corridor - 800 South should be the commuter corridor, and 900 South is more of a local neighborhood and business node.
 - vii. 9 Line recommendations are incorporated into the Central Ninth plans and include a shared lane on-street on 900 South, with additional bike facilities behind the curb and separated from pedestrian zones.
 - viii. Kort suggested that the RDA is open to changes to the Central Ninth plans should this study determine that they are necessary. Jeff suggested that the team look at the initial results of the traffic analysis when the 2040 No-Build work is done, and reassess at that point. The Central Ninth plans do include reducing lanes from 2 per direction to 1 per direction and this will likely be included in the 2040 No-Build analysis.
 - ix. Kort has names of contacts in the Central Ninth district who might be good to involve in the public outreach process. Maria will reach out separately to Kort to get contact names.
 - x. Maria will share the Central Ninth draft plans with this group; please remember that they are DRAFT plans and subject to change.
- c. Planning Department updates: JP identified a number of projects in different stages of development in the area. The Central Ninth has a form-based code in place that allows for more flexibility, greater density, and less parking.
- i. Fleet Block is a big question – has been under discussion for a long time but progress has been limited.
 - ii. Natural gas station and Henrie’s dry cleaners sites are both being redeveloped with multifamily townhomes.
 - iii. New office project is coming online at 650 South Main with 300KSF of office
 - iv. There is also discussion of a new TRAX station around 650 South Main.

900 South Ramps Feasibility Study
Meeting Minutes

- v. New projects are also planned around the 600 South off-ramp, including a 180-room hotel site.
 - vi. JP can pull a full report of planned development happening in the area.
 - vii. Jason asked how the traffic operations analysis would account for all the new development. Maria responded that these numbers should be captured in the updated socioeconomic data profiles that WFRC has been developing in support of the 2019-2050 RTP.
4. Next Steps
- a. Maria will send a Doodle poll for a site visit, and will include UTA rep (TBD) and a new Planning rep (also TBD)

900 South Ramps Feasibility Study
Meeting Minutes



Meeting: Review Existing Conditions

Date & Time: August 29 2018, 3PM-4:30PM

Location: Salt Lake City Transportation Conference Room, 1st Floor

Attendees: Jeff Gulden, Kevin Young, John Anderson, Brad Palmer, Peter Tang, Grant Farnsworth, Maria Vyas, Seishi Yamagata, Jason Phillips, Adam Pocock

1. Introductions and follow-up - Maria
 - a. Follow-up from last meeting:
 - i. John Anderson is the new Planning Department representative
 - ii. Fehr & Peers purchased Streetlight data based on location recommendations from group
 - iii. Central Ninth RDA design drawings were obtained and accounted for
 - iv. JP provided information on all planned projects in the area and contacts from previous RDA visioning efforts
2. Site visit review – Jason/Adam
 - a. 900 South/West Temple
 - i. RDA plans reduce 900 South from two lanes per direction to one
 - ii. Observed high volumes and queueing on 900 S off ramp ~8:45 AM, observed higher than expected NB RT off the ramp; it may be easier for people going eastbound to turn at 900 South than it is to turn eastbound on 800 South
 - iii. Existing intersection restricts NB to WB left turn movement
 - iv. Observed and discussed West Temple NB off ramp weave for NB to 900 S EB movement
 - v. 900 S WB to I-15 SB dual left turn lanes are proposed
 - vi. Long exposure for pedestrians crossing east-west at intersection
 - vii. Lane configuration is awkward for West Temple SB through movement between existing ramps
 - viii. Long term plans for the Trans-Valley corridor/9 Line project on 900 South – think about how pedestrians may need to cross this corridor in the future
 - b. West Temple at 1000 S Intersection
 - i. 900 S EB to SB sharp radius and steep grade is forcing traffic calming for flow into neighborhood
 - ii. West Temple SB free flow feeds to Jefferson St; East and West is a stop sign

900 South Ramps Feasibility Study
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- iii. WB has sight distance limitations
 - iv. No street lighting
 - c. 200 West/1000 South
 - i. 200 W NB & SB vehicles share lanes with TRAX (one of only two places where TRAX shares lanes with vehicles, this is not a preferred situation for transit or other roadway users)
 - ii. Observed a near miss of a WB to SB vehicle with NB TRAX
 - iii. There are three TRAX lines that use this section – red, blue, green
 - iv. Substation present on north side of existing Ramps
 - v. No ped crossing across 200 W
 - vi. Street lighting and signing was not visible
 - vii. Large trucks frequent industrial area to the south (candy factory mentioned)
 - viii. 250 high-density units under construction along 200 West
 - d. Fayette Avenue
 - i. New developments in planning process
 - ii. Parking issues along ramp r/w fence line; developer desiring to use public space as part of parking requirements
 - iii. Land use in area is changing from single family residential to mixed use and high density
 - e. 300 West
 - i. Substructure rehab underway
 - ii. Deck replaced in 2015? (not sure about this, rehab on ramp roadway was completed in 2017)
 - iii. RR tracks currently not in use but planned as future LRT line to intermodal center; would be a faster route by-passing CBD; there are multiple options for an LRT alignment bypassing CBD though, this isn't the only option. The group agreed that the rail line here should not be considered a fatal flaw for 300 West alternatives.
 - iv. 400 W is a public road, public road meanders but connects to 300 W on south side of off ramp
 - v. Interest in concepts where ramp terminates at 900 S
 - vi. Existing ramp length along I-15 provides for flexibility/options for ramp termini at 400 W and 300 W, but all options will likely be costly
 - vii. Discussed concepts of intersection with rail line through or near it
 - viii. Salt Lake City is considering a road diet on 300 West from 600 South to 900 South (and potentially further to 2100 South); may take it down to 2 lanes per direction, add bike lanes, improve sidewalks. There is a lot of truck traffic and pedestrian traffic on this corridor.
3. Traffic analysis review - Seishi

900 South Ramps Feasibility Study
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- a. Current conditions generally functioning well along the corridor according to traffic microsimulation analysis – all intersections average LOS C or better. However, through movements on 900 South at West Temple perform at LOS D.
 - b. Future growth rates for 2040 No Build model were generated based on historic growth rates in the area, and applied different growth rates for different roads based on how they function (local vs regional traffic); WFRC travel model was not reliable in this area
 - i. UDOT suggested that WFRC should be notified that there is a problem with their model in this area; Fehr & Peers will follow up with WFRC
 - ii. Fehr & Peers will verify where the ATR was located in this area; traffic data was available from the ATR and also from Salt Lake City
 - c. No Build model included the RDA's streetscape plan with reduced lanes, plus other intersection improvements at 900 South/West Temple:
 - i. Dual WB left turn lanes
 - ii. NBR overlap
 - iii. EB right turn pocket
 - d. 2040 No-Build results showed failing conditions at several study intersections, including 900 South/West Temple in AM and PM, and 900 South/300 West in the PM.
 - e. Peter noted that there is a big discrepancy in AM/PM conditions on 900 South/300 West, Seishi responded that this is due to delay for turning vehicles in the PM.
 - f. Jeff noted that NB vehicles coming off the 900 South exit cannot turn left on 900 South, and we may need to later evaluate whether this is desirable. Future development in the Fleet Block, Granary District, and elsewhere west of the freeway near 900 South may require allowing left turns here.
 - g. John noted that even though the RDA plans have an impact on traffic flow, the City deliberately wants to slow traffic on 900 South and make it more of a local business corridor.
 - h. UDOT is also evaluating whether on-street parking on West Temple, north of the interchange, should be removed; currently it is allowed during certain (non-peak) times of day but this contributes to some confusion.
4. Next Steps
- a. Consultant team will meet week after Labor Day to generate an initial list of alternatives for consideration, and complete a high-level assessment of key criteria for review by the Steering Committee
 - b. Steering Committee will meet again on September 25th at 3pm to review the initial alternatives and decide which 3 alternatives should be moved forward for VISSIM analysis.

