Final Report

City of Gillette — Gillette Railroad Overpass Study

Gillette, Wyoming
November 2021

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Executive Summary

The Gillette Railroad Overpass Study examined alternatives to address issues associated with the aging Gurley Overpass facility that crosses the Burlington Northern Santa Fe (BNSF Railroad) and provides unimpeded access to the northern portions of Gillette. Due to the age of the existing structure on Gurley Avenue, more frequent routine maintenance and longer duration closures are necessary to provide the required maintenance. This study built upon the prior *2008 Gillette Railroad Crossing Alternatives Evaluation Study* and examined grade separated crossing location and configuration alternatives to enhance mobility, improve traffic flows and add truck route access, accommodate multi-modal elements, and to provide long-term sustainable access to northern Gillette.

Eight conceptual crossing alternatives (some with sub-variations) across three crossing locations (Gurley Ave., Butler Spaeth Rd., and 4-J Rd.) were evaluated in Phase 1 of the study. Phase 1 evaluation criteria included traffic considerations, non-motorized travel, Planning-Level Costs, Right of Way (ROW)/Social Impacts, and Constructability. The top three scoring alternatives and the No Build (Gurley overpass closed) alternative were carried forward from Phase 1 to a more detailed Phase 2 analysis that incorporated traffic operations, environmental considerations, and ROW impacts into the iterative refinement and evaluation process. The three Phase 2 alternatives compared against the No Build scenario were:

- A new overpass on Butler-Spaeth Road (without 2nd Street grade raise and Gurley Avenue crossing closed)
- A replacement overpass at Gurley Avenue (without 2nd Street grade raise)
- Gurley Avenue one-way pairs/redundant structures

The replacement overpass at Gurley Avenue and the Gurley Avenue one-way pairs were combined into one option at Gurley Avenue with the understanding that the configuration of the new bridge or the use of one-way pairs would be determined during design if that selection were chosen.

Conceptual bridge structures and associated roadway embankments/retaining walls were developed for each of the alternatives to identify potential advantages and disadvantages.

Traffic forecasting, travel demand, and operations analysis was conducted to understand the impacts on the street network associated with each overpass and No Build alternative. Key findings from the traffic demand and operations reflective of 50,000 population (per the City's travel demand forecasts) analysis include:

Overall Gillette Road Network Travel

Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT)

- **Greatest benefit:** 3.b Gurley Avenue overpass (least VMT and VHT)
- **Moderate Benefit:** 1.b Butler Spaeth Road to Kluver Road Extension
- **Least benefit:** No Build, Gurley Avenue overpass closed (highest VMT and VHT)

Utilization of Grade Separated Crossing

Future daily traffic volumes at Brooks Avenue at-grade, Gurley Avenue overpass and/or Butler Spaeth Road overpass

- **Highest utilization:** 3.b Gurley Avenue overpass
  - Central location – less out-of-way travel
  - Good connectivity to other important north-south corridors

Lowest volume at Brooks Avenue at-grade crossing (7,00 vehicles per day, vpd)

- **Least utilization:** Butler Spaeth Avenue
  - Utilization decreases as an overpass location is shifted east towards Butler Spaeth due to less desirability from increased out-of-way travel
  - Brooks Avenue at-grade becomes more desirable (even with reliability issues with train blockage) due to central location and results in over 2 times more traffic than Gurley Avenue overpass alternative

- **No Build scenario:** Closing Gurley Avenue overpass and no new crossing results in 19,000 vpd at Brooks Avenue
  - Exceeds Brooks Avenue corridor capacity, requiring additional lanes and intersection improvements

Recommended Alternative

- **3.b Gurley Avenue overpass alternative**

Additional Gurley Avenue recommendations include a 5-lane section from Warlow Drive to 6th Street and 4 lanes across the Gurley Avenue structure to provide lane redundancy and improve reliability. The Gurley Avenue/4th Street intersection will need to be closed (4th Street cul-de-sac) to improve overpass grades, sight distance, and pedestrian/bicycle travel. The Gurley Avenue corridor improvements could be phased by initially constructing a 3-lane section with expansion to a 5-lane section considered when warranted by traffic growth.

Other network improvements include an option to connect 6th Street east to 7th Street between Gurley Avenue and Butler Spaeth to enhance local connectivity. This option would require Gurley Avenue/6th Street intersection improvements with a roundabout providing the best level of service. A traffic signal would be needed at the 6th Street/South Douglas Highway intersection. Signal warrants should be reviewed at South Douglas Highway intersections with 4th Street and 7th Street for the possible removal of existing signals due to shifts in travel patterns associated with the recommendations.

A desktop level environmental scan was completed to identify possible impacts and potential environmental program requirements for the study alternatives. The review included land ownership, land use and cover, socioeconomic factors, public lands and recreation, hazardous materials, air quality, noise, cultural resources, hydrology/water resources, and biological resources data. National Environmental Policy Act (NEPA) documentation would not be necessary if no federal funding, approvals, or federal permits are required for the project. The most likely federal involvement would result from Federal Highway Administration (FHWA) funding through WYDOT or a Section 404 permit from the US Army Corps of Engineers

(USACE). Pending the outcome of funding/permitting the environmental process could range between 6 and 16 months. State and local permits would need to be obtained prior to construction.

Planning level construction costs were also estimated for the overpass alternatives. The Gurley Avenue structure replacement costs were estimated to be $15.5M for a phased construction scenario which would leave the existing overpass open to traffic during construction. Additional network improvement costs associated with the Gurley Avenue overpass alternative which are recommended, but not required, are estimated to be $12.7M for a grand project total of $28.2M.

Potential funding sources were reviewed to provide the City possible avenues to pursue revenue to assist with project implementation, including federal, state, and local sources. Federal programs consist of competitive grant programs and potential programs in upcoming federal surface transportation legislation. It was noted as part of the funding source review, that nearly all public-sector sources identified involved the use of federal dollars, which carry with them additional regulatory requirements (i.e. the NEPA process) which need to be thoroughly understood, however if met, can greatly expand the pool of available funds possible for the project.

Introduction

The existing railroad overpass at Gurley Avenue provides a grade separated crossing that connects the northern portion of the Gillette with the central area of the city. Due to the age of the existing structure, deficiencies are exhibited, and steady maintenance is required. The Gillette Railroad Study examined ways to improve these deficiencies through the identification and evaluation of potential alternative overpass facilities that can improve mobility along the corridor while maintaining connectivity with the northern area of Gillette. The Railroad Crossing Alternatives Evaluation study, completed in 2008, identified potential crossing alternatives for the Gurley Avenue overpass and some of these alternatives are included in this study.

Study Area Description

Burlington Northern-Santa Fe (BNSF) operates the rail line at the Gurley Avenue overpass. Seven BNSF crossings related to this line are found in the city:

- Potter Avenue: at-grade crossing
- Garner Lake Road: at-grade crossing
- Gurley Avenue: grade-separated overpass
- Brooks Avenue: at-grade crossing
- Burma Avenue: at-grade crossing
- US 14 / 16: grade-separated underpass
- Foothills Boulevard: at-grade crossing

Of these seven crossings, two are within the study area. These crossings are the Gurley Avenue overpass and the Brooks Avenue at-grade crossing. **Figure 1** shows the study area, including the locations of the study area BNSF crossings. As stated in the 2008 study, the at-grade crossings have substantial impact on traffic operations, especially during the peak hour. Pedestrian and bicycle traffic is also impacted by these crossings as users are forced to use grade separated crossings for north-south mobility. Without improved crossing options, these issues will be exacerbated in the future as the community continues to grow and develop thereby increasing transportation demand.

Study Approach

This study builds off the 2008 Alternatives Evaluation and it uses a similar approach.

Identification of Alternatives

A review of previous reports and studies related to the Gurley Avenue overpass was conducted to understand the nature of the crossing and identify past alternatives that could be carried forward. The studies reviewed include the 2008 Railroad Crossing Alternative Evaluation, the Railroad Pedestrian Crossing Study, and the City of Gillette Master Transportation Plan.

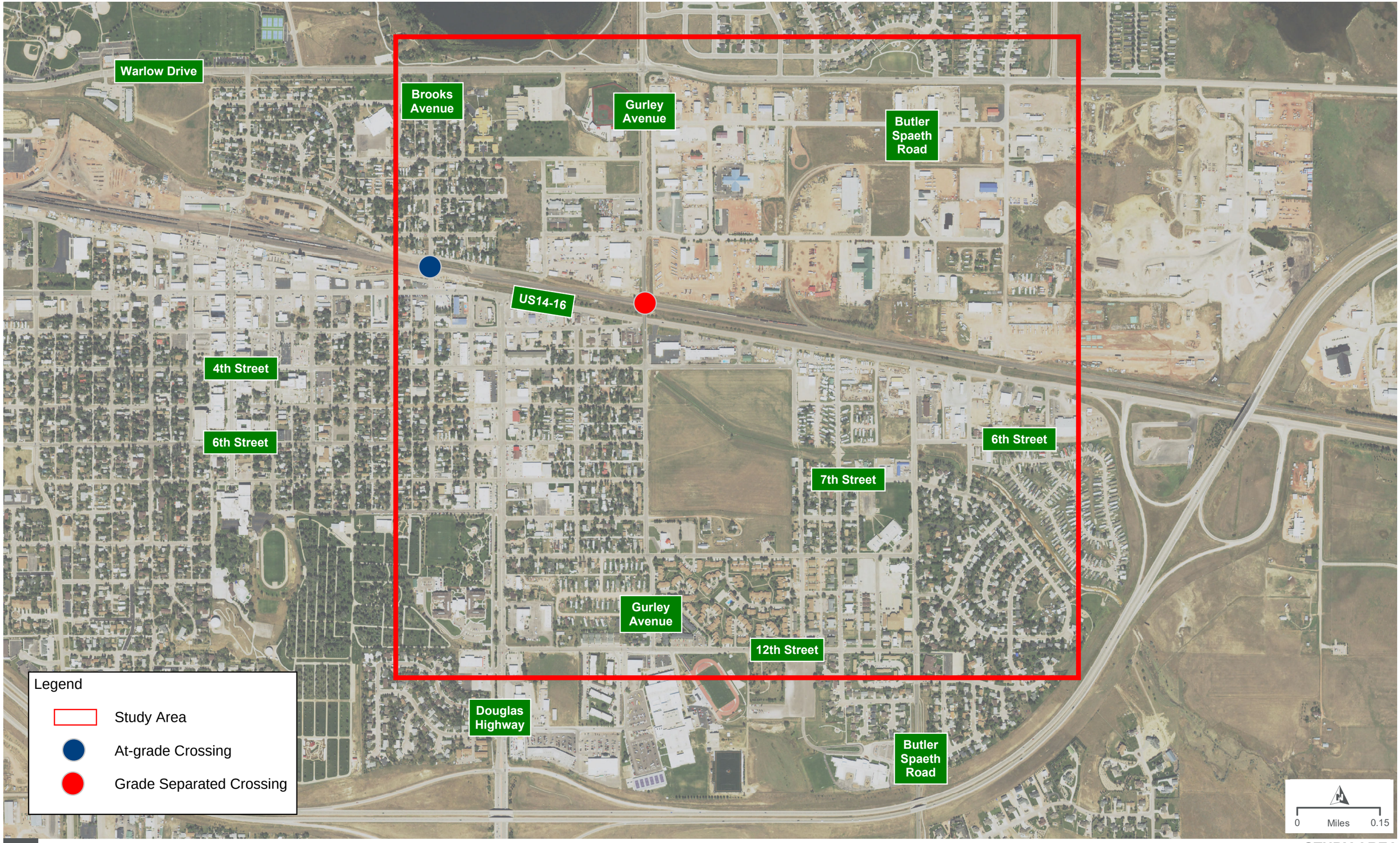
Meetings between the project team and city staff were held as part of the alternatives identification process so that new issues and concerns not captured in past studies could be incorporated into the alternatives development process.

Evaluating Alternatives

Evaluating crossing alternatives consisted of a series of analyses to determine how each alternative would meet the study goals and objectives. Criteria used for evaluation covered a range of topics, including:

- Traffic Considerations
- Non-motorized Travel
- Planning-Level Costs
- Right of Way (ROW) / Social Impacts
- Constructability

After the evaluation process, the top scoring alternatives were carried forward to more detailed analysis to estimate the traffic, environmental, and ROW impacts associated with each. A summary of potential funding sources is provided as well as a high-level implementation schedule for both a Federally and non-Federally funded implementation scenario.



STUDY AREA

FIGURE 1

GILLETTE RAILROAD OVERPASS STUDY

Phase 1 Concept Evaluation

Phase 1 Process

The Phase 1 process built off of the 2008 study and extended that work by incorporating new considerations, changing conditions, and current planning efforts. The outcome of this process was the development of concepts for the replacement of the existing structure, or the construction of a new grade separated crossing. The Phase 1 process also validated recommendations and introduced additional concepts that had been identified to date. The overarching goal of Phase 1 was to create a comprehensive list of concepts for an initial high-level evaluation and screening. The outcome of this Phase was the development and recommendation of three alternatives (one being the current location at Gurley Avenue) to carry forward to Phase 2.

