GLENWOOD & STATE INTERSECTION STUDY

ADA COUNTY, IDAHO

PROJECT DETAILS

» INT GLENWOOD ST & STATE ST STUDY, BOISE
» ITD PN A020(049), Key No. 20049 / ACHD PN 317045

PREPARED FOR

Ada County Highway District and Idaho Transportation Department

December 5, 2018
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The Glenwood Street and State Street intersection has a diverse set of challenges, which led to the Idaho Transportation Department (ITD) and Ada County Highway District (ACHD) partnering to lead the Glenwood Street and State Street Intersection Study, herein referred to as Study. This Study engaged local agencies, property owners, businesses, and the community to identify a preferred solution that:

» Improves intersection functionality for all users, including those with disabilities,

» Provides enhanced pedestrian and bicyclist connectivity,

» Accommodates the current and planned land uses, including the proposed redevelopment of State Street as a transit-oriented corridor, and

» Complies with ACHD and ITD standards and supports the State Street Transit & Traffic Operational Plan (Reference 1).

Alternative 4B – Median U-Turn was selected as the preferred intersection solution for this Study. For reference, this intersection form is similar to the project being constructed by ACHD at the Veterans Memorial Parkway and State Street intersection (Reference 2). Details of this alternative are presented in the Preferred Alternative section of this report. Figure 1 illustrates the Study timeline.

BACKGROUND

During this Study, collaboration occurred with ACHD, ITD, and Valley Regional Transit (VRT) regarding other ongoing projects on the State Street corridor for consistency. These projects are located outside of the study area and include:

» Construction Projects
  • State Street/Veterans Memorial Parkway/36th Street ThrU-turn
  • Collister Street/State Street Intersection
  • SH 44/Eagle Road Continuous Flow Intersection

» Design Projects
  • Pierce Park/State Street Intersection

» Planning
  • State Street Corridor Transit Oriented Development (TOD)

Figure 2 illustrates the location of these projects and studies in relationship to the Glenwood Street and State Street intersection.
Additionally, the State Street Transit and Traffic Operational Plan (TTOP) was completed in 2011 and accepted by ACHD, City of Boise, and VRT along with other agency partners. ITD participated in the TTOP process but did not accept the final TTOP. This plan identified and prioritized transit and traffic improvements on the State Street corridor including the roadway section shown in Figure 3. This roadway section on State Street was used in developing the intersection alternatives consistent with other concept studies completed by ACHD on State Street. As shown in Figure 3, the outside through lane is dedicated to high occupancy vehicles (HOV), buses, and right turn vehicles.

Figure 2. Ongoing Projects and Studies on State Street

Figure 3. Roadway Section on State Street from TTOP
**Study Area**

The Glenwood Street and State Street intersection, located five miles northwest of downtown Boise is a critical junction for moving people and goods through the State Street corridor and connecting the cities of Boise and Garden City. This signalized, high-volume intersection carries approximately 60,000 daily vehicles and five transit routes (#9, #9X, 44, 10, 12) in the Treasure Valley (Reference 3). The adjacent land uses serve as a regional commercial hub and evolving TOD node. The major roadways that intersect here consist of the following:

- **State Street (SH 44)** is a major east-west principal arterial located north of the Boise River. This roadway is a state highway between I-84 and Glenwood Street and then an ACHD roadway east of Glenwood Street. It has a posted speed of 45 miles per hour in the study area.

- **Glenwood Street** is a major north-south principal arterial that provides one of the few river crossings of the Boise River and connects travelers with Chinden Boulevard (US Highway 20/26). It has a posted speed of 35 miles per hour in the study area.

- **Gary Lane** is a north-south minor arterial that provides a connection to and from Hill Road serving mostly residential homes, a school, and some commercial uses. It has a posted speed of 35 miles per hour in the study area.

Table 1 summarizes the roadway characteristics of the major roadways in the study area.

The study area includes seven signalized intersections. Figure 4 highlights the study area and jurisdiction ownership for the major roadways at this junction.

**Table 1. Roadway Characteristics**

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Functional Classification</th>
<th>Existing Right-of-Way (feet)</th>
<th>Posted Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Street (SH 44), west of Glenwood Street</td>
<td>Principal Arterial¹</td>
<td>75 – 105</td>
<td>45</td>
</tr>
<tr>
<td>State Street, east of Glenwood Street</td>
<td>Principal Arterial¹, Mobility Corridor²</td>
<td>100 - 102</td>
<td>45</td>
</tr>
<tr>
<td>Glenwood Street</td>
<td>Principal Arterial¹</td>
<td>115 - 130</td>
<td>35</td>
</tr>
<tr>
<td>Gary Lane</td>
<td>Minor Arterial¹, Residential Arterial²</td>
<td>58 – 60</td>
<td>35</td>
</tr>
<tr>
<td>Saxton Drive</td>
<td>Local¹, Commercial Collector²</td>
<td>53</td>
<td>20</td>
</tr>
<tr>
<td>Riverside Drive</td>
<td>Collector¹, Residential Collector²</td>
<td>50 - 60</td>
<td>20</td>
</tr>
</tbody>
</table>

¹COMPASS 2040 Functional Classification (Reference 4)
²ACHD Master Street Map (Reference 5)
Coordination and active engagement with ACHD and ITD, stakeholders, various land owners and businesses, and the general public was a critical component of this Study. The agency and public engagement process included the following goals:

» Facilitate an open, honest, and transparent decision-making process with two-way communication between the project team, stakeholders, and the public.

» Provide early and continuous opportunities for the stakeholders and public to share values, understand the opportunities and constraints, develop potential solutions, and raise issues and concerns to be considered by the project team.

» Respond to comments and suggestions in a timely, professional manner.

» Build community understanding of opportunities, constraints, findings, and decisions.