900 South Ramps Feasibility Study
Meeting Minutes



Meeting: Steering Committee Meeting

Date & Time: September 25, 2018 3PM-5PM

Location: Salt Lake City Transportation Conference Room, 1st Floor

Attendees: Jeff Gulden, Kevin Young, John Anderson, JP Goates, Peter Tang, Brad Palmer, Grant Farnsworth, Maria Vyas, Adam Pocock, Seishi Yamagata, Lynn Jacobs

1. John provided a map of proposed development areas.
 - a. Fleet Block- there have been multiple RFP's for Fleet Block, not clear on what exactly will happen here.
 - b. "Rumored" means that there are no official approvals but maybe concept plans.
 - c. Ground contamination at Fleet Block.

2. Options Discussion
 - a. Tunnel Option:
 - i. This would be like Central 70 in Denver. City would want to know from UDOT what ROW would be available to pass over to the City, and whether there would be developable space. This would clean up operational problems at 900 South interchange currently.
 1. UDOT responded that they would want to retain the ownership of the land above the tunnel. This would significantly limit the potential for redeveloping the site.
 - ii. The issue might be getting underneath TRAX (possibly 2 times, given new potential TRAX alignments)
 - iii. Ground water is really high here, maybe 7-8 inches down. City doesn't allow basements in most of that area.
 1. We would have to talk to a tunneling expert about water table issues.
 - iv. We could open-cut and put a cover on top of it rather than boring a new tunnel.
 - v. It's a lot of grade change in a short distance to get up and down.
 - vi. It's definitely the high cost option- and maybe only gains the connectivity of roadways and some green space.
 - b. 850 South ramp extension option
 - i. Solves some operational problems @ 900 South.
 - ii. May have to depress 900 S. to make ramp clearance

900 South Ramps Feasibility Study
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- iii. Question of what happens to West Temple? Where would it go through?
 - iv. Multiple group members (John, Adam, Kevin, Brad) felt this was not the best option – it doesn't accomplish the goals of the study, and may make the existing features even worse from a community perspective.
- c. 300 West
- i. Adam and Jeff stated that this might be the easiest answer. Jeff would want to study just a T-intersection at 300 West, rather than continuing the route through the neighborhood. Others agreed that this should be studied.
 - ii. Biggest issue is the TRAX line- can't have an at- grade crossing at the ramps. We could put TRAX to go somewhere else, or elevate it. Elevating it would be expensive but would allow the trains to get to the hub with less delay.
 - iii. John- shouldn't let TRAX issue be a fatal flaw. However, this option also wouldn't serve downtown as well as other options.
 - iv. Concerns about input to neighborhood traffic at Mead Avenue.
 - v. Brad- if we moved forward with a 300 West option, then that would really be the main route into downtown from this interchange. He also noted that if we don't connect through to West Temple you've made it less efficient, and that the road diet planned north of 900 South may affect the ability to carry traffic.
 - vi. The group decided that the changes to the local street network can be refined when we decide what we are analyzing.
- d. 400 West
- i. This option also impacts future TRAX line
 - ii. May have to depress 900 South to clear it and get to grade by 800 South
 - iii. This option opens up more land for development
 - iv. Start to push people more to the west side rather than to downtown
 - v. Cleans up issues with short weave at 900 S/West Temple, but we would need to improve 400 West to handle the traffic.
 - vi. JP expressed concern about cutting the neighborhoods in half over by Granary. That area has just as much potential to grow as Central Ninth does.
 - vii. Grant said that UDOT would want to have as much traffic headed straight where they want to go to rather than forcing left turns.
 - viii. Potential to lose access to new project at Aspen and 400 W.
- e. 600 West

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- i. This option takes out the concrete plant, moves people further away from downtown
 - ii. Maintaining consistent impact all the way across
 - iii. 900 S would need to be depressed, but may impact FrontRunner crossing
 - iv. Requires bridging of two roads (900 S and 500 W, near freeway)
 - v. Doesn't take you to anywhere you'd really want to be
 - vi. Keeps ROW impacts closer to mainline I-15
 - vii. Doesn't impact future TRAX Lines
 - f. Close Ramp Option
 - i. PeMS data showed the closure of 900 South in the past tripled the congestion on 600 South
 - ii. If we don't move this forward, we will need to provide a reason why we didn't study it.
 - g. Do Nothing
 - i. There may be mitigations or adjustments that would be needed
- 3. Screening options for detailed evaluation
 - a. 850 South: this doesn't achieve the goals of the study.
 - b. Tunnel options-
 - i. Storm drain down the middle of 900 S to 600 S? Three Creeks?
 - ii. Tunnel option not moved forward because:
 - 1. Cost and lack of benefit since the space above cannot be redeveloped
 - 2. Maintenance is a big issue for UDOT, plus utility conflicts
 - 3. Curves are a concern from a safety standpoint
 - c. 600 West VS. 400 West – 600 W. takes you further away from where people want to go. Also it doesn't extend north of 550 North, whereas 400 West goes through. Otherwise functionally they are similar to each other but 400 W. is better because it goes north to Beck Street and also is closer to downtown. (500 West was also discussed as an option but was less favorable than the 400 West option as it would require an additional bridge and is not a through road north of 600 South.)
 - d. Close ramps: Maria suggested removing this from the list of options because of the traffic impacts on adjacent (and already congested) interchanges such as 500/600 South and 1300 South, in addition to potential impacts at Foothill Boulevard due to traffic heading to the University. The group agreed to remove this option from further discussion.
 - e. Options moved forward for further analysis:
 - i. 300 West – ramps intersect in a T at 300 West
 - ii. 400 West as shown on maps

900 South Ramps Feasibility Study
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- iii. 300/400 West combination ramps, with ramps continuing eastward past 300 West to West Temple.
- iv. No-Build (including mitigations to address known issues)

900 South Ramps Feasibility Study
Meeting Minutes



Meeting: Steering Committee Meeting

Date & Time: April 18, 2019 1:30PM-3PM

Location: Salt Lake City Engineering Conference Room, 6th Floor

Attendees: Jeff Gulden, Kevin Young, John Anderson, Tracy Tran, Peter Tang, Grant Farnsworth, Maria Vyas, Seishi Yamagata, Jason Phillips, Adam Pocock, Ahmad Alshakargi