Overpass Location / Alignment Concepts

The concepts analyzed in Phase 1 incorporated concepts from the 2008 study plus additional concepts identified by the City of Gillette and study team since completion of the 2008 study.

Phase 1 Overpass Concept List

Concept list numbering generally follows designations from the 2008 study with a few modifications to incorporate additional variations; references to specific alternatives discussed throughout the remainder of the report will use the ID shown in the list below. Whether the concept is being carried forward from the 2008 study or introduced as part of this study are noted in parentheses. Detailed layouts from the 2008 study are included in **Appendix A**.

1. Butler Spaeth Road to Kluver Road Extension options:
    - 1.a. With grade raise (2008 study alt. 1)
    - 1.b. Without grade raise (new)
    - 1.c. T intersection with grade raise (2008 study alt. 1.a.)
2. 4-J Road Overpass (2008 study alt. 2)
3. Gurley Avenue Overpass options:
    - 3.a. Phase 1 with grade raise (2008 study alt. 3)
    - 3.b. Phase 1 without grade raise (replace structure, new)
4. Butler Spaeth Road Overpass options:
    - 4.a. with grade raise (2008 study alt. 4)
    - 4.b. without grade raise (new)
5. Gurley Avenue one-way pair/redundant structures (new)
6. Major rehabilitation/redeck of Gurley Ave structure (new)
7. Burma Avenue option (2008 study)
8. No Build – continued maintenance of existing structure until closure

Local Network Improvements

The Phase 1 process focused on specific overpass crossing locations and required local network improvements to implement the respective concept. Improvements deemed non-essential to implementation of a specific crossing concept, such as those that would provide a benefit to most concepts and/or the overall transportation network, are tabled until Phase 2.

Phase 1 Evaluation Measures

The evaluation measures shown in **Table 1** were reviewed for each of the concepts. A numerical score was applied based on benefits and drawbacks associated with each in relation to goals of the study as well as in comparison to other concepts.

Table 1: Phase 1 Concept Evaluation Measures

Evaluation Metric	Measure	Criteria
Traffic Considerations	2008 Study traffic operations findings	Rating from 1 (worst) to 5 (best)
	Network / route connectivity	Rating from 1 (worst) to 5 (best)
Non-Motorized Travel	Non-motorized travel enhancements	Rating from 0 (none) to 5 (adequately accommodated)
Planning Costs	Planning-level costs of construction	Rating from 1 (high cost) to 5 (low cost)
ROW Impacts / Social Impacts	Impacts to business parcels	Rating from 1 (high impact) to 5 (minimal impact)
	Impacts to residential parcels	Rating from 1 (high impact) to 5 (minimal impact)
Constructability	Maintenance of traffic (MOT) Gurley Bridge	Operation of Gurley Bridge during construction
	MOT US 14-16	Operation of US 14-16 during construction
	Constructability of structure	Rating from 1 (worst) to 5 (best)

A scoring weight was applied to each measure based on priorities and goals discussed by the study team, summarized in **Table 2**.

Table 2: Phase 1 Evaluation Scoring Weight Summary

	Measure	Scoring Weight
	Traffic Considerations	**30%**
1	2008 Study Rating Traffic Operations	*15%*
2	Network/Route Connectivity	*15%*
	Non-Motorized Travel	**10%**
3	Enhancements	*10%*
	Planning-Level Costs	**20%**
4	Construction Costs	*20%*
	ROW Impacts/Social Impacts	**15%**
5	Impact to Business Parcels	*7.5%*
6	Impact to Residential Parcels	*7.5%*
	Constructability	**25%**
7	MOT – Gurley Bridge	*7.5%*
8	MOT – US14-16	*7.5%*
9	Structure	*10%*
	TOTAL	**100%**

Phase 1 Evaluation

Each concept was evaluated on how it compares with other concepts by assigning a score (ranging from 1 to 5) for each category in an evaluation matrix. The scoring weight criteria was applied to each concept for a 'Total Score' shown at the bottom of the matrix. Color coding was also included to highlight key differentiators as follows:

- **Green shading** indicates a concept measure was favorable compared to the other concepts in a category (4 or 5 score).
- No shading indicates a concept measure was in the middle compared to other concepts in a category (3 score).
- **Red shading** indicates a concept measure was unfavorable compared to the other concepts in a category or the measure does not meet study goals (score 0, 1, or 2).

The Phase 1 Evaluation Matrix is provided in **Table 3**. A summary of key contributing benefits and drawbacks to for each measure is below. See **Appendix A** for more detailed discussion on these benefits and drawbacks.

Table 3: Phase 1 Evaluation Matrix

	Measure	1. Butler Spaeth Rd to Kluver Rd			2. 4-J	3. Gurley Ave		4. Butler Spaeth Rd		5. Gurley Ave 1-Way Pairs	6. Major Rehab	7. Burma Ave	8. No Build	Scoring Weight
		1.a	1.b	1.c		3.a	3.b	4.a	4.b					
	US14-16 Grade Raise	*X*		*X*		*X*		*X*						
	Traffic Considerations													**30%**
1	2008 Study Rating Traffic Operations	**5**	**5**	**5**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**1**	*15%*
2	Network/Route Connectivity	**5**	**5**	**3**	**3**	**5**	**3**	**4**	**3**	**4**	**2**	**3**	**1**	*15%*
	Non-Motorized Travel													**10%**
3	Enhancements	**4**	**4**	**4**	**3**	**5**	**5**	**3**	**3**	**5**	**0**	**2**	**0**	*10%*
	Planning-Level Costs													**20%**
4	Construction Costs	**2**	**3**	**3**	**3**	**4**	**5**	**3**	**3**	**3**	**5**	**4**	**5**	*20%*
	ROW Impacts/Social Impacts													**15%**
5	Impact to Business Parcels	**2**	**3**	**2**	**4**	**3**	**4**	**3**	**3**	**4**	**5**	**2**	**5**	*7.5%*
6	Impact to Residence Parcels	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	*7.5%*
	Constructability													**25%**
7	MOT – Gurley Bridge	**5**	**5**	**5**	**5**	**2**	**2**	**5**	**5**	**4**	**2**	**5**	**0**	*7.5%*
8	MOT – US14-16	**2**	**5**	**2**	**5**	**2**	**5**	**2**	**5**	**5**	**5**	**5**	**5**	*7.5%*
9	Structure	**4**	**4**	**4**	**2**	**3**	**3**	**4**	**4**	**4**	**4**	**3**	**5**	*10%*
	Total Points	**3.75**	**4.25**	**3.65**	**3.43**	**3.70**	**3.90**	**3.48**	**3.55**	**3.90**	**3.28**	**3.48**	**2.93**	
	Top 3		**1**				**2 (tie)**			**2 (tie)**				

1. Butler Spaeth Road to Kluver Road Extension Options

The three Butler Spaeth Road to Kluver Road options provide a diagonal connection between Butler Spaeth Road and Kluver Road south and north of the railroad tracks, respectively. The Butler Spaeth Road to Kluver Road options include:

- 1.a: Butler Spaeth Road to Kluver Road with grade raise
- 1.b: Butler Spaeth Road to Kluver Road without grad raise
- 1.c T intersection with grade raise

Approximate limits of construction are between 7th Street and Warlow Drive.

Benefits

- Improved long-term multimodal (vehicular traffic, bicycles, pedestrians, etc.) operations and safety
- Short-term constructability and maintenance of traffic associated with constructing the new structure off the Gurley Avenue alignment

Drawbacks

- High construction costs
- Potential impact to businesses/private properties

Overall, it was determined that concept 1.b be carried forward to Phase 2 with further optimization of the alignment to minimize ROW impacts while options 1.a and 1.c be eliminated from further consideration. Refer to **Appendix A** for further information on the decision to carry forward option 1.b.

2. 4-J Road Overpass

The 4-J Road overpass concept provides a connection between 2nd Street and Warlow Drive, which also reflects the anticipated limits of construction.

Benefits

- 2008 study safety benefits
- Low cost shown in 2008 study due to limited local network improvements
- Gurley Avenue structure can remain open during construction

Drawbacks

- Minimal overall network traffic benefit associated with this concept due to proximity to other crossing locations
- Cost is expected to be considerably higher than what was presented in the 2008 study

Based on these two key drawbacks, it was concluded that concept 2 be eliminated from further consideration.

3. Gurley Avenue Overpass Options

The Gurley Avenue overpass options are to replace the existing structure on a similar alignment. While the 2008 study showed expanded options for local network connectivity, this option reflects replacement of the existing structure and tying into the existing Gurley Avenue pavement. Structure limits are likely to extend beyond the existing limits in order to better accommodate multimodal travel and flatten the approach grade.

Benefits

- Driver familiarity, network / route connectivity, and proximity to Douglas Highway
- A considerable amount of planning and development has occurred with consideration of a grade-separated crossing at Gurley Avenue
- Local network improvements are less when compared to alternatives, leading to fewer overall impacts and costs

Drawbacks

- Localized impacts and costs along US14-16 through raising to an at-grade intersection with Gurley Avenue
- Gurley Avenue traffic would need to be rerouted to other crossings during construction due to closure of the crossing during construction

It was concluded that option 3.b Phase 1 without grade raise be carried forward to Phase 2, while 3.a Phase 1 with grade raise be eliminated from further consideration. Refer to **Appendix A** for further information on the decision to carry forward option 3.b.

4. Butler Spaeth Road Overpass Options

The Butler Spaeth Road overpass concept calls for construction of a new overpass on the existing Butler Spaeth Road alignment. Approximate limits of construction extend between Warlow Drive and 7th Street.

Benefits

- Improved long-term multimodal (vehicular traffic, bicycles, pedestrians, etc.) operations and safety
- Short-term constructability and maintenance of traffic associated with constructing the new structure off the Gurley Avenue alignment

Drawbacks

- High construction costs
- Significant impact to businesses / private properties
- Significant ROW impacts

It was concluded that both options 4.a with grade raise and 4.b without grade raise be eliminated from further consideration.

Ultimately, a Butler Spaeth Road overpass concept that stays on alignment is not feasible due to property impacts. Investigating this concept with other alignment options becomes redundant with the planned refinement of the Butler Spaeth Road to Kluver Road concept in Phase 2.

Therefore, while this concept is eliminated, elements from this concept are carried forward in the Butler Spaeth Road to Kluver Road option 1.b.

5. Gurley Avenue One-way Pair/Redundant Structures

The Gurley Avenue one-way pair/redundant structure concept constructs a new overpass alongside the existing overpass. Traffic would be maintained on the existing Gurley Avenue overpass while the adjacent structure is being constructed. The specific side and how it would tie into the existing roadway network would be defined in the next phase of the study.

Benefits

- Long-term network connectivity benefits
- Constructability / maintenance of traffic
- Lower project costs due to two narrow structures in lieu of a single wider structure

Drawbacks

- Potential for business and residential impacts due to the new structure being constructed off-alignment

6. Major Rehabilitation/Re-deck of Gurley Avenue Structure

Concept 6 maintains the existing Gurley Avenue sub-structure and replaces the bridge deck.

Benefits

- Extend the life of the existing structure, resulting in a shorter closure

Drawbacks

- Does not provide long-term capacity and multi-modal enhancements to the corridor
- Adding vehicular lanes and/or bicycle/pedestrian features and flattening grades is both cost prohibitive and structurally challenging with the existing structure.
- Risk of uncovering unforeseen issues with the substructure when construction starts and the subsequent expansion in project magnitude.

With consideration to these drawbacks, it was concluded that a major rehabilitation does not address the long-term goals for an overpass in east Gillette.

7. Burma Avenue Overpass

The Burma Avenue overpass concept constructs an overpass with limits between Warlow Drive and 2nd Street.

Benefits

- Short crossing distance
- Need for only a single-span structure

Drawbacks

- Minimal overall network traffic benefit associated with this concept due to proximity to other crossing locations
- Cost is expected to be considerably higher than what was presented in the 2008 study

With consideration to the long-term drawbacks associated with location, it was determined that the Burma Avenue overpass concept 7 be eliminated from further consideration.

8. No Build
The No Build condition continues maintenance of the existing structure until closure is necessary due to being structurally deficient. There have been significant deck repairs over the last several years due to continual delamination issues. Duration between deck repairs is decreasing with each subsequent repair. It is anticipated that the timeframe for the next major repair will be sometime between 2023 and 2025, which likely represents the point at which repairs become cost-prohibitive when considering the return on investment.

While this option exhibits the least impact, such as ROW impact to businesses/residences, least cost, and only short-term impacts to traffic during maintenance activities, this option does not provide a long-term solution. When the overpass needs to be removed, the crossing is gone until a new one is constructed. While not recommended as part of this first phase, this option is carried forward throughout the study and future environmental process.