» Implement a process that drives ownership, validity, and commitment to the selection of a study alternative and moves the study alternative forward into implementation.

This section provides an overview of the various agency and public involvement activities completed during the Study. Details of what we learned from these efforts are highlighted in the other sections of this report.

PROJECT MANAGEMENT TEAM (PMT)

The PMT is the decision-making group for the Study and consisted of project managers and staff from ITD and ACHD. The PMT provided guidance to the Consultant on day-to-day activities of the Study, as well as reviewed and provided comments on all deliverables. The PMT met eight times during the Study.

PROJECT ADVISORY COMMITTEE (PAC)

The PAC consisted of a broader group of agency and non-agency representatives from various community groups and organizations. The PAC’s purpose was to provide a wide range of perspectives to the PMT during the development, evaluation, and selection of alternatives. The PAC participated in three meetings during the Study.

BUSINESSES AND PROPERTY OWNERS

Outreach was performed via mailers and door-to-door visits to businesses and property owners in the study area along with invitations to Public Informational Meetings (PIM) #1 and #2. Additionally, 1-on-1 meetings occurred as requested by businesses and property owners.

GENERAL PUBLIC

Outreach to the public occurred via the project website, PIMs, mailers, and online surveys. The project website (http://www.achdidaho.org/Projects/proj_study_glenwood-and-state-intersection-study.aspx) provided access to the Study description, materials, and notices on open houses.

PUBLIC COMMENT #1

The first round of public outreach occurred via PIM #1, which was held on August 15, 2017 from 3:30 PM to 4:30 PM for business and property owners and 5:00 PM to 7:00 PM for the public at Garden City City Hall (6015 N Glenwood Street, Garden City). 118 people signed in for the PIM #1. The PIM #1 and online survey provided participants with an opportunity to learn about the Study, map comments on issues they have in the area and provide feedback on various types of intersection types being studied. The online survey was open
from August 15 through August 30, 2017. Table 2 summarizes the source and number of comments received during the public comment period #1.

**Table 2 Sources of Comments Received via Public Comment Period #1**

<table>
<thead>
<tr>
<th>Source</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment Sheets from PIM #1</td>
<td>53</td>
</tr>
<tr>
<td>Map Comments from PIM #1</td>
<td>72</td>
</tr>
<tr>
<td>Emailed and Mailed Comments</td>
<td>1</td>
</tr>
<tr>
<td>Online Map Comments</td>
<td>27</td>
</tr>
<tr>
<td>Responses to Online Survey</td>
<td>231</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
</tr>
</tbody>
</table>

**PUBLIC COMMENT #2**

The second round of public outreach occurred via four PIMs held in Boise (2), Eagle (1) and Garden City (1) as well as an online survey. The PIMs took place at the following locations and times, as advertised (see Figure 5):

- Garden City Hall - 6015 N Glenwood Street, Garden City
  - April 4, 2018: 3:30-4:30 pm (business/property owners) and 5:00-7:00 pm (general public)
- Covenant Presbyterian Church – 4848 N Five Mile Rd, Boise
  - April 5, 2018: 6:00-7:00 pm
- Eagle Public Library – 100 N Stierman Way, Eagle
  - April 11, 2018: 6:00-7:00 pm
- Boise Public Library – 715 S. Capitol Blvd, Boise
  - April 12, 2018: 6:00-7:00 pm

234 people signed in at the four PIMs. The PIM #2 and online survey presented detailed concept designs and visualization of the four intersection alternatives and asked for their level of support for each alternative. Table 3 summarizes the PIM attendees and comments received during the public comment period #2.

**Table 3 Sources of Comments Received via Public Comment Period #2**

<table>
<thead>
<tr>
<th>Location or Source</th>
<th>Date(s)</th>
<th>Number of Attendees</th>
<th>Number of Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden City Hall PIM #2</td>
<td>April 4, 2018</td>
<td>152</td>
<td>72</td>
</tr>
<tr>
<td>Covenant Presbyterian Church PIM #2</td>
<td>April 5, 2018</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Eagle Public Library PIM #2</td>
<td>April 11, 2018</td>
<td>58</td>
<td>28</td>
</tr>
<tr>
<td>Boise Public Library PIM #2</td>
<td>April 12, 2018</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Emailed and Mailed Comments</td>
<td>April 12, 2018</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Online Comments</td>
<td>April 12, 2018</td>
<td>-</td>
<td>338</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>234</td>
<td>457</td>
</tr>
</tbody>
</table>

**OTHER ENGAGEMENT**

Local media issued several news reports on the Study in December 2017 and April 2018. ACHD staff provided updates to their Commission three times during the Study. The partnering agencies City of Boise, Garden City, and Valley Regional Transit, who were part of the PAC included presentation updates to their respective Councils and Boards during the Study.
NEEDS AND DEFICIENCIES

The Glenwood Street and State Street intersection has an extensive list of challenges when trying to balance the many users of the intersection. This section summarizes the existing and future needs and deficiencies based on data and analysis performed during the Study. Figure 6 illustrates the current pedestrian, bike, and transit facilities within the study area. Figure 7 illustrates the existing and year 2040 traffic conditions at the major intersections within the study area.

Figure 6. Existing Pedestrian, Bike, and Transit Facilities
Traffic Volumes

The current peak hour total entering traffic volumes range between 4,100 and 5,450 vehicles. The future (year 2040) peak hour total entering traffic volumes range between 6,500 and 8,100 vehicles and were estimated based on the Community Planning Association of Southwest Idaho (COMPASS) travel demand model and post-processing using National Cooperative Highway Research Program (NCHRP) Report 765 (Reference 6). The annual growth rate is approximately 1.7% over the 23 year time-period. Daily traffic volumes on Glenwood Street range between 34,000 and 40,000 vehicles and on State Street range between 36,000 to 38,000. Due to the river crossing located south of the intersection, this intersection experiences heavy turning movements resulting in higher traffic volumes for the eastbound right turn, northbound left turn, northbound right turn and westbound left turn movements.