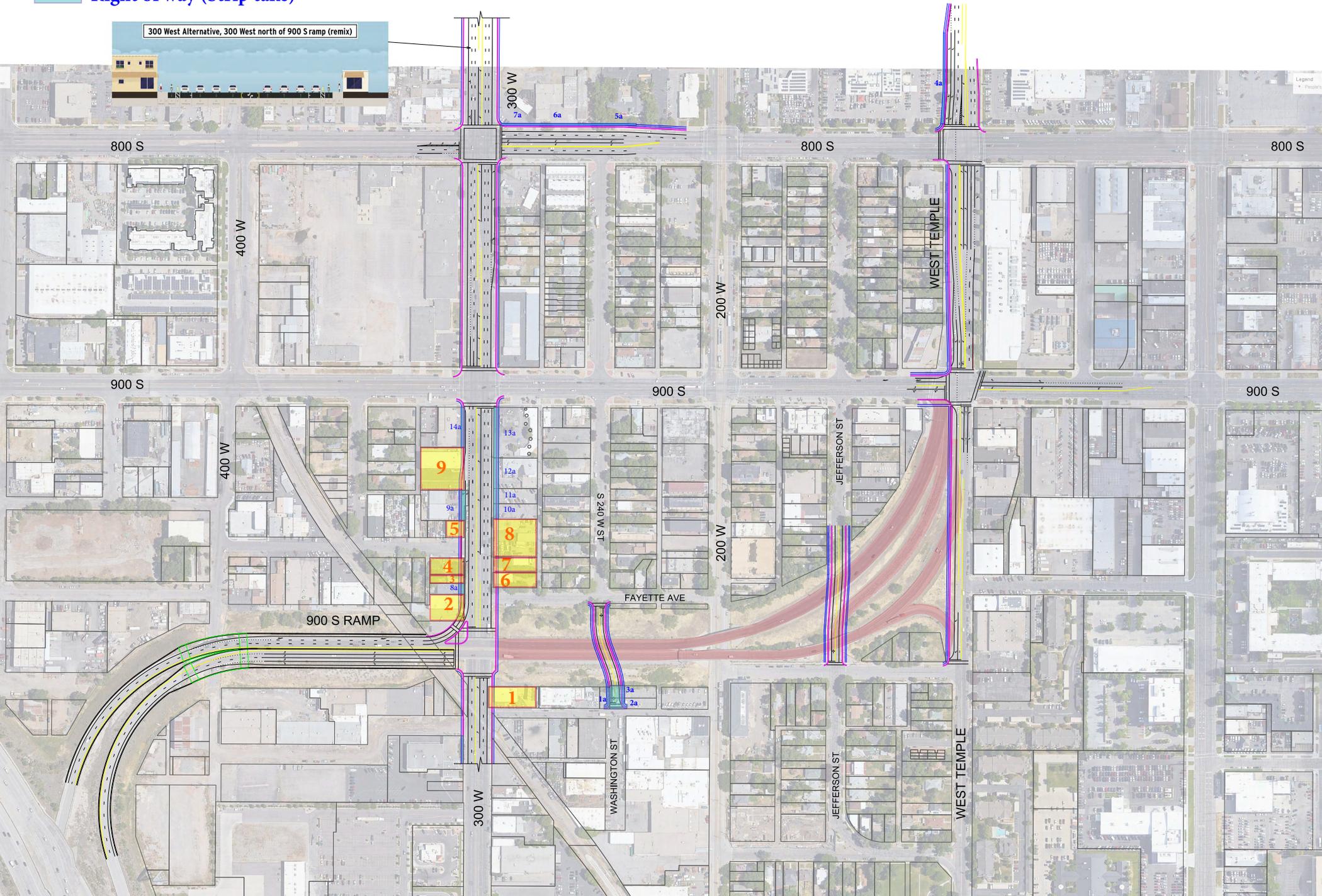
1. Review of constructability analysis – Adam Pocock
 - a. Layout review:
 - i. Draft layouts and initial cost estimates are attached to these notes.
 - ii. Layouts take into account plans for Central Ninth Streetscape project
 - iii. Layouts take into account 300 West lane reconfiguration
 1. Exception: with 300 West ramps alternative, road diet north of interchange will not be feasible and team assumed a larger cross-section here.
 - iv. All options assume that the UTA right-of-way will not be used for TRAX in the future.
 - v. Peter - UDOT is concerned that the interchange options will “look great on paper” to people at decision-making levels but that the impacts of the options will not be clear.
 - vi. Grant – UDOT also concerned about the assumption that TRAX line will not be needed in the future. The City may already be purchasing right-of-way along the alignment for future TRAX expansion.
 1. UTA planning to study TRAX options in the next year, but no decisions have been made yet.
 2. Estimating cost of realigning transit to accommodate interchange options was out of scope; if this project continues past this phase, City and UTA should coordinate on options.
 - vii. John – we are basically shifting impacts from one neighborhood (Central Ninth) to another (Granary) with this project.
 - viii. UDOT (Peter) will be sent a copy of the drawings for the layouts
 - b. Cost estimates
 - i. Right-of-way was based on assessor’s parcel data for strip takes and full takes
 - ii. Non-quantified items are things that we wouldn’t quantify at this level – fencing, overhead signs, etc; addressed via separate line-item percentage in the cost estimate instead.

900 South Ramps Feasibility Study
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- iii. Peter believes the cost estimates may be too low, would like to circulate them to UDOT to verify unit costs; Jacobs was open to revising unit costs on the estimate.
 - iv. Grant/Peter suggested adding a line item for contingency costs.
2. Traffic operations analysis results - Seishi Yamagata
- a. AM/PM traffic analysis results are attached to these notes.
 - b. The interchange options tend to redirect congestion from where it is currently concentrated (900 South/West Temple) to a number of other intersections. The effect of this is that more intersections are failing, but they are often failing less significantly than the failure level at 900 South/West Temple.
 - c. Grant – we should point out in final deliverables that the queues for the 300 West and 400 West options likely back up onto the C-D system
 - d. All alternatives force traffic from the ramps to cross TRAX at 200 West where they can currently pass over it. This adds a coordination issue for traffic trying to get to/from the ramps.
 - e. UDOT concerned about how car dealerships would react to the options.
 - f. John/Jeff – City staff also need a polished answer on what would happen if the ramps are closed completely, even though this was not analyzed in depth; they will need a prepared response because people will ask.
 - g. Grant – is there a way to identify improvements that would be consistent with city plans without making this level of investment?
 - i. Maria – refresher on goals from City planning documents:
 - 1. Improve connectivity
 - 2. “soften highway edges” (meaning of this is unclear)
 - 3. Improve lighting at viaduct
 - 4. Create a gateway garden south of the viaduct
 - 5. Create new mid-block pathways
3. Next steps – Jeff Gulden
- a. Jeff will need to share the results with City and elected officials. This will require getting approval through several levels – CAN, Mayor, Council – before going out to community groups.
 - b. UDOT would like to produce a memo to the project file expressing UDOT comments on the options.
 - c. Project team will distribute costs, concepts, and video clips of the traffic analysis
 - d. Project team is scoped to hold community meetings with local residents, business community, and car dealerships. This approach may change depending on feedback from City leadership.