Phase 1 Recommendations

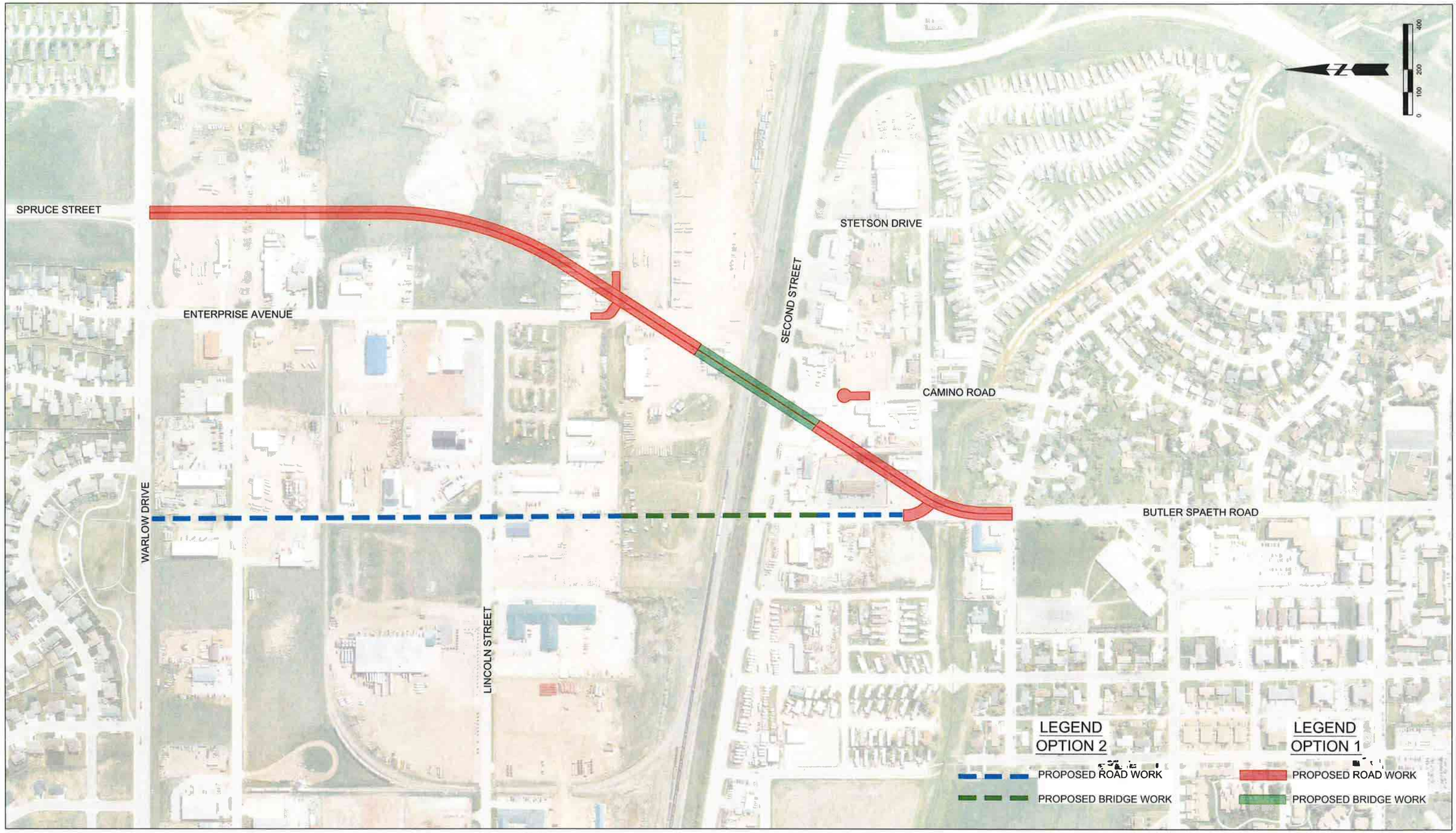
Based on findings and from the evaluation matrix, it is recommended that the following concepts be carried forward to Phase 2 for further refinement, analysis, and evaluation:

Concept 1.b Butler Spaeth Road to Kluver Road Extension without Grade Raise

Concept 3.b Gurley Avenue Overpass (2008 study Phase 1) without Grade Raise (Replace Structure)

Concept 5 Gurley Avenue one-way pair/redundant structures

Conceptual alignments of each are shown in **Figure 2 - Figure 4**.



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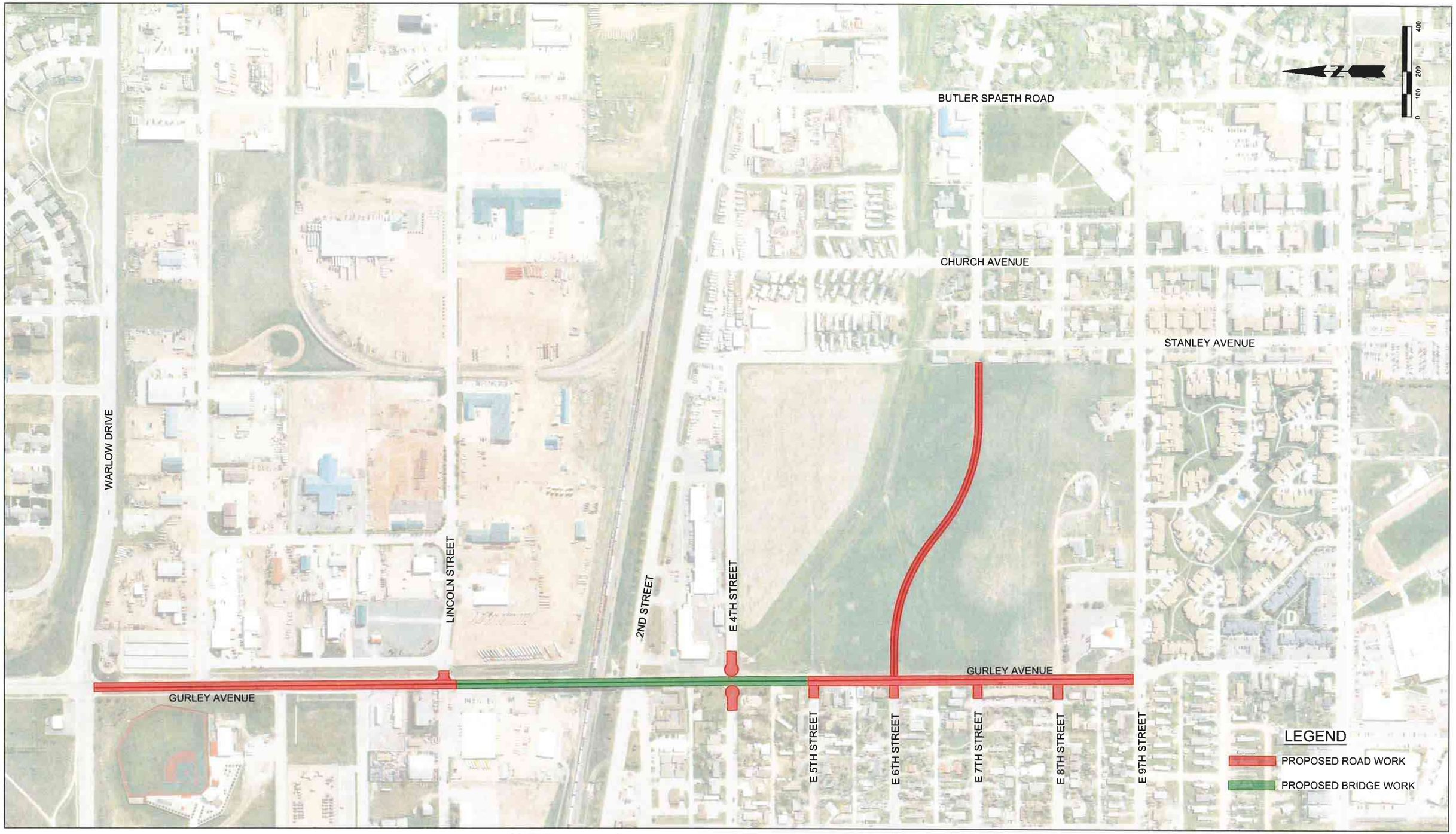
CITY OF GILLETTE
BUTLER SPAETH ROAD TO KLUVER ROAD LAYOUT

DATE
MARCH 2021

FIGURE
2



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GURLEY AVENUE TO
BUTLER SPAETH ROAD LAYOUT

DATE
MARCH 2021

FIGURE
3

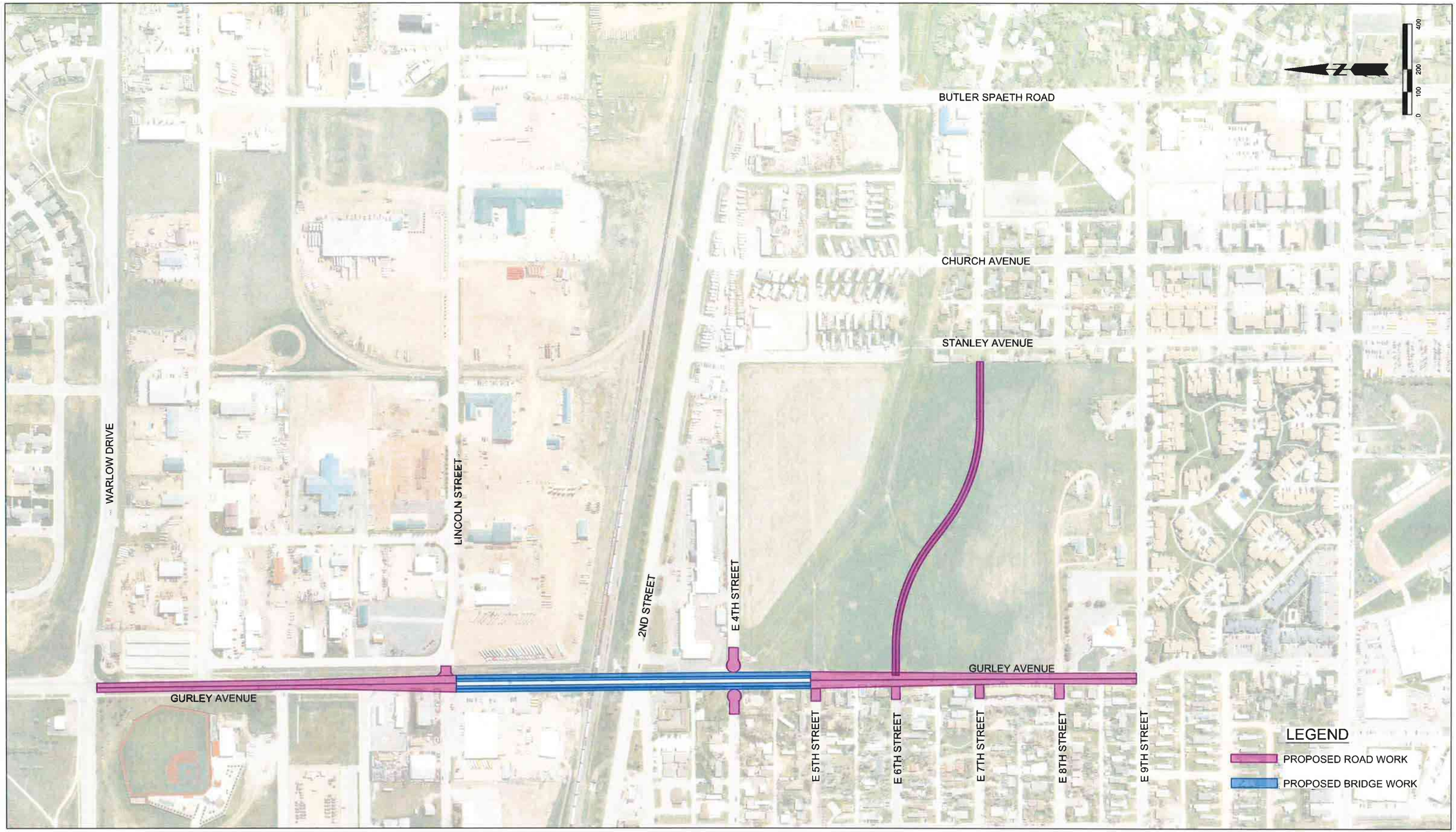

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FIGURE
4

Phase 2 Concept Evaluation

Recommended Alternative Structure Type and Location

Concept 1.b Butler Spaeth Road to Kluver Road Extension without Grade Raise

Concept 1.b Butler Spaeth Road to Kluver Road Extension Alternative 1

Alternative 1 for concept 1.b consists of a 286'-6" two-span steel continuous steel girder bridge. The overall width is 71'-10". Included are **four** 12' driving lanes, one 10' multiuse path on the west side, and one 5' sidewalk on the east side. The bridge contains eight built up steel plate girders, with a web depth of approximately 60". See **Figure 5**. The substructure will consist of two abutments and one pier utilizing four columns and a pier cap. Columns may have aesthetic patterns or textures if desired. The pier will need to be located within existing railroad right of way for the most efficient bridge design. The embankment fill leading up to the bridge is retained by Mechanically Stabilized Earth (MSE) walls at their ends only, adjacent to the abutments. The embankments are slope at 4:1 to tie back into existing ground elsewhere.

Advantages

- Allowing embankments to slope at 4:1 will reduce cost of construction

Disadvantages

- Additional Right of Way will need to be acquired for sloped embankments

Concept 1.b Butler Spaeth Road to Kluver Road Extension Alternative 2

Alternative 2 for concept 1.b utilizes the same bridge structure as Alternative 1, except that the approach roadway embankments are retained completely by MSE walls. This is in lieu of allowing the embankments to slope down to existing ground.