Transit Ridership and Infrastructure

ValleyRide operates five transit routes (#9, #9X, 44, 10, 12) with approximately 1,200 daily riders and 327,000 annual riders (Reference 7). This results in 7 buses passing through this intersection during the peak hours. Bus stops are located on all four

Figure 7. Existing and Year 2040 Traffic Conditions
PEDESTRIANS ACTIVITY LEVEL AND INFRASTRUCTURE

Approximately 135 pedestrians cross the intersection daily. This number fluctuates due to weather conditions, when local schools are in session, and changes in adjacent land uses (e.g., apartment complex in the northwest quadrant was not occupied when this Study completed data collection). The pedestrian crossing distances are long due to the large intersection size and result in pedestrian crossing times of 29 to 34 seconds (5 seconds of walk time plus remaining flash don’t walk time). No accessible pedestrian signals exist at the signalized intersections. Additionally, there is a gap in connectivity for pedestrians to cross both State Street to the east and Glenwood Street to the south due to the spacing of traffic signals. Figure 8 illustrates the crossing locations that exist on State Street and Glenwood Street.

BICYCLIST ACTIVITY LEVEL AND INFRASTRUCTURE

Approximately 90 bicyclists cross the intersection daily. This number fluctuates due to weather conditions, when local schools are in session, and changes in adjacent land uses (e.g., apartment complex in the northeast quadrant was not occupied when this Study completed data collection). Bike lanes are not present on any of the roadways within the study area, except for a buffered bike lane on Gary Lane north of Bunch Court and short bike lane between the Plantation Shopping Center driveway and Bunch Court.

SIDEWALK AND BIKE LANE CONNECTIVITY TO THE GREENBELT

There is intermittent sidewalk and bike lane connectivity on Glenwood Street between Riverside Drive and Marigold Street to connect with the Greenbelt located on the southside of the Boise River. On Glenwood Street, there is a detached asphalt pathway on the east side of the roadway and detached sidewalks on the west side between State Street and Riverside Drive. South of Riverside Street, there is an attached 5-foot sidewalk on the east side and no sidewalks present on the west side of Glenwood Street to the north side of the bridge. Attached 5.5-foot sidewalks are provided on both sides of Glenwood Street at the bridge to Marigold Street. There is a striped 5-foot bike lane (includes the gutter pan) on Glenwood Street between Riverside Street and Marigold Street. The pedestrian and bicyclist facilities would need enhancements to create a more comfortable, safer environment for pedestrians and bicyclists in this segment of Glenwood Street.

SAFETY PERFORMANCE

Year 2011 to 2015 crash data was reviewed for this Study. There were a total of 512 reported crashes in the study area, of which 112 reported crashes occurred at the Glenwood Street and State
Street intersection. No fatalities occurred at the intersection during this timeframe, but 46% of the crashes resulted in injury. 13% of the crashes were reported as driveway-related crashes. Figure 9 illustrates the breakdown of reported crashes by crash type at the Glenwood Street and State Street intersection. If no changes occur at the intersection, a 12% increase in crashes is expected by 2040 per the Highway Safety Manual analysis. Within the study area, there were two reported crashes with pedestrians and 12 reported crashes with bicyclists. Other deficiencies that impact safety performance at the intersection and within the study area include:

- Near to over-capacity traffic conditions,
- Lack of raised medians to restrict movements at driveways – there are 29 driveways in the study area,
- Challenges with access and connectivity to local neighborhoods via Bunch Court, Strawberry Glenn Road, and Marigold Street
- Lack of crossings for pedestrians and bicyclists,
- Lack of bike facilities on State Street and segment of Gary Lane,
- Substandard bike facilities on the Glenwood River Bridge, and
- Several closely spaced driveways.

*Figure 9. Reported Crash Types (Study Area and Glenwood Street and State Street Intersection)*

**Themes from the Public (PIM #1) and PAC (Meeting #1) Comments on Needs and Deficiencies**

**PAC Comments (12 Comment Sheets Received)**

- Fill in gaps for pedestrians and bicyclists
- Make comfortable and safe for pedestrians and bicyclists
- Remove free right-turns for pedestrians and bicyclists
- Provide far-side bus stops and lower speeds (35 mph or less)
- Coordinate with the TOD Study and future land uses
- Add vehicle capacity
- Improve signal timing
- Balance peak hour operations with other times of the day
- Remove two-way left-turn lane on State Street
- Reduce posted speed on State Street to 35 mph

**Public Comments (384 Comments Received)**

- Add pedestrian and bicyclist facilities to improve access and safety
- Improve signal timing and coordination
- Increase in congestion from apartments (NW quadrant)
- Maintain or improve access for local neighborhoods via Bunch Court, Marigold Street, and Strawberry Glenn Road
SUMMARY

Based on this assessment and input from the PAC, public, and PMT, the project team identified the following summary of what this all means for the identification and development of alternatives at this intersection:

» Traffic operations – Improve traffic flow
   • Build another river crossing
   • Improve signal timing
   • Add capacity with through and turn lanes
   • Remove and reroute left turns (alternative intersections)

» Safety – Reduce crashes
   • Improve traffic flow
   • Limit the number of driveways
   • Reduce conflict points (alternative intersections)
   • Provide facilities for pedestrians and bicyclists

» Multimodal – Enhance the environment
   • Improve crossings and connectivity
   • Enhance the pedestrian facilities
   • Provide bike facilities
   • Integrate transit stops

When trying to balance the many users at this intersection, increase in traffic volumes at the intersection, and safety performance, alternative intersection forms (e.g. roundabouts, median u-turn, displaced left turn, quadrant) along with conventional and grade separation alternatives, as depicted in Figure 10 (Reference 8) were explored as potential solutions to address the needs and deficiencies.
A tiered approach was used to develop, evaluate, and screen alternatives at the Glenwood Street and State Street intersection. Figure 11 illustrates the tiered approach.