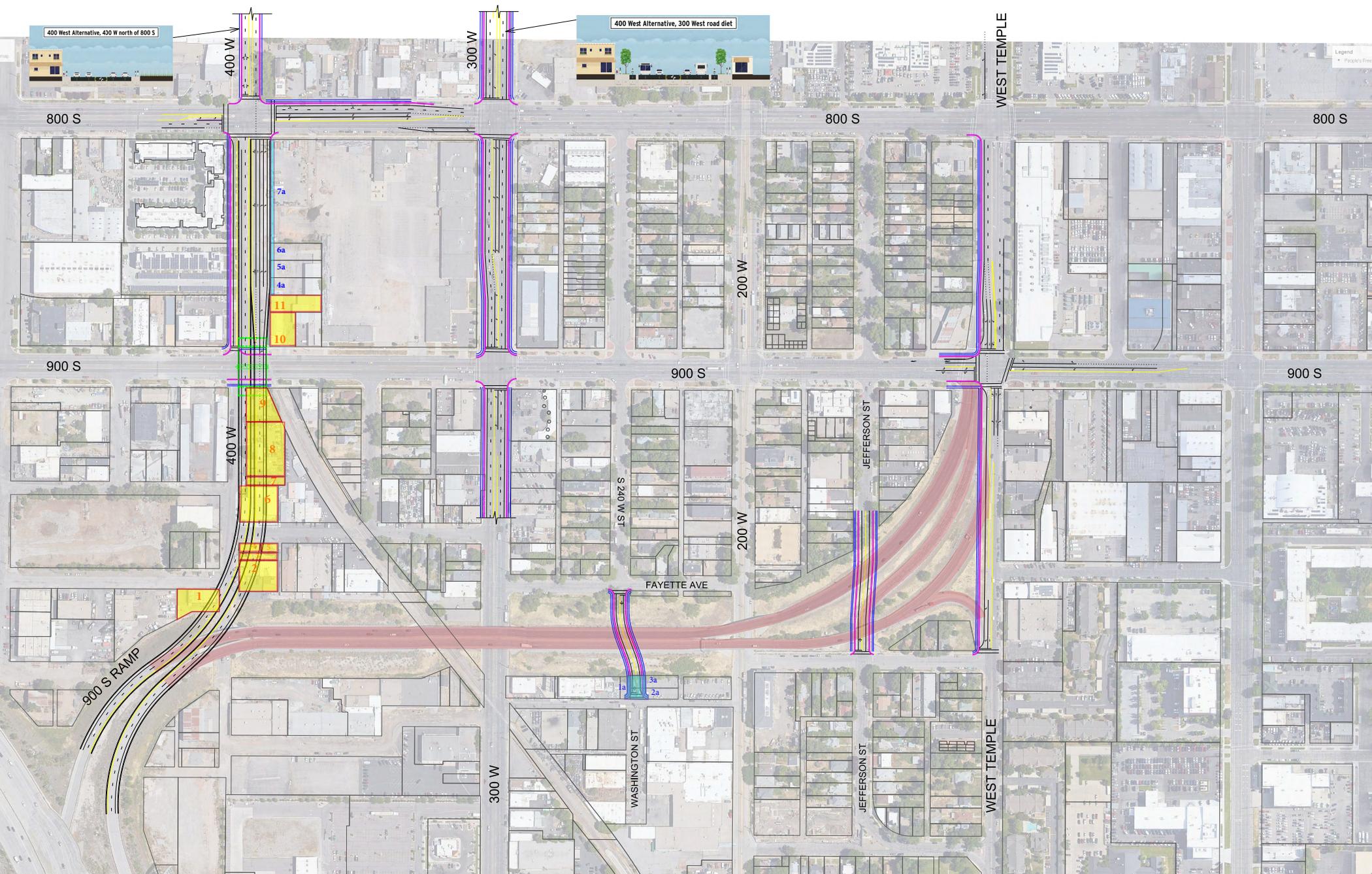
Right of way (Total take)

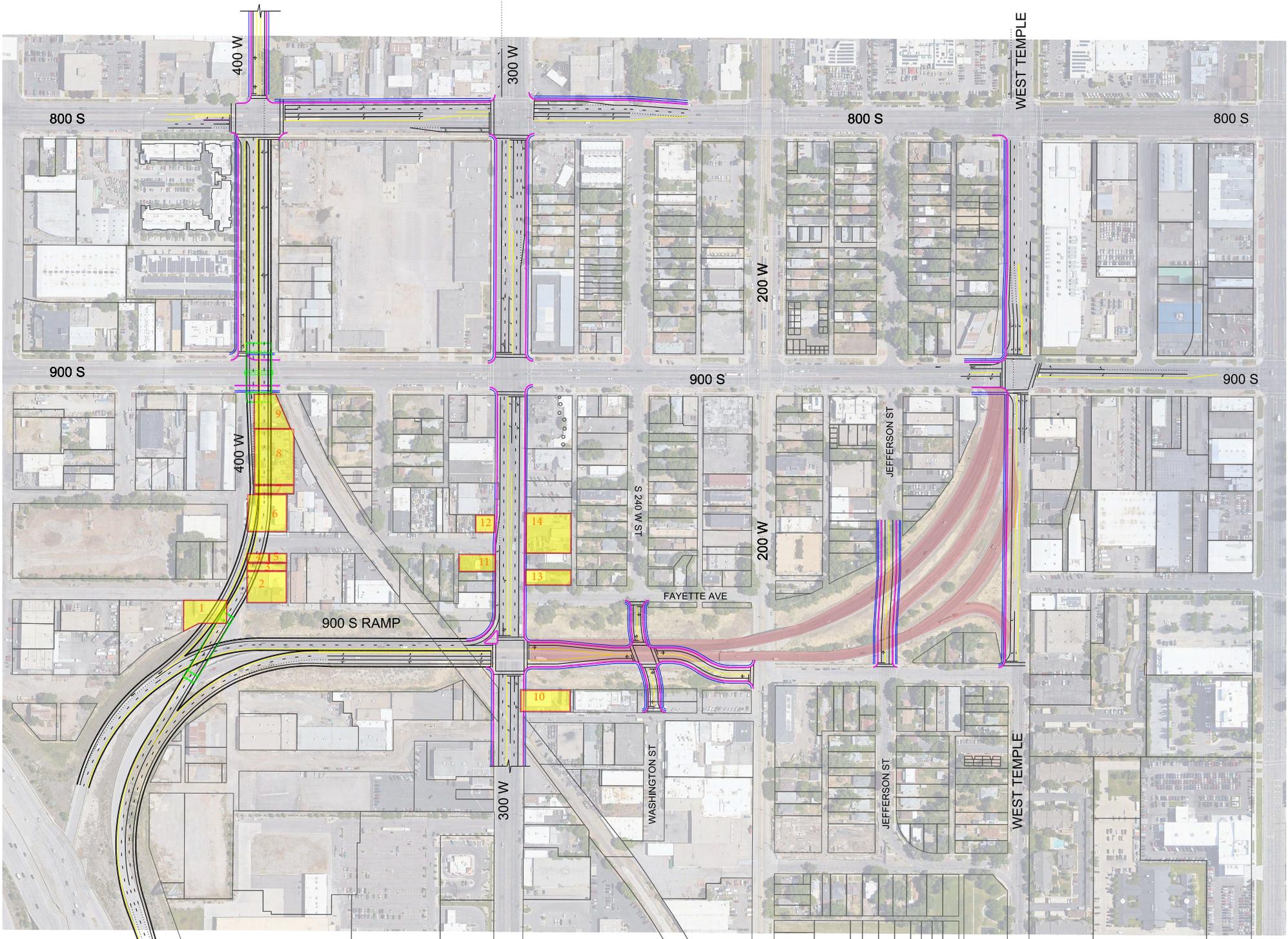
Right of way (Strip take)



Right of way (Total take)

Right of way (strip take)