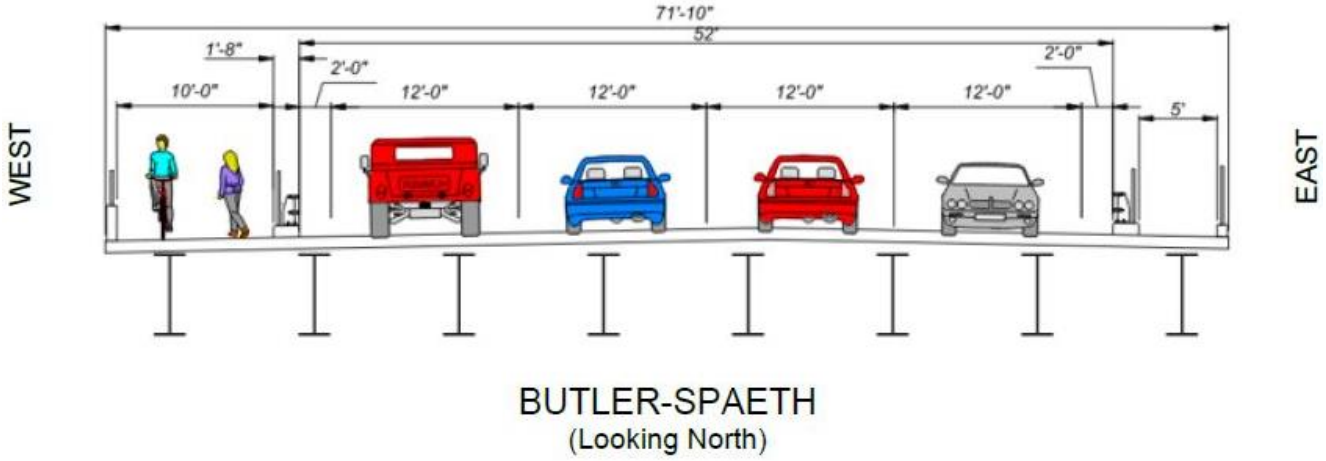
Advantages

- Reduced Right of Way will need to be acquired since the embankments are retained by walls

Disadvantages

- Additional cost of construction due to increased MSE wall area

Figure 5: Butler-Spaeth Four Lane Bridge Typical Section



Concept 3.b Gurley Avenue Overpass Phase 1 without Grade Raise

Concept 3.b Gurley Avenue Overpass Alternative 1

Alternative 1 for concept 3.b consists of a 315'-3" two-span continuous steel girder bridge. The bridge width is 47'-10" overall containing **two** driving lanes, one 10' pathway and one 5' sidewalk. See **Figure 6**. The pathway and sidewalk are protected from traffic by barriers. The bridge contains six built up steel plate girders, with a web depth of approximately 60". The abutments are supported by piling within the approach embankment fill. The embankment fill leading up to the bridge is retained by Mechanically Stabilized Earth (MSE) walls at their ends only, adjacent to the abutments. The embankments are allowed to slope at 4:1 to tie back into existing ground elsewhere. See **Figure 4**. The middle support is located 157'-8" from each abutment. This support will need to be located within the railroad right-of-way for the most efficient bridge design. Clearance is maintained from the railroad tracks per Burlington Northern Santa Fe (BNSF) requirements. Additional crash protection of the pier is not required. Future widening to four lanes is possible, we recommend that the embankments be built wide enough for future build out of the roadway and bridge.

Advantages

- MSE walls at the embankment ends reduces costs for walls
- The entire existing bridge may remain in service during construction if staged construction is performed. Or at least one lane of the existing bridge may remain in use during construction of the new bridge if staged construction is NOT performed. See **Figure 7**.

Disadvantages

- Without MSE walls on embankment sides, additional ROW is required for slopes.
- Temporary MSE wire face walls will be needed to retain the embankment near existing bridge piers during construction of the embankments. These walls will be abandoned in place and covered with soil once existing bridge and piers are demolished.

Concept 3.b Gurley Avenue Overpass Alternative 2

Alternative 2 for concept 3.b utilizes the same bridge structure as Alternative 1, except that the approach roadway embankments are retained completely by MSE walls. See **Figure 8**. This is in lieu of allowing the embankments to slope down to existing ground. Future widening to four lanes is possible, we recommend that the embankments be built wide enough for future build out of the roadway and bridge.

Advantages

- Reduced Right of Way will need to be acquired since the embankments are retained by walls
- The entire existing bridge may remain in service during construction if staged construction is performed. Or at least one lane of the existing bridge may remain in use during construction of the new bridge if staged construction is NOT performed. See **Figure 7**.

Disadvantages

- Additional cost of construction due to increased MSE wall area
- Temporary MSE wire face walls will be needed to retain the embankment near existing bridge piers during construction of the embankments. These walls will be abandoned in place and covered with soil once existing bridge and piers are demolished. See **Figure 8**.

Figure 6: Two Lane Bridge Typical Section

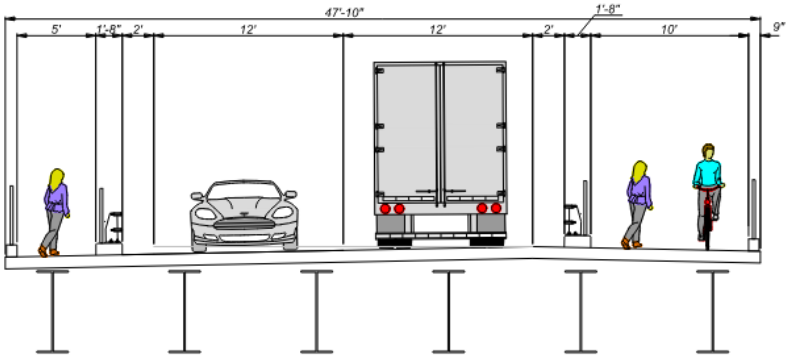
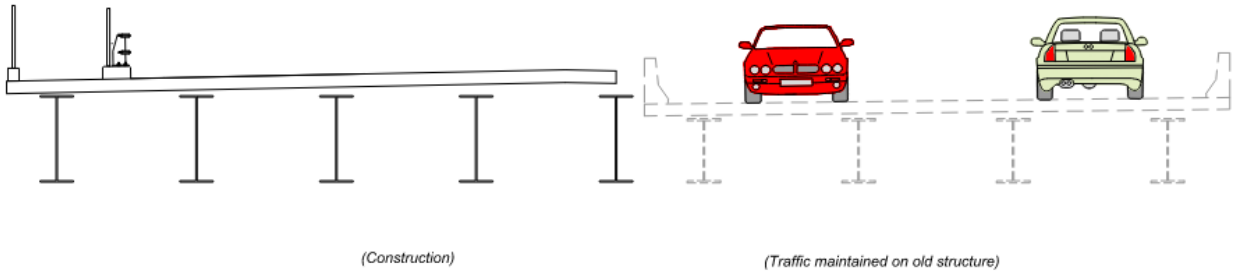
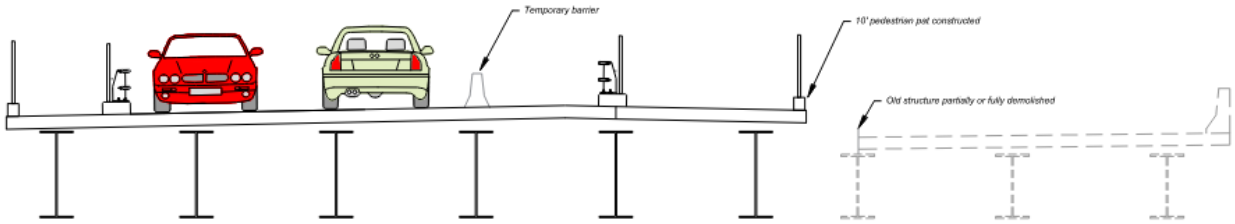


Figure 7: Two Lane Bridge Typical Section with Phased Construction (Four Lane Similar)



(Construction) *(Traffic maintained on old structure)*

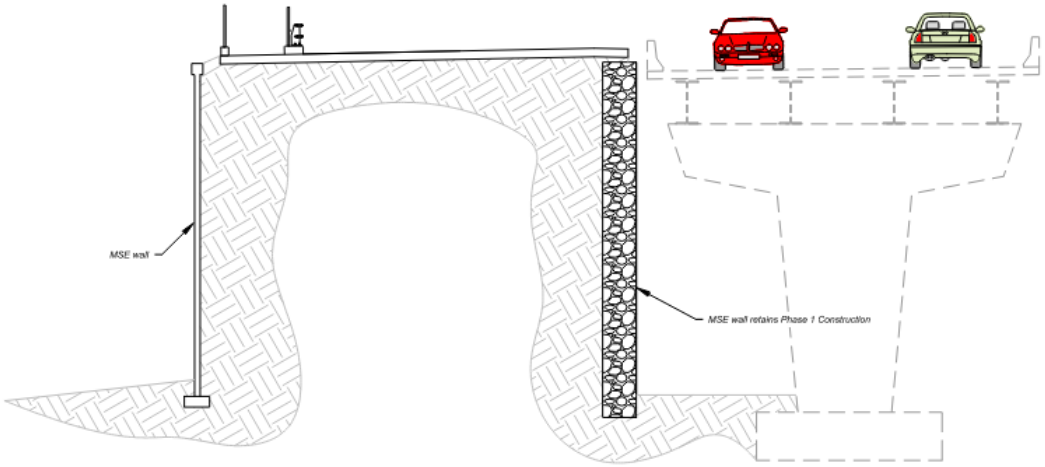
PHASE 1 - CONSTRUCTION



(Traffic moved to new structure) *(Old structure demolished, 10ft pedestrian path added to new structure)*

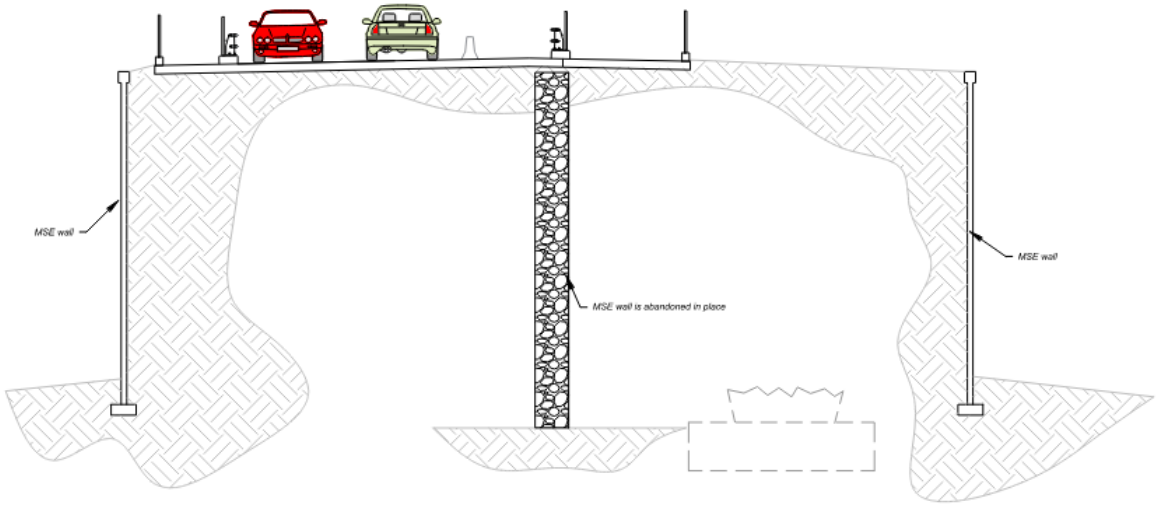
PHASE 2 - CONSTRUCTION

Figure 8: Two Lane Embankment Typical Section with Phasing (Four Lane Similar)



(Construction) (Traffic maintained on old structure)

PHASE 1 - EMBANKMENT CONSTRUCTION



PHASE 2 - EMBANKMENT CONSTRUCTION

(Completed Section similar)

Concept 3.b Gurley Avenue Overpass Alternative 3

This alternative consists of a 315'-3" two-span continuous steel girder bridge. The bridge width is 71'-10" overall containing **four** driving lanes, one 10' pathway and one 5' sidewalk. See

Figure 9**.** The pathway and sidewalk are protected from traffic by barriers. The bridge contains nine built up steel plate girders, with a web depth of approximately 60". The abutments are supported by piling within the approach embankment fill. The embankment fill leading up to the bridge is retained by Mechanically Stabilized Earth (MSE) walls at their ends only, adjacent to the abutments. The embankments are allowed to slope at 4:1 to tie back into existing ground elsewhere. See **Figure 8**. The middle support is located 157'-8" from each abutment. This support will need to be located within the railroad right-of-way for the most efficient bridge design. Clearance is maintained from the railroad tracks per Burlington Northern Santa Fe (BNSF) requirements. Additional crash protection of the pier is not required.