**INITIAL INTERSECTION OPTIONS AND SCREENING**

Prior to Tier 1, 18 intersection options were identified and screened with the PMT to select a shortlist of initial alternatives for further development and evaluation. The intersection options were initially evaluated on their ability to provide reasonable operations (at or under capacity) and be compatible with the adjacent land uses. A planning-level operations analysis was performed using the FHWA CAP-X software, critical movement analysis, and Sidra 7.0. Table 4 summarizes the types of intersection options identified and evaluated with the initial screening, and the eight alternatives selected for further evaluation in Tier 1.

**Figure 11. Tiered Approach**

1. Initial Alternatives
   - Initial Evaluation
   - Public Comment

2. Refined Alternatives
   - Design Concepts
   - Refined Operational Analysis
   - Public Comment

3. Preferred Alternative
   - Recommend Preferred Alternative to ACHD and ITD
<table>
<thead>
<tr>
<th>Category</th>
<th>Alternative #’s</th>
<th>What Is It?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Intersection</td>
<td>NB - No build</td>
<td>This category maintains the existing configuration, improves signal timing, adds turn and through lanes, or modifies the signal to a roundabout at the existing signalized intersection of Glenwood Street and State Street.</td>
<td>To maintain or accommodate more vehicles through the intersection resulting in improved operations.</td>
</tr>
<tr>
<td></td>
<td>1A - Signal timing improvements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1B - Triple NB left turns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1C - Triple NB left turns + 3rd EB and WB through lane</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1D - Multilane roundabout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offset T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2A - Signalized offset T-intersection</td>
<td>This category converts the four-legged intersection of Glenwood Street and State Street to a T-intersection by closing Gary Lane. The movements on Gary Lane are routed to Saxton Drive and results in two signalized, T-intersections and/or roundabouts at the Glenwood Street and State Street and Saxton Drive and State Street intersections.</td>
<td>T-intersections have less conflict points resulting in improved operations and safety.</td>
</tr>
<tr>
<td></td>
<td>2B - Signalized offset T-intersection with RIRO for Walmart</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2C - Multilane roundabout offset T-intersection with RIRO for Walmart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadrant Intersection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3A - Quadrant intersection (NW and SE)</td>
<td>All of the left turns are removed from the Glenwood Street and State Street intersection and rerouted to occur as right turns and left turns via four signalized intersections (two existing signals and two new signals). Through lanes are added to the intersection.</td>
<td>Removing left turns from the intersection improves operations and safety</td>
</tr>
<tr>
<td>Displaced Left Turn (Continuous Flow Intersection)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4A - Median U-turns (east and west only)</td>
<td>This category removes the eastbound and westbound left turns from the Glenwood Street/ and State Street intersection and reroutes them to another intersection as a signalized U-turn. Turn and through lanes are added to the intersection.</td>
<td>Removing left turns from the intersection improves operations and safety</td>
</tr>
<tr>
<td></td>
<td>4B - Median U-turns (east and west only) + triple NB left turns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade Separated Flyover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5A - Displaced NB left + reroute SB lefts to Saxton</td>
<td>This category has one or more of the left-turns being moved to the other side of the opposing through traffic at the intersection. Turn and through lanes are added to the intersection.</td>
<td>Left-turns proceed at the same time as the through movements eliminating a conflict point and resulting in improved operations and safety.</td>
</tr>
<tr>
<td></td>
<td>5B - Displaced NB left + reroute lefts to crossover</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5C - Displaced NB &amp; WB lefts + reroute SB &amp; WB lefts to Saxton</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5D - Displaced NB &amp; WB lefts + reroute SB &amp; EB lefts to crossovers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6A - NB Left Flyover/Flyunder</td>
<td>This category grade separates the northbound left turn and/or the eastbound and westbound through lanes from the signalized intersection of Glenwood Street and State Street.</td>
<td>The northbound left turn is a major movement, so removing it from the intersection improves operations and safety.</td>
</tr>
<tr>
<td></td>
<td>6B - EB &amp; WB Inside Through Lane Overpass</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6C - EB &amp; WB Outside Through Lane Overpass</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tier 1 Alternatives Development and Evaluation

Eight initial options were selected for further evaluation in Tier 1. These initial options, highlighted in Table 1 include two conventional intersection forms (no build and Alternative 1C), one quadrant intersection form (Alternative 3A), two median u-turn intersection forms (Alternatives 4A and 4B), two displaced left turn intersection forms (Alternatives 5A and 5C), and one grade separated flyover form (Alternative 6A). These eight alternatives were further developed by the project team into concept designs and evaluated using a -1, -0.5, 0, +0.5, +1.0 scoring based on the following evaluation criteria:

» **Automobile Mobility** – The criteria includes average intersection delay and level of service, expected residual intersection capacity, and travel time through the intersection. The traffic operations analysis was performed using Synchro 9 and used to apply the criteria.

» **Pedestrian, Bicyclist, Transit Rider Mobility** – The criteria includes pedestrian connectivity and crossing opportunities, bike facilities and connectivity, enhanced transit accommodations, and compatibility with the State Street TTOP. The concept designs, crossing distance measurements, review of TTOP, and input from the PMT and PAC were used to apply the criteria.