800 S

800 S

800 S

900 S

900 S

900 S

400 W

300 W

200 W

200 W

WEST TEMPLE

S 240 W ST

FAYETTE AVE

JEFFERSON ST

WEST TEMPLE

WASHINGTON ST

JEFFERSON ST

900 S RAMP

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

900 SOUTH FEASIBILITY STUDY

ALTERNATIVES COST-ESTIMATE

			300 West Alternative		400 West Alternative		300 W + 400 W Alternative	
MAJOR ITEMS	UNIT	UNIT COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
Remove existing ramp (300w to west temple)	yd ³	\$8.00	140,132	\$1,621,057	186,740	\$1,993,921	140,132	\$1,621,057
Roadway Excavation	yd ³	\$8.00	46,608	\$372,864	7,582	\$60,655	90,126	\$721,010
Retaining Wall	SF	\$65.00	0	\$0	83,230	\$5,409,979	64,761	\$4,209,483
Barrier	LF	\$125.00	5,409	\$676,174	8,382	\$1,047,778	12,250	\$1,531,254
Pavement (asphalt)	SF	\$5.50	246,983	\$1,358,407	268,369	\$1,476,032	423,927	\$2,331,596
Curb and gutter	LF	\$24.00	7,527	\$180,648	6,286	\$150,864	8,821	\$211,712
Concrete Sidewalk	SF	\$6.50	33,150	\$215,472	29,117	\$189,261	40,938	\$266,097
Ramp structures	SF	\$150.00	18,898	\$2,834,730	10,662	\$1,599,270	18,206	\$2,730,900
Signalized intersection	EA	\$150,000	4	\$600,000	3	\$450,000	4	\$600,000
SUB TOTAL				\$7,859,352		\$12,377,759		\$14,223,108
ASSUMED ITEMS	PERCENTAGE							
Mobilization	10%			\$785,935		\$1,237,776		\$1,422,311
Drainage	10%			\$785,935		\$1,237,776		\$1,422,311
Utility	15%			\$1,178,903		\$1,856,664		\$2,133,466
non-quantified items	30%			\$2,357,806		\$3,713,328		\$4,266,932
SUB TOTAL				\$5,108,579		\$8,045,543		\$9,245,020
ESTIMATED CONSTRUCTION COST				\$12,967,931		\$20,423,303		\$23,468,128
RIGHT OF WAY	UNIT	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST
Strip Take	Acre	SLC.Assessor	0.46	\$480,746	0.22	\$184,388	0.23	\$214,074
Total Take	EA	SLC.Assessor	9	\$4,725,090	11	\$3,626,800	14	\$4,722,690
ESTIMATED RIGHT OF WAY COST				\$5,205,836		\$3,811,188		\$4,936,764
TOTAL ESTIMATED COST				\$18,173,767		\$24,234,491		\$28,404,892

Date: April 17, 2019

AM Peak Hour Results

Metrics	Alternatives			
	No Build	300 West	400 West	Combined
Network % Demand Served	83%	85%	92%	89%
Off-ramp Queue – West Temple ¹	5,025 ft. ³	-	-	-
Off-ramp Queue – 300 West ¹	-	4,200 ft. ³	-	3,975 ft.
Off-ramp Queue – 400 West ¹	-	-	4,575 ft.	2,700 ft.
Number of Intersections with LOS E-F	1	3	2	4
Bottleneck Intersection Locations ²	900 S/W. Temp. NBT	800 S/W. Temp. NBL	800 S/300 W EBT	800 S/300 W EBT
		800 S/300 W WBL	900 S/W. Temp. WBT	800 S/W. Temp. WBL
		800 S/300 W NBR		

1. Average Maximum Queue, rounded up to nearest 25 ft.
2. NB=Northbound, SB=Southbound, EB=Eastbound, WB=Westbound, T=Thru, L=Left-turn, R=Right-turn
3. Exceeds available storage length (potential queue spillback to 1300 S Exit)

PM Peak Hour Results

Metrics	Alternatives			
	No Build	300 West	400 West	Combined
Network % Demand Served	84%	63%	75%	91%
Off-ramp Queue – West Temple ¹	5,025 ft. ³	-	-	-
Off-ramp Queue – 300 West ¹	-	4,200 ft. ³	-	800 ft.
Off-ramp Queue – 400 West ¹	-	-	5,000 ft. ³	775 ft.
Number of Intersections with LOS E-F	5	5	6	7
Bottleneck Intersection Locations ²	900 S/W. Temp. WBL	800 S/W. Temp. SBR, NBL	800 S/300 W EBT, WBL	800 S/300 W NBT, EBT, WBL
	900 S/300W SBL, NBR, EBT	800 S/300W WBL, NBT	800 S/W. Temp. NBL, WBL	900 S/300 W SBL, EBT
			900 S/300 W SBL	

1. Average Maximum Queue, rounded up to nearest 25 ft.
2. NB=Northbound, SB=Southbound, EB=Eastbound, WB=Westbound, T=Thru, L=Left-turn, R=Right-turn
3. Exceeds available storage length (potential queue spillback to 1300 S Exit)

AM Peak Hour Results

Intersection	No Build		300 West		400 West		Combined	
	Delay	PDS	Delay	PDS	Delay	PDS	Delay	PDS
300 W / 900 S	22	98%	54	76%	30	100%	44	87%
200 W / 900 S	24	95%	42	90%	38	92%	39	91%
W Temp / 900 S	142	73%	79	88%	57	84%	56	92%
W. Temp / Mead	1	79%	1	97%	1	97%	1	97%
W. Temp / 800 S	34	75%	85	80%	39	73%	196	68%
200 W / 800 S	13	88%	47	80%	30	59%	35	59%
300 W / 800 S	19	97%	54	78%	44	85%	51	75%
400 W / 800 S	1	95%	1	100%	96	67%	222	69%
300 W / I-15 Ramp	-	-	126	72%	-	-	180	73%
Network	163	83%	225	85%	140	92%	261	89%