Advantages

- MSE walls at the embankment ends reduces costs for walls
- The entire existing bridge may remain in service during construction if staged construction is performed. Or at least one lane of the existing bridge may remain in use during construction of the new bridge if staged construction is NOT performed.

Disadvantages

- Without MSE walls on embankment sides, additional ROW is required for slopes.
- Temporary MSE wire face walls will be needed to retain the embankment near existing bridge piers during construction of the embankments. These walls will be abandoned in place and covered with soil once existing bridge and piers are demolished.

Concept 3.b Gurley Avenue Overpass Alternative 4

This alternative utilizes the same bridge structure as Alternative 3, except that the approach roadway embankments are retained completely by MSE walls. This is in lieu of allowing the embankments to slope down to existing ground. See **Figure 7**.

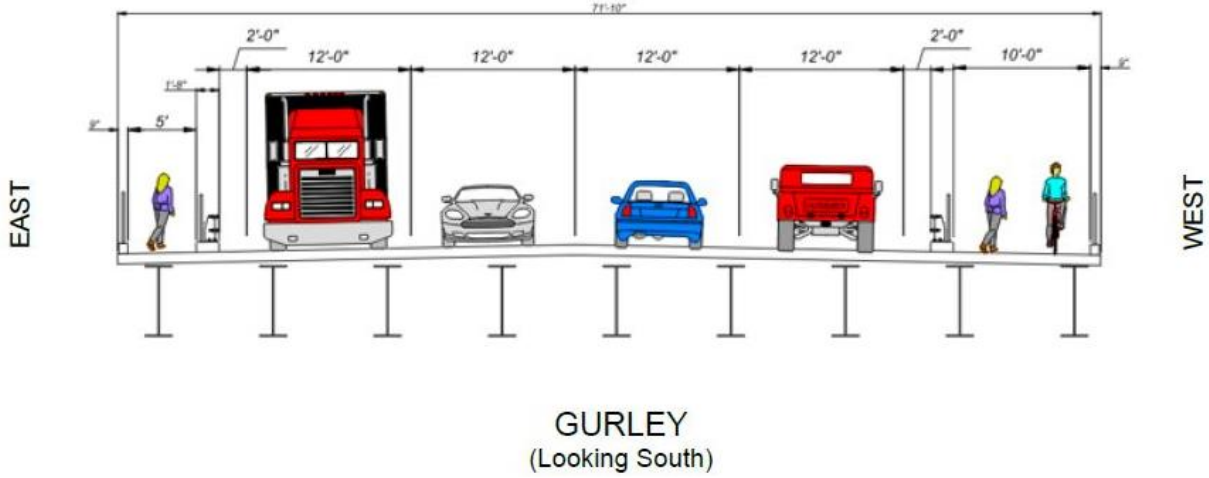
Advantages

- Reduced Right of Way will need to be acquired since the embankments are retained by walls
- The entire existing bridge may remain in service during construction if staged construction is performed. Or at least one lane of the existing bridge may remain in use during construction of the new bridge if staged construction is NOT performed.

Disadvantages

- Additional cost of construction due to increased MSE wall area
- Temporary MSE wire face walls will be needed to retain the embankment near existing bridge piers during construction of the embankments. These walls will be abandoned in place and covered with soil once existing bridge and piers are demolished.

Figure 9: Four Lane Bridge Typical Section



GURLEY
(Looking South)

Gurley Overpass Alternative Cost Matrix

		Bridge Approachs	
		Sloped Embankments	Wrap Around MSE Walls
Bridge Width	Two-Lane	$ (Alternative 1)	$$ (Alternative 2)
	Four-Lane	$$$ (Alternative 3)	$$$$ (Alternative 4)

Concept 3.b Gurley Avenue Overpass Alternatives 1 and 3 utilize sloped embankments for bridge approaches which in turn will require significant right of way acquisition and costs. Alternatives 2 and 4 use Mechanically Stabilized Earth retaining walls for the roadway approaches, thereby limiting the right of way acquisition required but increasing construction cost. Each of the 4 alternatives allow for use of the existing bridge during construction of the new bridge. Phased construction will be required to achieve this, although at an increased cost.

Gurley Avenue / 4th Street Culvert

Gurley Avenue / 4th St. Culvert Alternative 1

The existing culvert at the intersection of Gurley Ave and East 4th Street will experience increased loads due to the bridge approach embankment fill weight. This alternative proposes using expanded polystyrene (EPS) foam in lieu of soil to raise the grade above the culvert. Roadway base material would be placed on top of the foam for final grading.

Advantages

- No structural changes to the existing culvert are required
- Culvert flow can be maintained during construction

Disadvantages

- Typical contractors may not be familiar with EPS products

Figure 10: EPS Foam Fill

Gurley Avenue / 4th St. Culvert Alternative 2

The existing culvert at the intersection of Gurley Ave and East 4th Street will experience increased loads due to the bridge approach embankment fill weight. This alternative proposes encasing the existing culvert in reinforced concrete supported by piling. Earth fill would be placed to raise the grade. Roadway base material would be placed on top of the foam for final grading.

Advantages

- Typical reinforced concrete construction means and methods
- Culvert flow can be maintained during construction

Disadvantages

- Additional materials, additional excavation, and pile driving are required

Gurley Avenue / 4th St. Culvert Alternative 3

The existing culvert at the intersection of Gurley Ave and East 4th Street will experience increased loads due to the bridge approach embankment fill weight. This alternative proposes constructing a new reinforced concrete culvert in place of the existing culvert. Earth fill would be placed to raise the grade. Roadway base material would be placed on top of the foam for final grading.

Advantages

- Typical reinforced concrete construction means and methods

Disadvantages

- Demolition and reconstruction of culvert will take additional working days over other alternatives
- Culvert flow will need to be diverted during construction. Bypass pumping or stream diversion will be required.

Gurley Avenue / 4th St. Culvert Conclusions

The existing culvert at the intersection of Gurley and 4th St. will need to be addressed due to the additional earth fill load from the proposed bridge approach embankment and grade raise. Of the three alternatives, Alternative 1 appears to be the least disruptive and most economical. This option utilizes foam blocking in lieu of earth fill, thereby negating the effect of increase earth fill loads. This alternative also does not disrupt the stream flows.

Traffic Operations Analysis

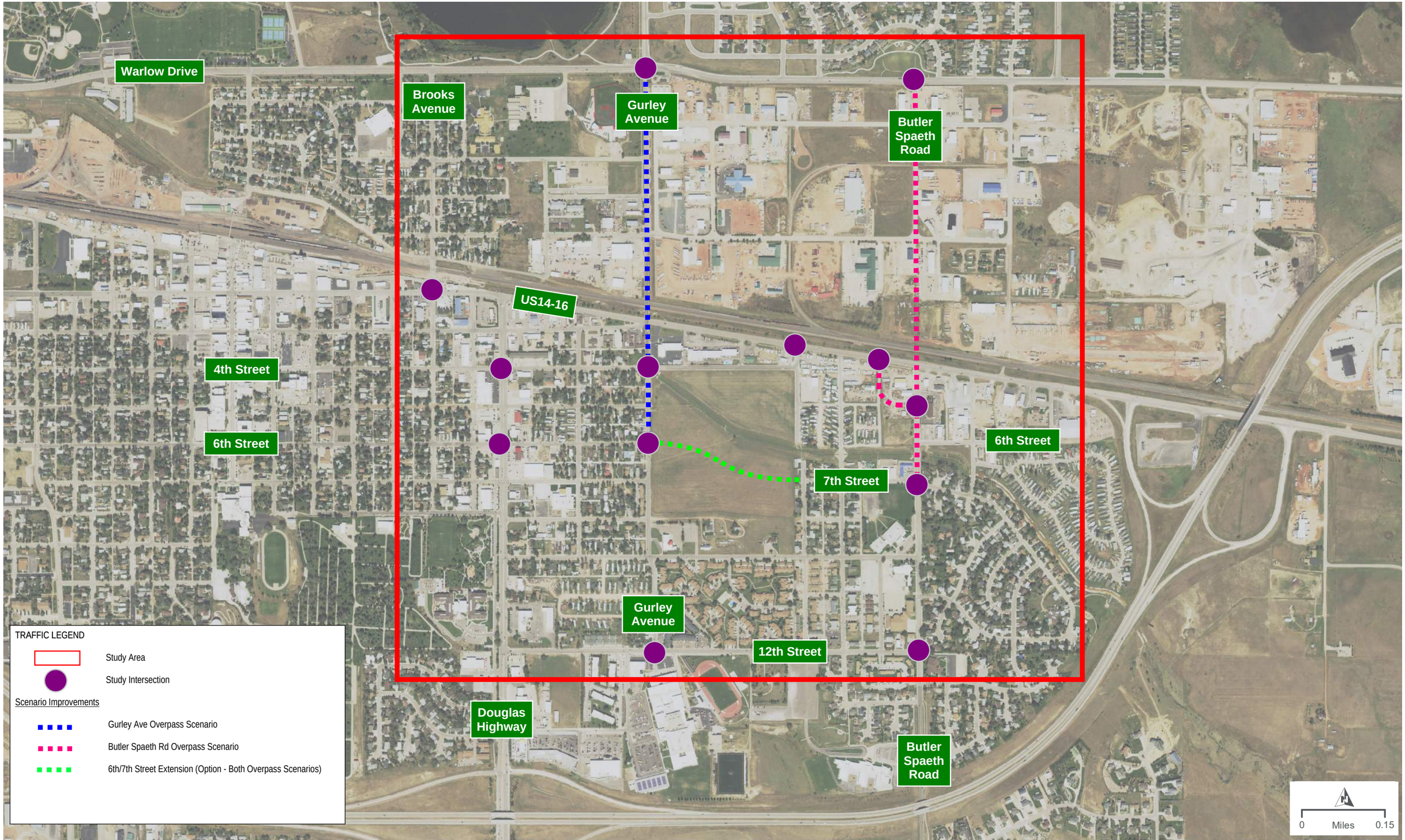
Traffic forecasting, operations analysis, and identification of needed improvements to meet operational goals within the Gillette Railroad Overpass Study area were completed to understand the impacts related to the bridge alternatives. The two overarching Build condition overpass scenarios, plus a No Build condition (Gurley Avenue bridge closure) scenario, were carried forward from the Phase 1 Concept Evaluation for further analysis:

- Concept 3.b Gurley Avenue Overpass Scenario
  - Gurley Avenue Overpass Phase 1 without grade raise
- Concept 5 Gurley Avenue One-Way Pair/Redundant Structures
- Concept 1.b Butler Spaeth Road to Kluver Road Extension Scenario
  - Butler Spaeth Road to Kluver Road Extension without grade raise
- No Build Condition Scenario
  - Existing Gurley Avenue structure closed

This section presents the following traffic elements to be used in the evaluation and decision-making process, as well as the potential future preliminary design:

- Future-year condition daily and peak hour traffic volumes
- Traffic design analysis at locations being modified as part of the respective scenario:
  - Number of corridor lanes
  - Intersection lane configurations
  - Intersection queue lengths
  - Intersection level of service (LOS)

The traffic operations analysis study area is reflected in **Figure 11**. The goal of the study area is to capture intersections that will potentially be impacted by modifications reflected in each scenario. Analysis intersections identified by the study team are identified in the figure.



TRAFFIC ANALYSIS STUDY AREA

FIGURE 11

Analysis Scenarios

The analysis scenarios are reflective of overarching modifications related to two crossing location alternatives, one at the existing Gurley Avenue overpass location and the other at Butler Spaeth Road. A planning-level graphical representation of these scenarios is shown in **Figure 11**.

Concept 3.b Gurley Avenue Overpass Phase 1 without Grade Raise Scenario

The Gurley Avenue overpass reflects a new structure on the existing Gurley Avenue alignment. Termini of potential Gurley Avenue corridor improvements are Warlow Drive to the north and 12th Street to the south, though the east / west connection to Douglas Highway was analyzed at 6th Street.

Due to current issues with grade and pedestrian mobility with the existing structure, the scenario assumes closure of Gurley Avenue access to 4th Street to provide a more gradual transition between the bridge and existing Gurley Avenue profile.

The scenario includes an extension of 6th Street / 7th Street between Gurley Avenue and Butler Spaeth as part of the City's long-range plan of providing improved east / west minor arterial connectivity for trucks and local traffic.

Concept 1.b Butler Spaeth Road to Kluver Road Extension without Grade Raise Scenario

This scenario incorporates a crossing along or in the general proximity of the Butler Spaeth Road corridor. Termini of potential corridor improvements are Warlow Drive to the north and 12th Street to the south.

Multiple alignment options were discussed and evaluated at a high level throughout the study process. This traffic operations analysis scenario reflects a direct north/south alignment along the existing Butler Spaeth segments north and south of the railroad tracks. A 'quadrant intersection' connection between Butler Spaeth and US14-16 was incorporated to provide a direct linkage between the two roadways.

The scenario also includes an extension of 6th Street / 7th Street between Gurley Avenue and Butler Spaeth Road, similar to the Gurley Avenue overpass scenario.

No Build Condition Scenario

The No Build condition reflects a scenario where the Gurley Avenue overpass is closed and removed. All traffic is then redistributed to the remaining existing crossings in Gillette.