» **Safety Performance** – The criteria includes the change in number of vehicle-to-vehicle conflict points and number of driveways, improved accessibility and response time for emergency vehicles, and reasonable comprehension and wayfinding for users. The concept designs, conflict point analysis, travel times from Synchro 9, and input from the PMT and PAC were used to apply the criteria.

» **Land Use** – The criteria includes new right-of-way needs, extent of impact to adjacent properties (buildings/structures), ability to provide reasonable access to adjacent properties, compatibility with State Street TOD Implementation Plan, and impacts to utilities and existing utility infrastructure. The concept designs and input from the PMT and PAC were used to apply the criteria.

» **Cost** – The criteria includes cost estimates for design and construction of the alternative. Planning level costs estimates were developed to apply the criteria.

» **Community Support** – The criteria includes level of support from the PAC and level of support from the community. Comments and feedback from PAC Meeting #1 and PIM #1 were used to apply the criteria.

Table 5 summarizes the evaluation results of the Tier 1 alternatives and identifies the four alternatives selected for further evaluation in Tier 2.

Table 5. Evaluation Results of the Tier 1 Alternatives

<table>
<thead>
<tr>
<th>Criteria</th>
<th>NB</th>
<th>1C</th>
<th>3A</th>
<th>4A</th>
<th>4B</th>
<th>5A</th>
<th>5C</th>
<th>6A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Mobility</td>
<td>-1.0</td>
<td>-0.5</td>
<td>0.0</td>
<td>-0.5</td>
<td>0.7</td>
<td>0.3</td>
<td>0.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Pedestrian, Bicyclist,</td>
<td>-0.5</td>
<td>0.1</td>
<td>0.6</td>
<td>0.3</td>
<td>0.4</td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Transit Rider Mobility</td>
<td>0.2</td>
<td>0.2</td>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Safety Performance</td>
<td>0.5</td>
<td>0.0</td>
<td>-0.2</td>
<td>0.3</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.6</td>
<td>-0.6</td>
</tr>
<tr>
<td>Land Use</td>
<td>1.0</td>
<td>0.0</td>
<td>-0.5</td>
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<td>0.0</td>
<td>0.0</td>
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<td>-1.0</td>
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<tr>
<td>Cost</td>
<td>-0.8</td>
<td>0.3</td>
<td>0.5</td>
<td>0.3</td>
<td>0.5</td>
<td>0.3</td>
<td>-0.3</td>
<td>-1.0</td>
</tr>
<tr>
<td>Community Support</td>
<td>-0.6</td>
<td>0.1</td>
<td>0.5</td>
<td>0.9</td>
<td>1.7</td>
<td>0.9</td>
<td>-0.2</td>
<td>-2.4</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td>-0.6</td>
<td>0.1</td>
<td>0.5</td>
<td>0.9</td>
<td>1.7</td>
<td>0.9</td>
<td>-0.2</td>
<td>-2.4</td>
</tr>
</tbody>
</table>

Tier 1 Alternatives Selected for Further Evaluation in Tier 2

Alternatives Not Carried Forward to Tier 2

Based on the Tier 1 evaluation and direction from the PMT, the four alternatives not selected for further evaluation in Tier 2 include:

» **Alternative 1C (Conventional + Triple NB Left Turns)** – This alternative maintains existing connectivity and has intersections projected to operate at level of service (LOS) C to F during the AM and PM peak hours. It ranked #5 of the eight alternatives.

» **Alternative 4A (Median U-Turn – East and West)** - This alternative is projected to have intersections operate at a LOS A and F during the AM and PM peak hours. It ranked #2 of the eight alternatives, as it provided a smaller overall intersection footprint for pedestrians and bicyclists. However, due to the projected traffic operations and similarity to Alternative 4B, this alternative was not selected for further evaluation.
» Alternative 5C (Partial Displaced Left Turn – NB and WB) - This alternative is projected to have intersections operate at a LOS A and F during the AM and PM peak hours. It ranked #6 of the eight alternatives, due to greater right-of-way needs and higher costs.

» Alternative 6A (Northbound Left Turn Flyover) - This alternative is projected to have intersections operate at a LOS D and F during the AM and PM peak hours. It ranked #8 of the eight alternatives, due to greater right-of-way needs, land use compatibility, and highest costs.

ALTERNATIVES CARRIED FORWARD TO TIER 2

Based on the Tier 1 evaluation and direction from the PMT (The PMT did not rank the Tier 1 alternatives. ), the four alternatives selected for further evaluation in Tier 2 include:

» Alternative 1 (No Build) - This alternative provides a comparison to the build alternatives and is a required alternative as part of a NEPA process, if applicable in the future for funding. The alternative is projected to have intersections operate between LOS B and F during the AM and PM peak hours.

» Alternative 3A (Partial Quadrant Intersection) - This alternative provides reasonable traffic operations (LOS B to E); enhances pedestrian, bike, and transit infrastructure and connectivity; and connects the northeast and southeast parcels. This intersection form was supported by the PAC who also supported Alternative 4B.

» Alternative 4B (Median U-Turn – East and West + Triple NB Left Turns) - This alternative provides good traffic operations (LOS A to E), provides additional crossings on State Street, and connects the northeast and southeast parcels. This intersection form was supported by the PAC.

» Alternative 5A (Partial Displaced Left Turn) - This alternative provides good traffic operations (LOS B to E) and maintains a similar design to today’s intersection with minimal out-of-direction travel. This intersection form was supported by the community.

THEMES FROM THE PUBLIC (PIM #1) AND PAC (MEETING #2) COMMENTS ON TIER 1 ALTERNATIVES

PAC COMMENTS (12 COMMENT SHEETS RECEIVED)

» Need for enhanced pedestrian and bike facilities
  • Multiuse path on Glenwood Street
  • Crossings on all legs of an intersection
  • Improvements for visually impaired

» Triple left turns are not consistent with TTOP

» For the displaced left turn alternatives
  • Islands are difficult for pedestrians
  • Potential changes to transit routes

» Land use opportunities are best with quadrant alternative

» List transit separately from pedestrians and bikes in evaluation criteria

» Expand land use evaluation criteria to include future uses

» Expand pedestrian evaluation criteria to include crossing distances and exposure

» The PAC had the strongest support for Alternatives 3A, 4A, and 4B.