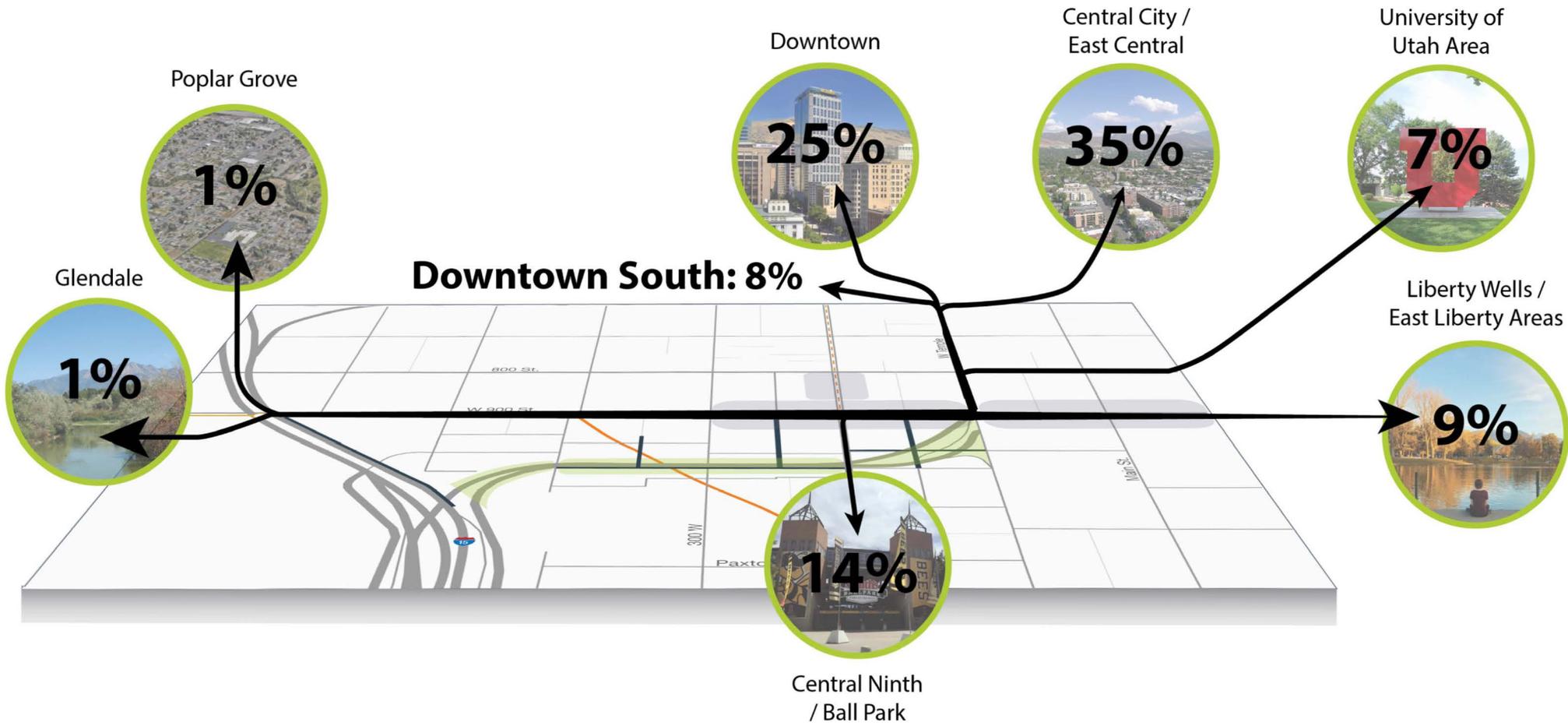
PM Peak Hour Results

Intersection	No Build		300 West		400 West		Combined	
	Delay	PDS	Delay	PDS	Delay	PDS	Delay	PDS
300 W / 900 S	180	83%	162	58%	146	66%	83	79%
200 W / 900 S	65	75%	84	55%	50	63%	60	83%
W Temp / 900 S	143	81%	173	47%	141	67%	38	92%
W. Temp / Mead	1	86%	9	98%	1	97%	1	98%
W. Temp / 800 S	146	82%	269	54%	137	71%	169	84%
200 W / 800 S	49	79%	54	54%	73	64%	75	80%
300 W / 800 S	84	89%	49	61%	93	64%	105	81%
400 W / 800 S	2	89%	2	91%	182	68%	93	84%
300 W / I-15 Ramp	-	-	266	54%	-	-	89	80%
Network	251	84%	506	63%	396	75%	208	91%

Note: PDS = Percent demand served. Red boxes denote higher delay/lower demand served than the No Build option.

Exhibit E: 900 South Ramp Existing Origin/Destination Summary

Note: The specific origins and destinations of motorists using the 900 South ramp was determined through the use of StreetLight Data, which summarizes anonymized data from vehicles to better understand where vehicles are traveling to and from.

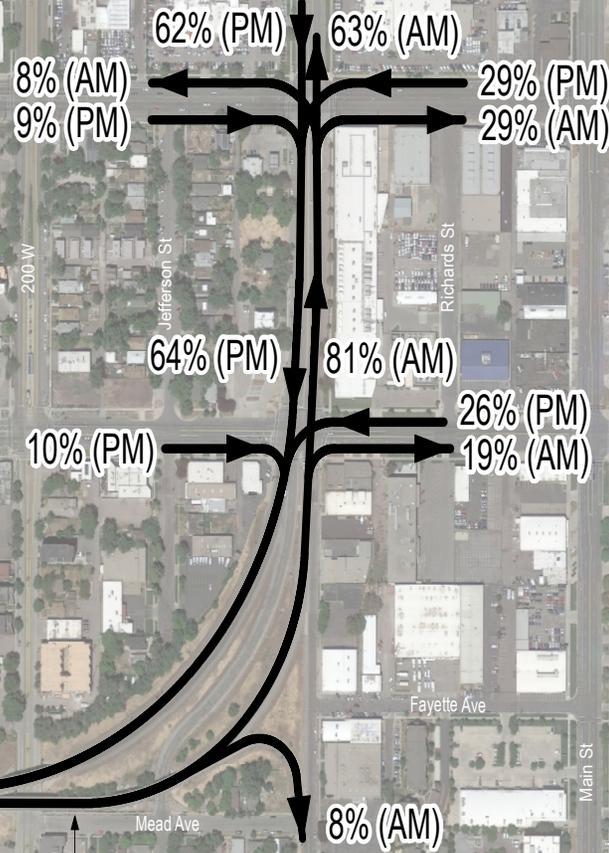


500 South On-Ramp carries 28,900 vehicles per weekday.
600 South Off-Ramp carries 30,200 vehicles per weekday.

As a comparison, 300 West carries approx. 16,000 vehicles per day.

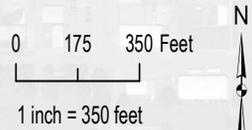
On an average weekday, the 900 South Ramps carry approx. 32,000 vehicles.
During the AM peak hour, over 1,900 vehicles travel northbound.
During the PM peak hour, over 1,700 vehicles travel southbound.

1300 South On-Ramp (to south) carries 10,800 vehicles per weekday.
1300 South Off-Ramp (from south) carries 14,000 vehicles per weekday.