Traffic Forecasts

The Gillette travel demand model (TDM) was the source of growth rates based on the following base model scenarios:

- Base year population (Existing condition)
- 50,000 population (Future-year condition)

Because growth in and around the City of Gillette varies due to a variety of circumstances, years were not attached to the TDM base scenarios. Rather, both reflect a TDM area population and equivalent land-use plan which translates into traffic demand loaded into the model.

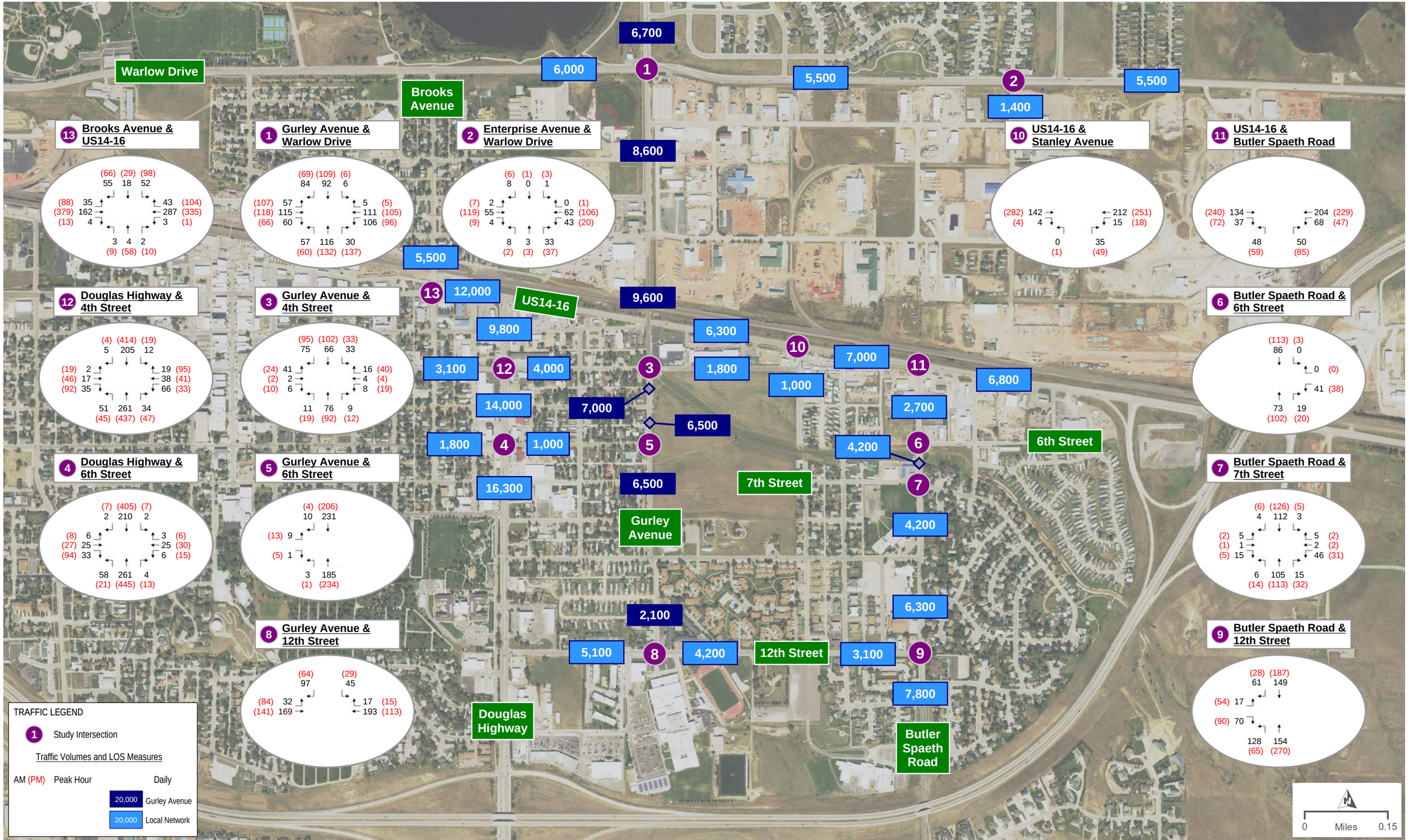
Both scenarios were modified to add or remove railroad crossing links reflective of the three analysis scenarios to develop planning-level TDM volumes and growth rates. For more information on the TDM, see **Appendix B**.

Daily and Peak Hour Volume Development
Existing volumes were based on traffic counts collected in 2021. Changes in TDM-based volumes were used to develop segment growth rates that were applied to both existing daily and peak hour traffic volumes.

A summary of existing conditions traffic volumes is provided in **Figure 12**.

Future-year 50,000 population daily and peak hour traffic volumes are provided in the following figures:

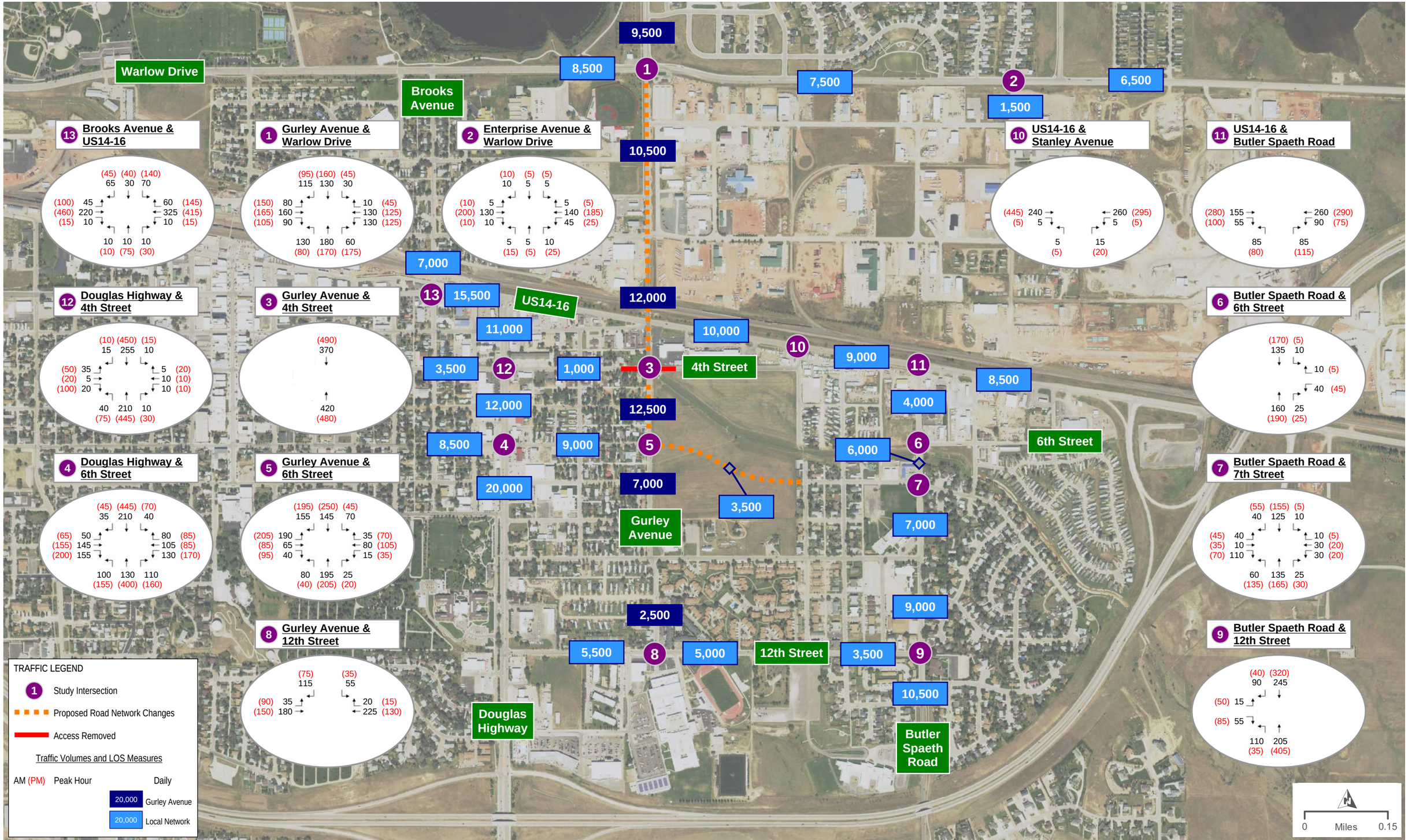
- **Figure 13: Gurley Avenue overpass Scenario Traffic Volumes**
- **Figure 14: Butler Spaeth Road overpass Scenario Traffic Volumes**
- **Figure 15: No Build Condition Scenario Traffic Volumes**