PUBLIC COMMENTS (384 COMMENTS RECEIVED)

» Median U-turn
  • Adding new signals will result in more congestion
  • Difficulty for trucks making a u-turn

» Displaced left turn
  • Need for education
  • Concern for bicyclist and pedestrian safety

» Any alternative intersection form needs to educate the public and provide proper signage

» The public had the strongest support for the displaced left turn intersection followed by median u-turn intersection than conventional intersection.
TIER 2 ALTERNATIVES
DEVELOPMENT AND EVALUATION

Four alternatives were identified for further evaluation in Tier II, which included:

» Alternative 1 – No Build
» Alternative 3A – Partial Quadrant Intersection
» Alternative 4B – Median U-turn
» Alternative 5A – Partial Displaced Left Turn

In Tier II, the evaluation of the four alternatives was refined based on the following new information.

CONCEPT DESIGN REFINEMENT

The concept designs were updated to include additional detail and refinement on the location and type of bike facilities, location and type of pedestrian facilities (including grade separated crossings), spacing and configurations of new signalized intersections, roadway alignment on State Street to match with the concept design at the Pierce Park Lane and State Street intersection, and location of raised medians and driveway restrictions.

BICYCLIST AND PEDESTRIAN OVERPASS

In the alternatives development process, a bicyclist and pedestrian overpass was explored at the Glenwood Street and State intersection. The overpass was considered for the east and south approaches of the intersection, in particular with Alternative 5A – Displaced Left Turn due to its larger intersection footprint and complexity of the at-grade crossings. The bicyclist and pedestrian overpass option was presented at PIM #2 and PAC Meeting #3.

» Several PAC members (Idaho Walk Bike Alliance, City of Boise, and VRT) do not support an overpass. Garden City Police and Garden City support an overpass. Of general note, if Alternative 5A is selected, an overpass is needed to connect with all four quadrants.

» 67% of the public responded in either support or strongly support of this option for the following reasons: safety; lots of pedestrians and bicyclists; helps connect the north and south; makes sense with the alternatives being considered and adjacent land uses; and if you did one thing, do this now.

» 17% opposed or strongly opposed this option due to cost and not enough pedestrian and bicyclist activity to warrant this improvement.

Based on this information and discussion with the PMT, the bicyclist and pedestrian overpass was discarded from further consideration due to high construction and maintenance costs, lack of full support from the PAC, and the lack of a major pedestrian and bicyclist generator for implementing this type of facility.

TRAFFIC OPERATIONS – VISSIM MODEL

The traffic operations analysis was updated and modeled using the microscopic simulation tool, VISSIM. The refined concept designs and year 2040 weekday PM peak hour traffic conditions for the four alternatives were used to develop the VISSIM models. Figure 12 illustrates a screen capture of the VISSIM model for Alternative 4B – Median U-turn.

Through this analysis and further review of the traffic projections, it was identified that Glenwood Street would benefit from being widened to three lanes in each direction between Riverside Drive and Chinden Boulevard (US 20/26). This recommendation is excluded from this Study but included here for reference by ITD in identifying future projects and studies within District 3.

Table 6 summarizes the VISSIM results for the four alternatives.

Figure 12. VISSIM Model for Alternative 4B – Median U-turn
Table 6. VISSIM Results for the Tier 2 Alternatives

<table>
<thead>
<tr>
<th>Network Performance</th>
<th>No Build</th>
<th>3A - Quadrant</th>
<th>4B - Median U-turn</th>
<th>5A - Displaced Left Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Delay (seconds)</td>
<td>255</td>
<td>187</td>
<td>121</td>
<td>128</td>
</tr>
<tr>
<td>Network Speed (mph)</td>
<td>11</td>
<td>11.9</td>
<td>17.8</td>
<td>18.1</td>
</tr>
<tr>
<td>Network Vehicles Served</td>
<td>9122 (+8%)</td>
<td>9831 (+23%)</td>
<td>11194 (+23%)</td>
<td>10697 (+17%)</td>
</tr>
</tbody>
</table>

Travel Time (seconds)

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>3A - Quadrant</th>
<th>4B - Median U-turn</th>
<th>5A - Displaced Left Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB Glenwood to WB State (Northbound Left Turn)</td>
<td>221</td>
<td>199</td>
<td>114</td>
<td>134</td>
</tr>
<tr>
<td>WB State to WB State (Westbound Through)</td>
<td>266</td>
<td>190</td>
<td>80</td>
<td>87</td>
</tr>
<tr>
<td>WB State to SB Glenwood (Westbound Left Turn)</td>
<td>283</td>
<td>359</td>
<td>308</td>
<td>262</td>
</tr>
<tr>
<td>EB State to EB State (Eastbound Through)</td>
<td>212</td>
<td>133</td>
<td>77</td>
<td>112</td>
</tr>
<tr>
<td>SB Gary to SB Glenwood (Southbound Through)</td>
<td>151</td>
<td>256</td>
<td>239</td>
<td>219</td>
</tr>
</tbody>
</table>

Represents alternative with best performance

As shown in Table 6, Alternatives 4B – Median U-turn and Alternative 5A – Displaced Left Turn are projected to result in the best operational performance between the four alternatives.