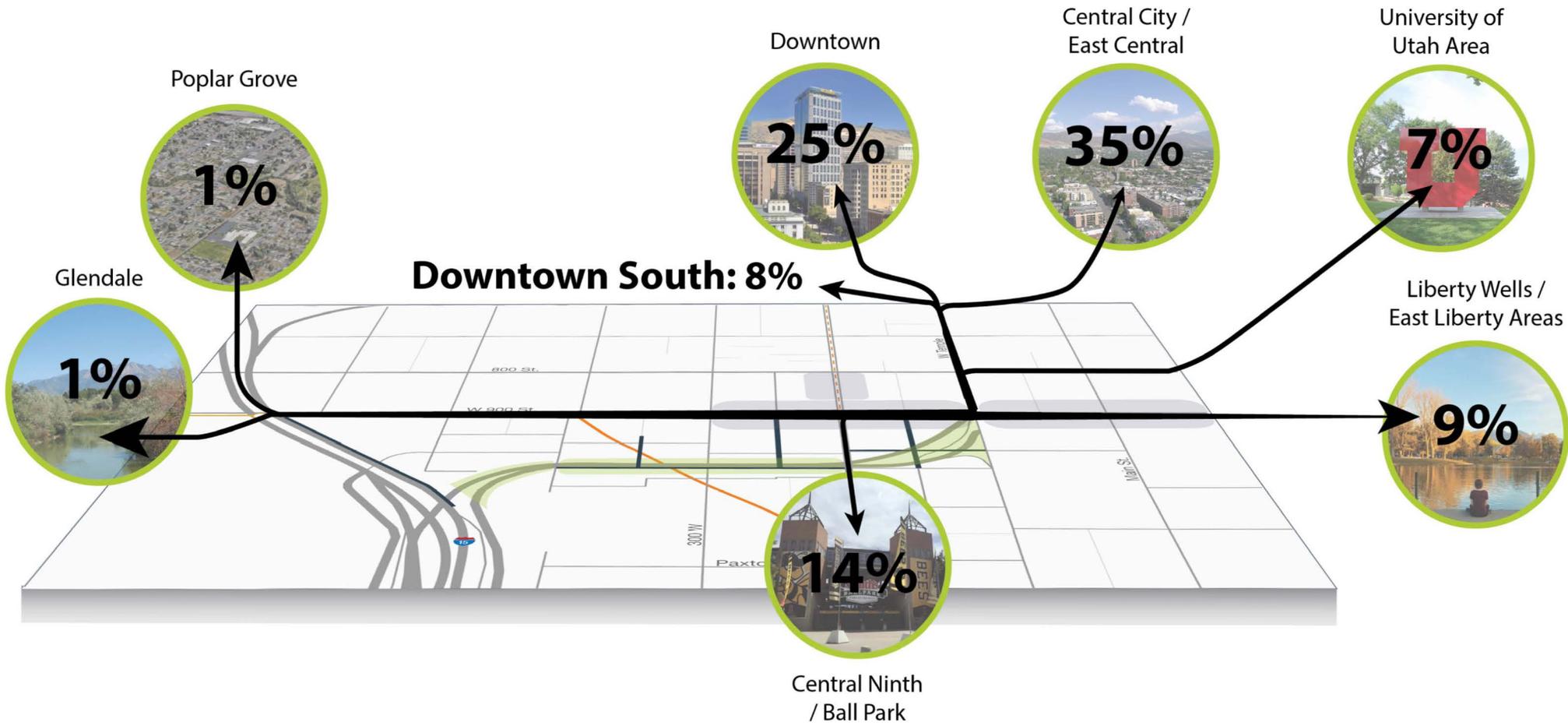


Ramp Traffic Volumes

900 South Ramp Feasibility Study

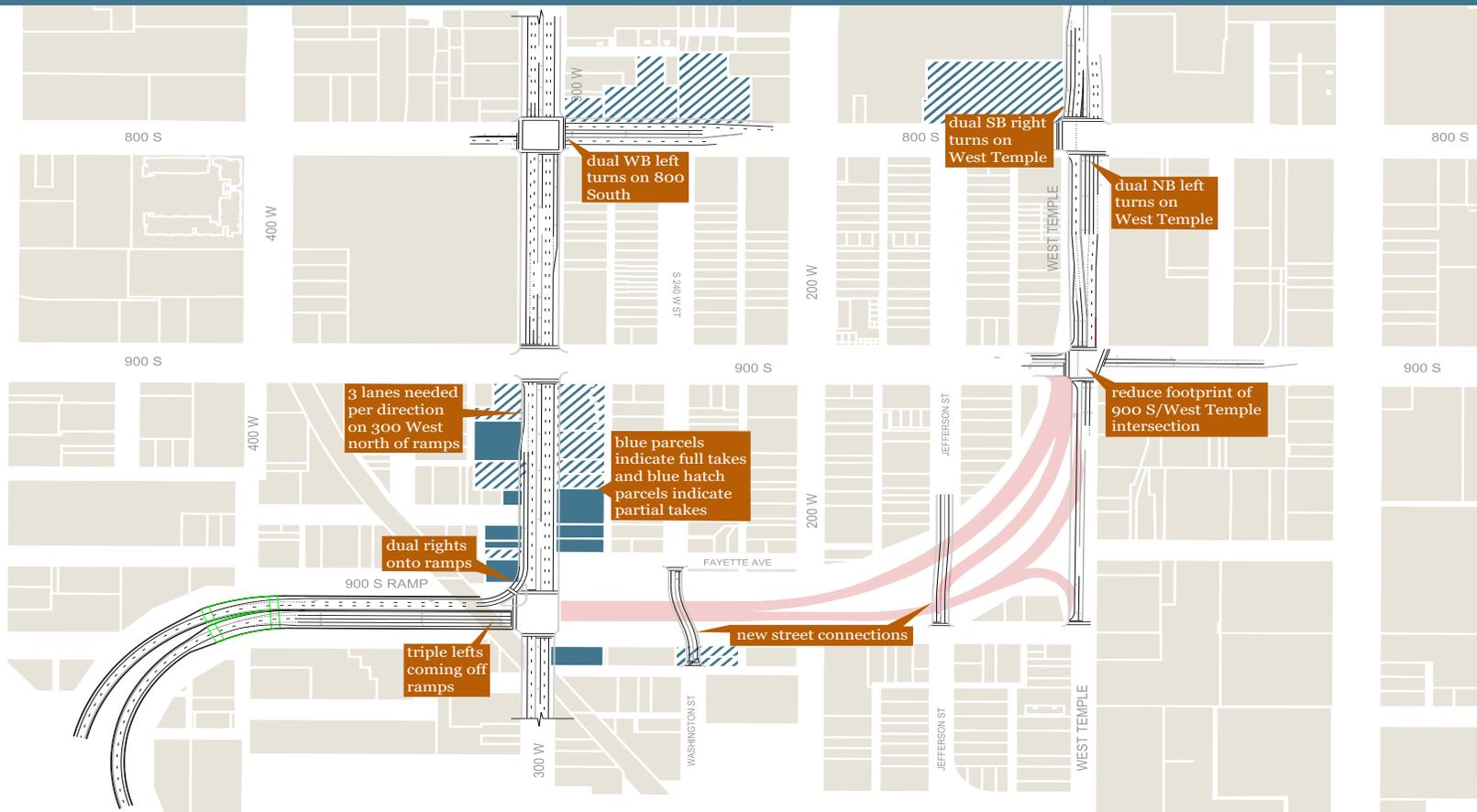
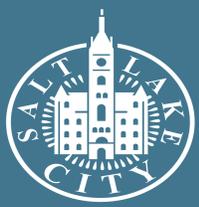


Note: Volumes reported are non-holiday weekday averages for May 2018, except for the 300 West volumes which are from July 2017.



Scenario A: 300 West

900 South Ramp Feasibility Study



300 West: Shorten ramps to end at 300 West and roughly 1000 South

Neighborhood Improvements



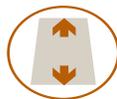
8.1

Net Change in Developable Acres



0.78

New Miles of Sidewalk



-2,180'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



0

Increase in Intersections with PM LOS E/F



-21%

Change in Traffic Served



No

Reduce Off-Ramp Queue Lengths?

Constructability

23

Partial or Full Takes

\$36M

2019 Conceptual Cost

Advantages

1. Greatest reduction in overall ramp length
2. Shifts traffic away from Central Ninth District
3. Less intrusion on Granary District than other scenarios (doesn't impact Fleet Block)

Disadvantages

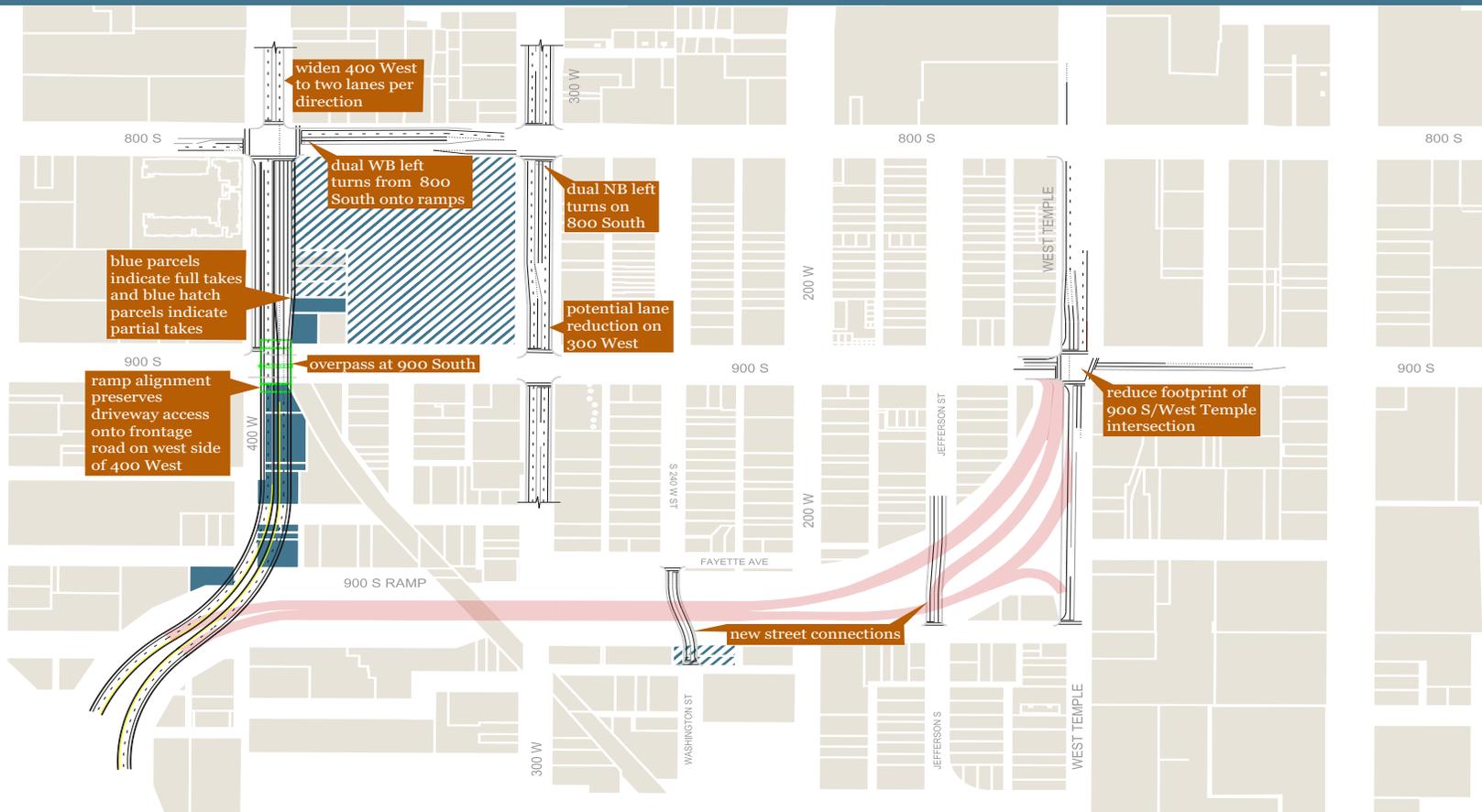
1. Affects UTA's "American Spur" rail alignment (at 300 West)
2. Reduces the likelihood for a successful lane reconfiguration on 300 West, per City plans
3. Off-ramp queues could potentially spill back into freeway collector-distributor lanes