EXISTING CONDITIONS TRAFFIC VOLUMES

FIGURE 12

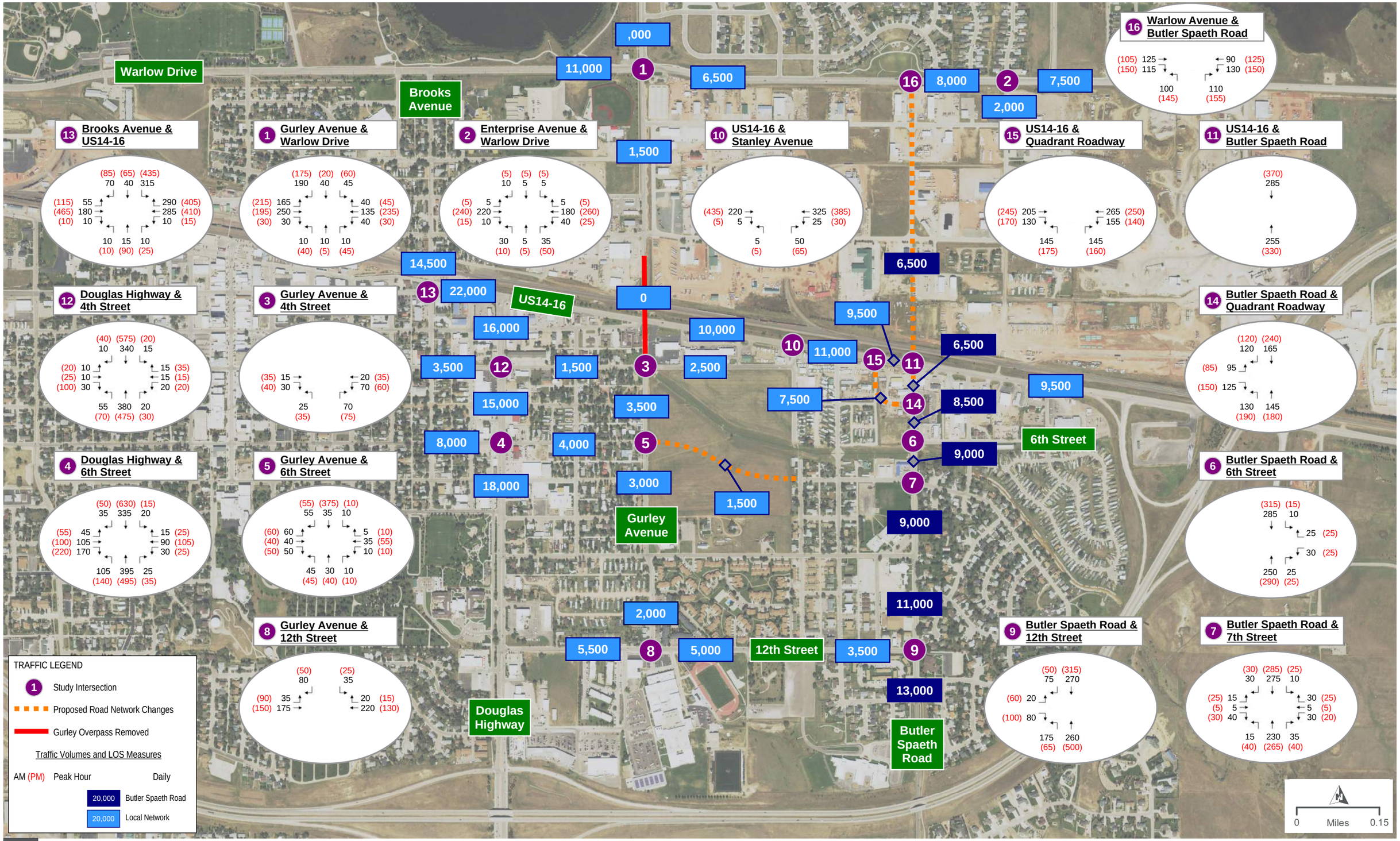
GILLETTE RAILROAD OVERPASS STUDY



FUTURE YEAR (50,000 POPULATION) GURLEY AVENUE OVERPASS SCENARIO TRAFFIC VOLUMES

FIGURE 13

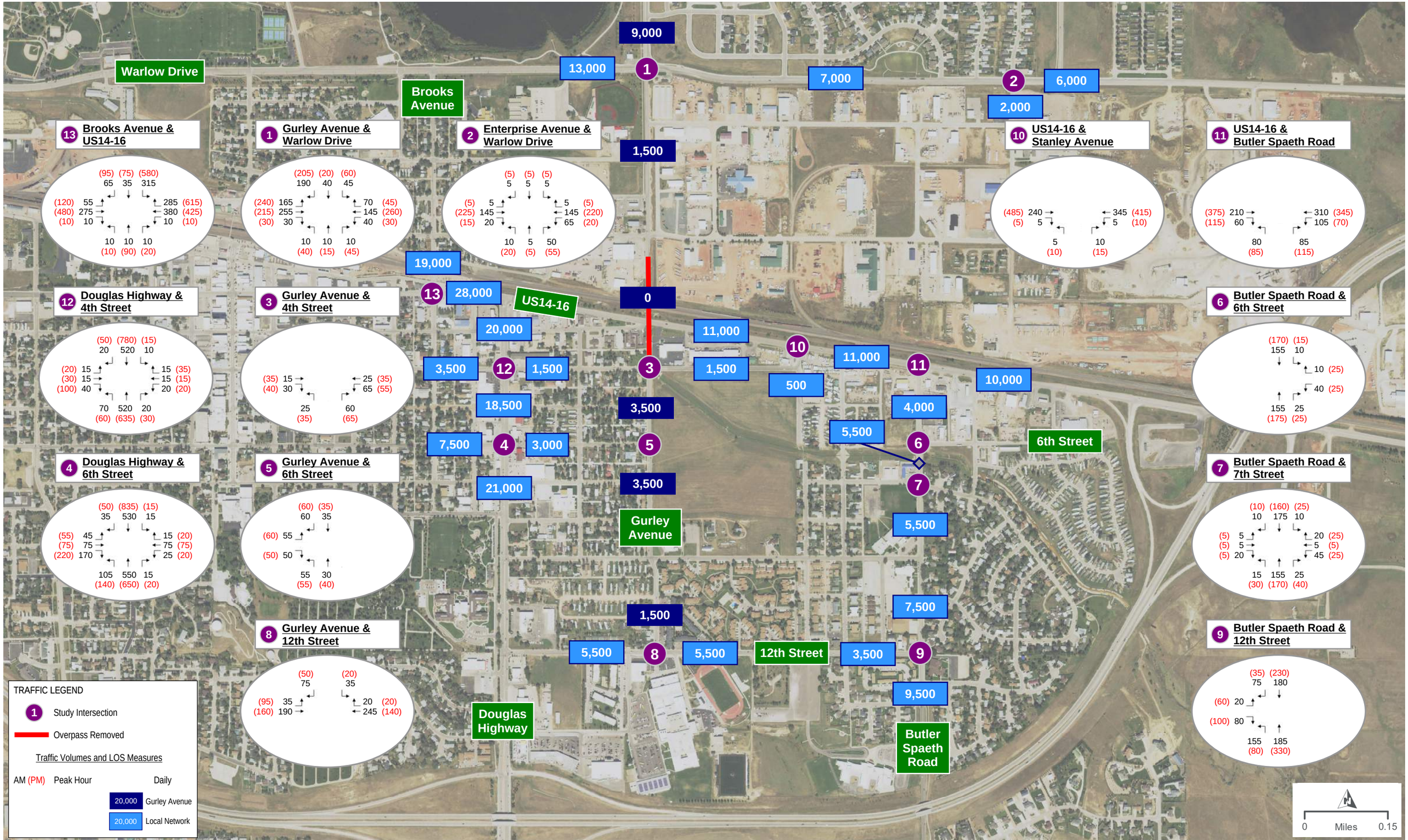
GILLETTE RAILROAD OVERPASS STUDY



FUTURE YEAR (50,000 POPULATION) BUTLER SPAETH ROAD OVERPASS SCENARIO TRAFFIC VOLUME

FIGURE 14

GILLETTE RAILROAD OVERPASS STUDY



FUTURE YEAR (50,000 POPULATION) NO-BUILD SCENARIO TRAFFIC VOLUMES

FIGURE 15

GILLETTE RAILROAD OVERPASS STUDY

Daily Volume Comparison

The daily volume comparison summarizes several planning-level assessments of daily traffic volumes and patterns from a network and study area perspective. Findings in these assessments are important to establishing traffic-related benefits and drawbacks of each scenario.

TDM Network Metrics

TDM scenario output provided initial high-level network-wide metrics for comparison of daily vehicle miles traveled (VMT) and vehicle hours traveled (VHT). For this analysis, two TDM sub-option scenarios were developed for the Butler Spaeth Road overpass to determine whether vehicular demand was different depending on where the Warlow Drive connection occurred. A summary of the 50,000 population analysis scenarios is provided in **Table 4**.

Table 4: TDM Key Statistics for Overpass Scenarios

50,000 Population Scenario	Vehicle Miles Traveled (VMT)	Vehicle Hours Traveled (VHT)
Butler Spaeth Road overpass – Butler Spaeth to Warlow Connection	929,986	24,135
Butler Spaeth Road overpass – Butler Spaeth to Spruce Street	930,062	24,117
Gurley Avenue overpass	929,572	24,090
No Build	934,279	24,176

Key findings from this analysis include:

- Concept 3.b Gurley Avenue overpass provided the least VMT and VHT of all 50,000 population scenarios
    - Scenario reflects the greatest benefit to Gillette area traffic
- No Build (Gurley Avenue overpass closed) exhibited the highest VMT and VHT of all scenarios
    - Scenario reflects the least benefit to Gillette area traffic of all scenarios
- Concept 1.b Butler Spaeth Road overpass scenarios exhibited similar, but consistently higher, VMT and VHT when compared to the Gurley Avenue overpass scenario

Railroad Crossing Screenline Comparison

Daily volumes were developed for each of the traffic operations analysis scenarios to better understand changes in traffic patterns throughout the study area. **Figure 16** provides a summary of daily volumes at select locations for the existing conditions and three traffic operations analysis scenarios.

In general, combined future-year traffic demand at Brooks Avenue, Gurley Avenue, and / or Butler Spaeth Road local network railroad crossings (as applicable) ranged between 19,000 and 21,000 vehicles per day. The following summarizes a breakdown of each crossing's traffic demand across the three future-year scenarios.

Concept 1.b Butler Spaeth Road to Kluver Road Extension Scenario

- Gurley Avenue overpass: closed
- Butler Spaeth overpass: 6,500 vpd (least of all overpass scenarios)
- Brooks Avenue at-grade crossing: 14,500 vpd (greatest of all overpass scenarios)

Concept 3.b Gurley Avenue Overpass Scenario

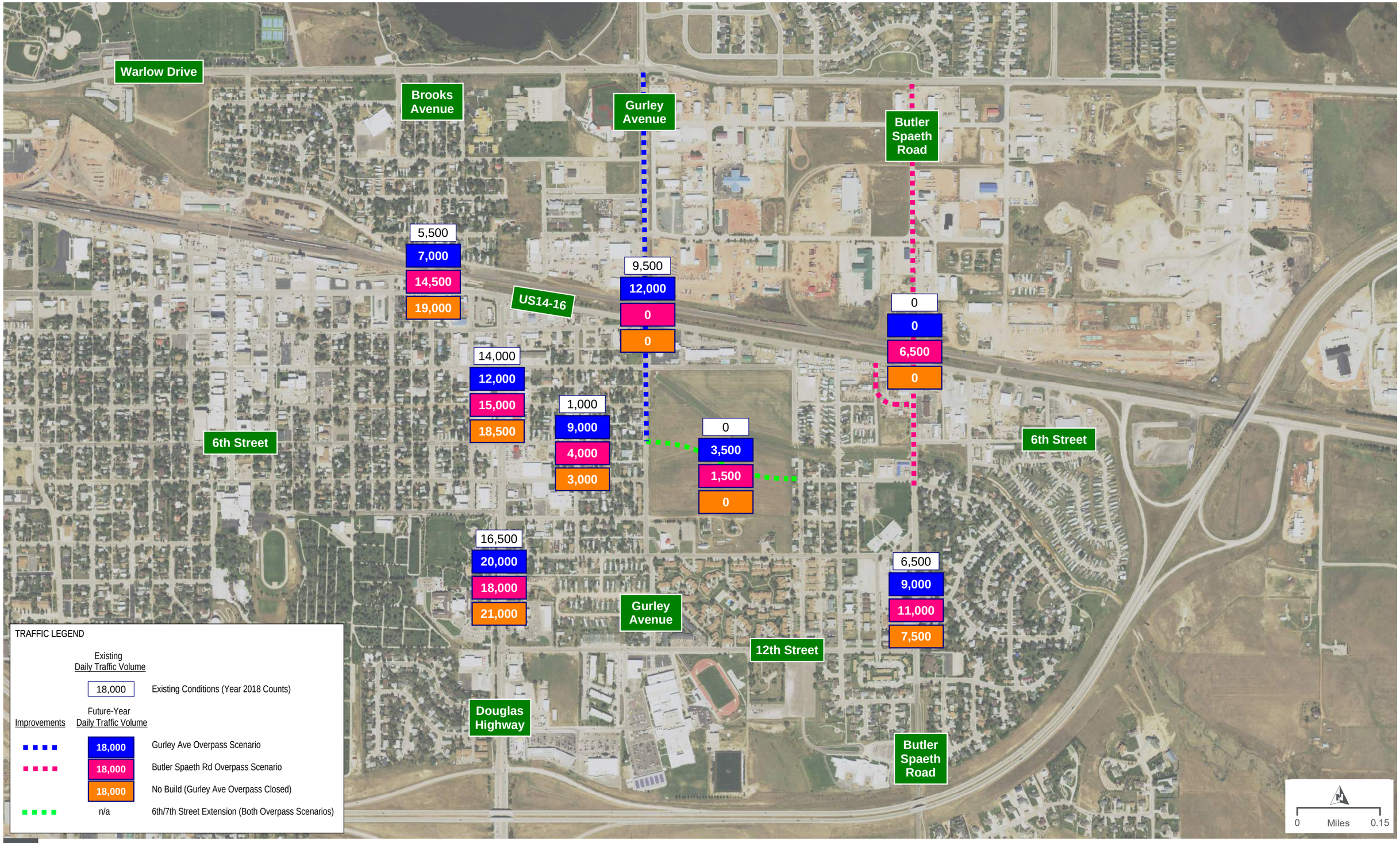
- Gurley Avenue overpass: 12,000 vpd (greatest of all overpass scenarios)
- Brooks Avenue at-grade crossing: 7,000 vpd (least of all overpass scenarios)

No Build Condition Scenario

- Gurley Avenue overpass: closed
- Brooks Avenue at-grade crossing: 19,000 vpd (greatest of all scenarios)

Key findings from this review align with those found in the network-wide TDM evaluation:

- Highest utilization of grade-separation would be with an overpass on Gurley Avenue, due to:
    - More centrally located, less traffic needs to travel out-of-the-way for grade separation,
    - Good connectivity to other important north/south corridors (Douglas Highway and Butler Spaeth Road)
    - Proximity to Brooks Avenue
- As the overpass location is shifted east to Butler Spaeth Road, utilization of the grade separation decreases, due to:
    - The location becoming less desirable for a greater number of vehicles as a larger proportion of traffic would need to go out of their way to access the overpass
    - Brooks Avenue crossing becomes more convenient for a larger volume of traffic due to convenience, even though there may be reliability issues due to trains blocking the crossing
        - Brooks Avenue at-grade crossing exhibits nearly two times more traffic in the Butler Spaeth Road overpass scenario than the Gurley Avenue overpass scenario



SCENARIO DAILY TRAFFIC VOLUME SUMMARY

FIGURE 16

GILLETTE RAILROAD OVERPASS STUDY

North/South Corridor Number of Through Lane Needs

A planning-level review of Gurley Avenue and Butler Spaeth Road corridor roadway capacity, using a 3-lane 11,000 to 16,000 vpd threshold range, is summarized in the following:

Existing Volumes Scenario

- Butler Spaeth Road corridor: volumes range between 2,700 and 7,800 vpd

The greatest volumes are south of 12th Street, but are at levels that provide ample capacity as a 2-lane section with turn lanes at major access points

- Gurley Avenue overpass: 9,600 vpd
    - Approaching lower end of multilane volume threshold (11,000 vpd)

This volume is approaching the lower range of the 3-lane section threshold. Increased turbulence along the corridor, coupled with higher volumes, would suggest a need for future capacity improvements on either side of the existing structure.

Concept 1.b Butler Spaeth Road Overpass Scenario

- Butler Spaeth Road overpass: 6,500 vpd

Ample capacity across the structure is provided with a single lane in each direction. However, increasing traffic volumes and potential friction with access points and major intersections south of the bridge require consideration of a multilane section.

- Butler Spaeth Road corridor: volume ranges between 6,500 and 13,000 vpd
    - Southern limits within multilane volume threshold range (11,000 – 16,000 vpd)

North / south Butler Spaeth Road corridor traffic volume from a grade separated crossing pushes volumes into the 3-lane to multilane threshold range along segments at the southern study boundary.

- Gurley Avenue corridor: 2,000 – 3,500 vpd

With a Gurley Avenue overpass removed, volumes on Gurley Avenue would be expected to decrease significantly and fall well below volume thresholds for additional lanes.