COST ESTIMATES

Planning-level cost estimates were prepared for the three build alternatives. The cost estimates were based on the refined concept designs, full reconstruction with concrete pavement, ITD bid items (2016 Average Unit Price Report), ACHD projects, and 25% contingency. The cost estimates range from $16.9 million to $17.8 million for the three build alternatives.

CONTINUED ON THE NEXT PAGE
Alternative 5A – Partial Displaced Left Turn
- Creates a large intersection
- Prioritizes autos over pedestrians, bicyclists, and transit users
- LOS D is a concern at Glenwood Street and State Street
- Not supportive of State Street TTOP
- Raised medians not good for emergency services
- Not a good option for visually impaired
- TOD options diminished
- Elevated pedestrian walkway would be needed to connect all four corners

Other comments
- Include pedestrian and bike improvements on the Glenwood Bridge (River to Marigold)
- Include protected bike lanes or multi-use pathway on State Street
- Maintain bike and pedestrian traffic at grade
- Be consistent with improvements on the State Street corridor
- Include accessible pedestrian signals (APS)
- Maintain a buffer for street trees with the multi-use pathway
- Lower posted speeds

The PAC had the strongest support for Alternative 3A followed by Alternative 4B, No Build, and Alternative 5A.

PUBLIC COMMENTS (457 COMMENTS RECEIVED)

No Build Alternative
- Lowest cost of alternatives
- Results in no additional construction on State Street
- Least impact on existing businesses
- Something needs to be done
- Traffic will get worse

Alternative 3A – Partial Quadrant Alternative
- Best for all transportation modes including biking, walking or taking the bus
- Maintains access for shopping center off Gary Lane
- Gives drivers options for making turns
- Too expensive
- Too many additional signals
- Doesn’t do enough to fix the congestion problem for the cost of the improvements

Alternative 4B – Median U-turn
- Similar design to nearby intersection (Veterans Memorial Parkway & State Street)
- Entrance to Walmart makes more sense with this alternative
- Cost effective option
- U-turns are perceived to be unsafe and difficult for some vehicles to make
- Increased number of traffic signals
- Need to wait and see if this works at Veterans Memorial Parkway & State Street

Alternative 5A – Partial Displaced Left Turn
- Lowest cost with the most improvement to traffic flow
- Least impact to existing right of way
- Support with the addition of the bicyclist and pedestrian overpass
- Too confusing/difficult to navigate
- Blocks access to Strawberry Glenn
- Blocks access to many businesses
- Does not do enough to improve traffic flow
- Poor for people biking or walking

The public had the strongest support for Alternative 5A followed by Alternative 4B than No Build and Alternative 3A.
Using this updated information, the four alternatives were evaluated further based on the evaluation criteria. Table 7 presents the Tier 2 evaluation results of the four alternatives.

**Table 7. Evaluation Results of the Tier 2 Alternatives**

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>3A - Quadrant</th>
<th>4B - Median U-turn</th>
<th>5A - Displaced Left Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auto Mobility</strong></td>
<td>-0.8</td>
<td>-0.2</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Pedestrian, Bicyclist, Transit Rider Mobility</strong></td>
<td>-0.6</td>
<td>0.9</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Safety Performance</strong></td>
<td>0.0</td>
<td>0.1</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td>0.3</td>
<td>0.2</td>
<td>0.0</td>
<td>-0.2</td>
</tr>
<tr>
<td><strong>Community Support</strong></td>
<td>0.0</td>
<td>0.3</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td>-1.1</td>
<td>1.3</td>
<td>2.3</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Cost (in millions)</strong></td>
<td>-</td>
<td>$17.8</td>
<td>$17.2</td>
<td>$16.9</td>
</tr>
<tr>
<td><strong>Right of Way (square-feet)</strong></td>
<td>-</td>
<td>164,000</td>
<td>141,000</td>
<td>104,000</td>
</tr>
</tbody>
</table>

Represents alternative with best score in Tier 2

As shown in Table 7, Alternative 4B - Median U-turn had the highest ranking of the four alternatives. Additionally, this alternative was the next best alternative within the PAC and public comments and supported by the PMT to move forward with implementation.
PREFERRED ALTERNATIVE

Alternative 4B – Median U-Turn is recommended as the preferred alternative at the Glenwood Street and State Street intersection. This intersection form is similar to the project being constructed by ACHD at the Veterans Memorial Parkway and State Street intersection. Figure 13 illustrates the concept design for the preferred alternative (Alternative 4B – Median U-Turn). Figure 14 illustrates the estimated right of way needs for the preferred alternative (Alternative 4B – Median U-Turn).

Figure 13. Concept Design for the Preferred Alternative (Alternative 4B – Median U-Turn)
The preferred alternative includes the addition of two new traffic signals on State Street. The eastbound and westbound left turns are removed from the Glenwood Street and State Street intersection and rerouted to the two new traffic signals via U-turns. Key elements of this alternative and design considerations are described in the remainder of this section.

**ALIGNMENT, TRAFFIC SIGNALS, AND LANE CONFIGURATIONS**

- The eastbound and westbound left turns are removed from the Glenwood Street and State Street intersection and routed to two new traffic signals on State Street via U-turns.
  - The south leg of the traffic signal at the Saxton Drive and Glenwood Street intersection is removed and relocated approximately 325 feet to the east of Saxton Drive as a new traffic signal (approximately 625 feet from Glenwood Street). These two traffic signals operate as two T-intersections.
  - A new traffic signal is added on State Street between Glenwood Street and Hertford Way located approximately 600 feet from Glenwood Street.