Note:

UDOT owns the 900 South on/off ramp and has no plans to change its current configuration. UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Scenario B: 400 West

900 South Ramp Feasibility Study



400 West: Realign ramps north along 400 West, passing over 900 South to touch down at 800 South

Neighborhood Improvements



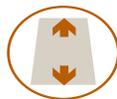
12.0

Net Change in Developable Acres



0.78

New Miles of Sidewalk



-1,030'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



1

Increase in Intersections with PM LOS E/F



-9%

Change in Traffic Served



No

Reduce Off-Ramp Queue Lengths?

Constructability

18

Partial or Full Takes

\$29M

2019 Conceptual Cost

Advantages

1. Reclaims the most land for potential redevelopment
2. Could potentially accommodate the City's plans for a lane reconfiguration on 300 West
3. Removes all freeway traffic from 900 South and 9 Line Trail crossing

Disadvantages

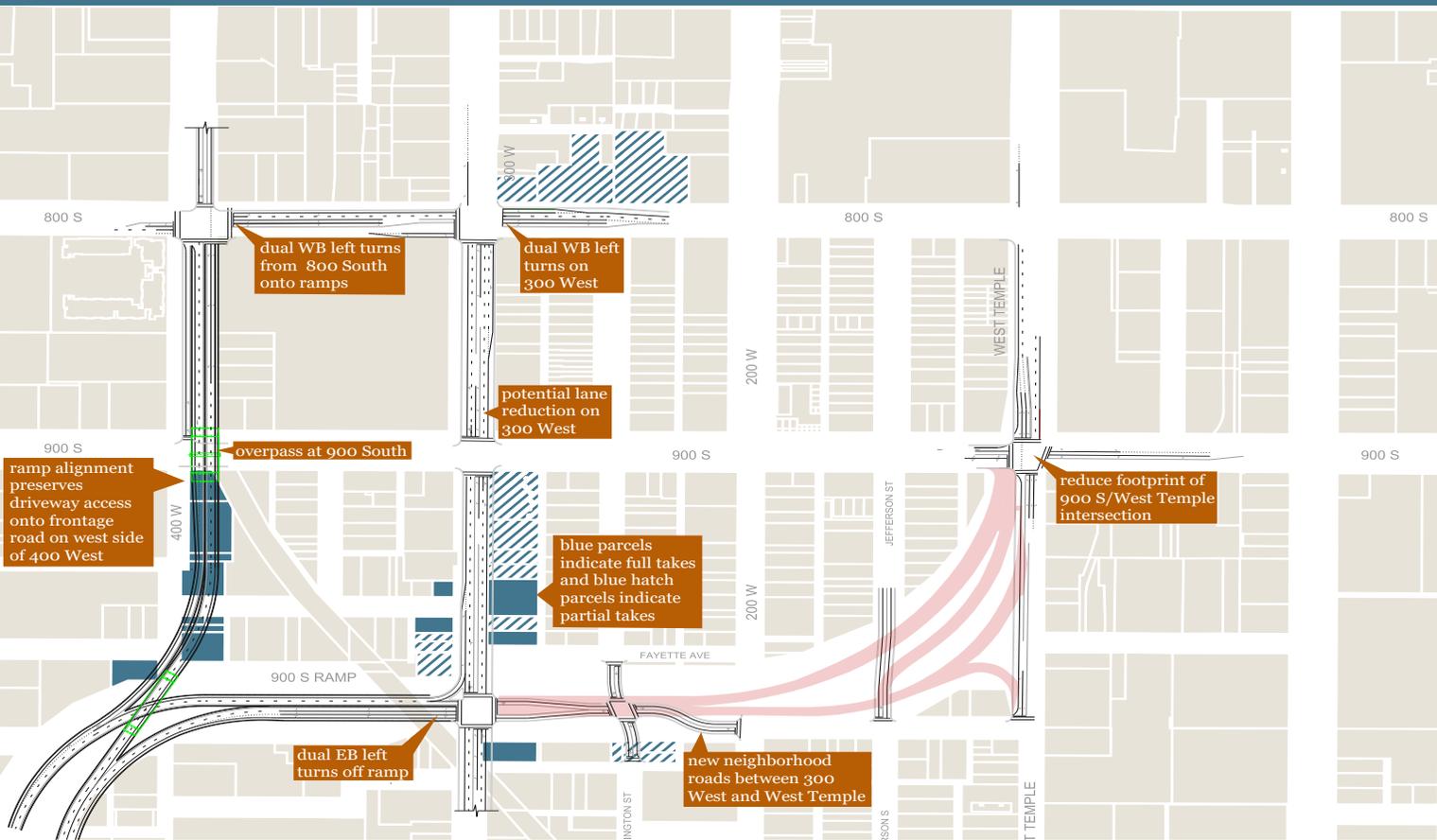
1. Affects UTA's "American Spur" rail alignment (at 400 West)
2. Impacts access to the west side of the Fleet Block and eliminates northbound access to the driveways on the Artspace Commons Block
3. Off-ramp queues could potentially spill back into freeway collector-distributor lanes

Note:
 UDOT owns the 900 South on/off ramp and has no plans to change its current configuration.
 UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).

Scenario C: 300/400 West Combination



900 South Ramp Feasibility Study



300/400 West Combination: Combine 300 West and 400 West options, and create a new east-west local road network

Neighborhood Improvements



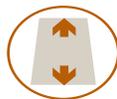
6.5

Net Change in Developable Acres



0.72

New Miles of Sidewalk



-518'

Change in Ramp Length

2040 PM Peak Hour Traffic Projections (Compared to Baseline)



2

Increase in Intersections with PM LOS E/F



+7%

Change in Traffic Served



Yes

Reduce Off-Ramp Queue Lengths?

Constructability

28

Partial or Full Takes

\$39M

2019 Conceptual Cost

Advantages

1. Most improvement in reducing queues on the ramps
2. Re-establishes east-west street grid between 300 West and West Temple
3. Serves more overall traffic in the study area, even though some individual intersections perform worse than the baseline

Disadvantages

1. Affects UTA's "American Spur" rail alignment, twice (at 300 West and at 400 West)
2. Impacts access to the west side of the Fleet Block and eliminates northbound access to the driveways on the Artspace Commons Block

Note:
 UDOT owns the 900 South on/off ramp and has no plans to change its current configuration.
 UTA owns the rail spur in the project area and has included it in its light rail extension plan (identified as a Phase 2 project in the long range Regional Transportation Plan).