- The traffic signals are modified at the Saxton Drive and State Street, Saxton Drive and Gary Lane, and Glenwood Street and State Street intersections. The two new traffic signals (secondary) and modified traffic signal (secondary) at Saxton Drive operate in coordination with the traffic signal (primary) at Glenwood Street and State Street and other traffic signals located on State Street. The three secondary traffic signals provide a majority of their green time to the major movements on State Street and operate the side street movements (northbound and southbound) at the same time as the side street movements at Glenwood Street and State Street intersection. Additionally, the signal timing for the two signals west of Glenwood Street operate to allow for the northbound triple left turn movements to progress through without stopping. These operational features and signal timing are critical for this alternative in providing progression on State Street, minimizing stops, and managing vehicle queues in this area.

- Three northbound left turn lanes, three eastbound through lanes (includes HOV/transit lane), and three westbound through lanes (includes HOV/transit lane) are provided at the Glenwood Street and State Street intersection.

- A channelized eastbound right-turn lane (with rectangular rapid-flashing beacon [RRFB]) is provided at the Glenwood Street and State Street intersection.
Raised medians are included on State Street, Glenwood Street, and Gary Lane.

The channelized islands are removed for the northbound and southbound right turn lanes.

All travel lanes are shown as 12 feet.

PEDESTRIAN, BIKE, AND TRANSIT INFRASTRUCTURE

Detached sidewalks (6 feet) are provided on State Street and Gary Lane.

Pedestrian crossings are provided at the new traffic signal on State Street located east of Glenwood Street.

A buffered bike lane (2-foot buffer and 5-foot bike lane and 2-foot curb and gutter) is provided on the northside of State Street. This design is consistent with the Pierce Park Lane and State Street intersection project.

A multi-use pathway (10 feet) is provided on the southside of State Street. The multi-use pathway is subject to change and should match the facility type implemented with the State Street/ Pierce Park intersection design project.

Buffered bike lanes (2-foot buffer and 5-foot bike lane and 2-foot curb and gutter) are provided on both sides of Gary Lane.

A multi-use pathway (10 feet) is provided on the west side of Glenwood Street.

A multi-use pathway (10 feet) is provided on the east side of Glenwood Street.

Bus stops are provided at/near the existing locations on State Street, Glenwood Street, and Gary Lane.

ITEMS FOR FURTHER EVALUATION DURING THE DESIGN PHASE

Several design-related items were raised by the PAC and public during the Study. These items were discussed with the PMT and identified for further evaluation during the design phase. Table 8 summarizes this information for future use in the design phase.

<table>
<thead>
<tr>
<th>Design-Related Item for Further Evaluation</th>
<th>Why?</th>
</tr>
</thead>
</table>
| Use 11-foot travel lanes rather than 12-foot travel lanes | • Reduces the crossing distance for pedestrians and vehicles at the intersections  
• Reduces intersection footprint and potential right-of-way needs |
| Incorporate accessible pedestrian signals (APS) at all signalized intersections | • Enhances safety for visually-impaired pedestrians |
| Incorporate station planning at the two bus stop locations on State Street (Saxton Drive / State Street and new traffic signal located east of Glenwood Street / State Street) | • Supports on-going TOD and TTOP planning efforts on State Street |
| Explore separated bike lane or multi-use pathway on State Street between Glenwood Street and Saxton Drive | • Coordination with ITD on the facility type given the posted speed of 45 miles per hour |
| Include pedestrian and bike improvements on the Glenwood Street Bridge between River Street and Marigold Street (e.g. Greenbelt) | • Improves critical connection for pedestrians and bicyclists  
• Enhances safety for pedestrians and bicyclists across the Glenwood Street Bridge |
| Consolidate right-turn lanes with through lanes on the westbound and northbound approaches | • Reduces the crossing distance for pedestrians and vehicles at the intersections  
• Reduces intersection footprint and potential right-of-way needs |
| Reduce the posted speed from 45 miles per hour to 35 miles per hour on State Street east of Glenwood Street | • Enhances the environment for pedestrians and bicyclists  
• Improves safety performance of the roadway  
• Reduces noise pollution  
• Supports on-going TOD and TTOP planning efforts on State Street  
• Results in a posted speed that aligns with the land use, street, and environmental context |
| Include a pedestrian and bicycle treatment on the south side of State Street that is consistent with the Pierce Park Lane and State Street intersection project | • Provides design consistency and continuity to bicyclists, pedestrians, transit riders, and motorists on the south side of State Street |
With intersection ownership being split between ACHD and ITD, the two agencies will need to form an interagency agreement to partner on funding of the intersection project. Next steps include identifying funding for intersection project and programming the project within ACHD’s and ITD’s respective programs. Once the project is programmed, the design and right-of-way phase could be initiated by ITD and ACHD, which is a 2-3 year process followed by a 1-2 year construction phase depending on the final scope and limits of the project. Figure 15 illustrates the general next steps for moving this project from concept to construction.

Figure 15. From Concept Study to Construction


A. PMT Meeting #1
B. PMT Meeting #2
C. PMT Meeting #3
D. PMT Meeting #4
E. PMT Meeting #5
F. PMT Meeting #6
G. PMT Meeting #7
H. PMT Meeting #8
I. PAC Meeting #1 Summary
J. PAC Meeting #2 Summary
K. PAC Meeting #3 Summary
L. PIM #1 Summary
M. PIM #2 Summary
N. Traffic Counts
O. Crash Data
P. Travel Demand Model Output
Q. Existing Traffic Volumes Network Tool
R. Year 2040 Traffic Volumes Network Tool
S. Existing Traffic Conditions Operations Worksheets
T. Year 2040 Traffic Conditions Operations Worksheets
U. Initial Alternatives Operations Worksheets
V. Tier 1 Alternatives Operations Worksheets
W. Tier 1 Alternatives Evaluation Summary
X. Tier 2 Alternatives Operations Worksheets
Y. Tier 2 Alternatives Evaluation Summary
Z. Tier 2 Alternatives Planning Level Cost Estimates
AA. Environmental Scan
BB. Concept Drainage Memorandum