Concept 3.b Gurley Avenue Overpass Scenario

- Butler Spaeth Road corridor: volumes range between 4,000 and 10,500 vpd
    - Southern limits approaching lower end multilane volume threshold (11,000 vpd)

The 6th Street / 7th Street connection is a contributing link to volume increases along Butler Spaeth Road.

- Gurley Avenue overpass: 12,000 vpd
    - Within multilane volume threshold range (11,000 – 16,000 vpd)

The 12,000 vpd anticipated to use the Gurley Avenue grade-separated crossing in the future is within the 3-lane to multilane threshold range. Volumes would stay elevated, between 10,500 and 12,500, between Warlow Drive and 6th Street. Therefore, it is prudent to review this corridor as a multilane cross-section in this study to better understand potential impacts.

No Build Condition

Traffic volumes show the most significant drop on the Gurley Avenue corridor with closure of the Gurley Avenue overpass due to changes in traffic patterns. Volumes along Butler Spaeth Road exhibit similar traffic patterns as today but would are expected to increase commensurate with Gillette's anticipated population growth. Douglas Highway will provide ample capacity for increased traffic volumes based on a planning-level 5-lane roadway capacity upper limit of 30,000 vpd.

US 14-16 Connectivity

Connectivity with US 14-16 was identified as an important element at the onset of the study. While a raised intersection was eliminated from consideration in Phase 1, both Build condition scenarios provide convenient access to the grade separation through quadrant intersections and / or improved local network routes. The following summarizes connectivity between the grade-separated crossings and US 14-16:

Concept 1.b Butler Spaeth Road to Kluver Road Extension Scenario

- Quadrant roadway provides convenient and direct connection between Butler Spaeth Road and US 14-US16 traffic

Concept 3.b Gurley Avenue Overpass Scenario

- Primary connection for Gurley Avenue and US 14-16 traffic will occur via 6th Street and Douglas Highway
    - Quadrant roadway for a more direct connection could be investigated further in design

No Build Scenario

- Limited to at-grade connectivity subject to reliability issues at the US 14-16 / Brooks Avenue intersection

6th Street / 7th Street Connection

A 6th Street / 7th Street connection, between Gurley Avenue and Butler Spaeth Road, was incorporated into both Build condition scenarios. The following summarizes a planning-level assessment of how much area traffic would utilize this segment if constructed.

Concept 1.b Butler Spaeth Road to Kluver Road Extension Scenario

- Least segment traffic volume (1,500 vpd)
    - Traffic is predominantly localized east/west traffic with an origin or destination somewhere between I-90 and the railroad
    - Limitations due to out-of-the-way travel and lower volumes using the Butler Spaeth Road crossing (compared to the Gurley Avenue overpass) contribute to lower volumes

Concept 3.b Gurley Avenue Overpass Scenario

- Greatest segment traffic volume (3,500 vpd)
    - Over two times greater than the 1,500 vpd forecasted in the Butler Spaeth Road overpass scenario
    - Volumes reflect a blend of:
        - General localized east / west traffic using 6th Street and 7th Street with an origin or destination somewhere between I-90 and the railroad
        - Traffic using this segment as a connection between the Gurley Avenue overpass and Butler Spaeth underpass of I-90

No Build

- A 6th Street / 7th Street connection not included in a No Build condition

Douglas Highway Traffic Pattern Notes

Future-year Douglas Highway traffic patterns of note identified by the study team are summarized as follows:

Concept 1.b Butler Spaeth Road to Kluver Road Extension Scenario

- Douglas Highway traffic only shows a slight increase from existing volumes in this scenario because north/south traffic using the grade separation can stay on Butler Spaeth Road through the study area and not need to travel over to Douglas Highway

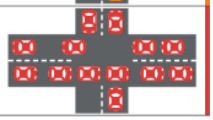
Concept 3.b Gurley Avenue Overpass Scenario

- North / south traffic traversing the study area and using the Gurley Avenue overpass generally follows a Douglas Highway-6th Street-Gurley Avenue route
- Douglas Highway traffic volumes show a decrease between 6th Street and 4th Street because the Douglas Highway to Gurley Avenue east / west connection is relocated to 6th Street instead of 4th Street

Traffic Operations Analysis Methodology

Operational performance of roadways is evaluated in terms of quality of service, which describes how well a transportation facility operates from a traveler's perspective. Quality of service is typically measured with 'Level of Service' (LOS), which is presented by a letter grade similar to those used in school. A summary of LOS measures for different roadway facilities pertinent to this study are provided in **Figure 17**.

Figure 17: LOS Descriptions

	Unsignalized Intersection	Signalized Intersection	
A	Queuing is rare **Intersection Control Delay:** ≤10 seconds/vehicle	Very minimal queuing; excellent corridor progression and/or short cycle lengths **Intersection Control Delay:** ≤10 seconds/vehicle	
B	Occasional queuing **Intersection Control Delay:** >10–15 seconds/vehicle	Some queuing; good corridor progression and/or short cycle lengths **Intersection Control Delay:** >10–20 seconds/vehicle	
C	Regular queuing **Intersection Control Delay:** >15–25 seconds/vehicle	Regular queuing; not all demand may be serviced on some cycles (cycle failure) **Intersection Control Delay:** >20–35 seconds/vehicle	
D	Queue lengths increased **Intersection Control Delay:** >25–35 seconds/vehicle	Queue lengths increased; routine cycle failures **Intersection Control Delay:** >35–55 seconds/vehicle	
E	Significant queuing **Intersection Control Delay:** >35–50 seconds/vehicle	Long queues, congested conditions; majority of cycles fail **Intersection Control Delay:** >55–80 seconds/vehicle	
F	Volume to capacity ratio approaches 1.0; very long queues **Intersection Control Delay:** >50 seconds/vehicle	Volume to capacity ratio near 1.0; very long queues, almost all cycles fail **Intersection Control Delay:** >80 seconds/vehicle	

Note: Unsignalized intersection control delay shown in figure for overall (or weighted) intersection delay. Two-way stop-control delay (TWSC) is measured from the worst-case stop-controlled approach with the same average delay (seconds/vehicle) thresholds.

Details on traffic operations methodology as well as analysis output is provided in **Appendix B**.

Traffic Operations Analysis

This section summarizes recommended intersection traffic operations improvements for each scenario. Each scenario includes a population peak hour traffic volume of 50,000. The recommended improvements are first highlighted for the respective roadway segment or intersection and followed by discussion to supplement those recommendations. For roadway segments, the recommendations include cross-section and limits. For intersections, recommendations include lane configurations for each approach, intersection traffic control, and resulting LOS measures as applicable.

Lane configuration abbreviations used in this section include:

- LT: left turn lane
- T: through lane
- RT: right turn
- T/RT: shared lane that accommodates through and right turn traffic
- LT/T: shared lane that accommodates left turn and through traffic
- LT/T/RT: shared lane that accommodates left turn, through, and right turn traffic

Findings presented in this section are meant to aid in the study process and guide preliminary design, but not dictate design. There may be locations where it is infeasible to incorporate this memo's findings to the full extent. It is anticipated those areas will be evaluated further during design.

Concept 1.b Butler Spaeth Road to Kluver Road Extension Scenario

Butler Spaeth Road Corridor Cross-Section

Recommended cross-section: 5-lane section

- 2 through lanes in each direction plus center left turn lane with sidewalk
- Narrowed to 4-lane section across bridge
- Limits: Warlow Drive to 7th Street
    - Consideration to future multilane needs from 7th Street southward through 12th Street

Volumes along the Butler Spaeth Road corridor increase going from north to south. For comparative purposes and to provide lane redundancy on the overpass, a multilane section is recommended through the bridge between Warlow Drive (north) and 7th Street (south). Similar to the Gurley Avenue overpass scenario corridor, this would provide a conservative look at potential impacts and covers a phased approach option of a 3-lane section with right turn lanes at major intersections and access points.

Consideration to extending a multilane segment further south to address forecasted volumes around 12th Street is also recommended as the future-year traffic patterns show traffic using the grade separated crossing generally staying on the corridor.

Butler Spaeth Road/Warlow Drive Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: T, T / RT
- Westbound: LT, T, T
- Northbound: LT, RT
- Traffic control: stop-control from northbound approach
- Intersection LOS (AM/PM): A / A
- Worst-case stop-controlled approach LOS (AM/PM): B / C

The scenario extends a multilane section northward to tie into Warlow Drive. It is anticipated that a large portion of traffic using the Butler Spaeth Road overpass will originate east of Butler

Spaeth Road, thus a westbound left turn lane will be beneficial to remove this turning traffic from the through lane.

Overlapping left turn conflicts or blocking is a concern with extending Butler Spaeth Road northward to Warlow Drive, particularly if a center left turn lane is introduced. This occurs where westbound Warlow Drive traffic making a left turn to head southbound conflicts with eastbound Warlow Drive traffic making a left turn to head north on a roadway just east of the new intersection. With current intersection spacing, this would be a consideration for any potential connection along Warlow Drive from just west of Lakeland Hills Drive to Moose Drive.

While opening as a stop-controlled intersection from the northbound approach, it is recommended this intersection be designed to accommodate signalization if/when traffic signal warrants are met.

Quadrant Roadway Intersections

One of the primary goals of a quadrant intersection is to provide a convenient and safe connection between two roadways via two 'T' intersections.

Recommendations at these intersections include several similar elements:

- Split left and right turn lanes on the quadrant intersections due to high proportion of turning volumes
- Provide left turn lanes for traffic turning onto the quadrant roadway
- Potential for phased implementation of recommendations

Recommended intersection configuration: intersection modifications (Butler Spaeth Road/Quadrant Roadway Intersection)

- Eastbound: LT, RT
- Northbound: LT, T, T
- Southbound: T, T / RT
- Traffic control: stop-control from eastbound approach
- Intersection LOS (AM/PM): A / A
    - Worst-case stop-controlled approach LOS (AM/PM): B / C

Recommended intersection configuration: intersection modifications (US14-16/Quadrant Roadway Intersection)

- Eastbound: T, T / RT
- Westbound: LT / T, T
- Northbound: LT, RT
- Traffic control: traffic signal
- Intersection LOS (AM/PM): A / A

At the US 14-16 / Quadrant Roadway intersection, it is recommended that a westbound left turn lane be considered to remove turning traffic from the through lanes. However, this was not required to meet operational goals and the signalized intersection operates at LOS A with split phasing (each approach would have its own, separate green indication).

Overall, measured delay is reasonable at both intersections and meets the intent of a convenient and safe quadrant roadway connection between US 14-16 and Butler Spaeth Road.

Butler Spaeth Road / 6th Street Intersection

Recommended intersection configuration: intersection modifications

- Westbound: LT / RT (no change)
- Northbound: T, T / RT
- Southbound: LT, T, T
- Traffic control: stop-control from the westbound approach (no change)
- Intersection LOS (AM/PM): A / A
    - Worst-case stop-controlled approach LOS (AM/PM): B / B

The 5-lane section is carried through this interchange. No modifications are required to the 6th Street approaches.

Butler Spaeth Road / 7th Street Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT / T / RT (no change)
- Westbound: LT / T / RT (no change)
- Northbound: LT, T / RT
- Southbound: LT, T, RT (lane drop)
- Traffic control: stop-control from the eastbound and westbound approaches (no change)
- Intersection LOS (AM/PM): A / A
- Worst-case stop-controlled approach LOS (AM/PM): B / C

This intersection may serve as the southern terminus of the proposed 5-lane section with the southbound outside lane dropped as a right turn lane to westbound 7th Street. If a 5-lane section is continued southward, the lane drop would be replaced with a shared T / RT lane.

Because traffic forecasts in this scenario show less demand for a 6th Street / 7th Street connection to Gurley Avenue, east / west volumes entering the intersection are low. A two-way stop-controlled intersection from the 7th Street approaches would provide ample capacity and maintains free movements for the higher-volume north/south traffic. Lanes on both 7th Street approaches do not show a need to be separated but splitting LT and T / RT lanes should be considered in design if roadway width is available.

Butler Spaeth Road / 12th Street Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT / T / RT (no change)
- Westbound: driveway (no change)
- Northbound: LT, T / RT
- Southbound: LT, T / RT
- Traffic control: stop-control from the eastbound and westbound approaches (no change)
- Intersection LOS (AM/PM): A / A
- Worst-case stop-controlled approach LOS (AM/PM): C / C

While Butler Spaeth Road volumes through this intersection are the greatest in the study area, a 3-lane section is shown to meet operational goals with the eastbound 12th Street approach being stop-controlled. Butler Spaeth Road left turn lanes and maintaining free north / south movements through the intersection are integral to the operational results. The 12th Street approach was found to operate adequately as a stop-controlled approach because a high portion of eastbound traffic turns right and can enter the intersection with minimal delay. Further consideration to striping separate LT and T / RT lanes on the eastbound approach may be warranted if eastbound left turn volumes increase in the future.

This intersection should be monitored for traffic signal warrants as part of this scenario due to increasing Butler Spaeth Road volumes. If signalized, delay introduced to the high volume north / south traffic may require consideration of additional lanes.

Gurley Avenue & 6th Street

Recommended modifications: switch stop-control from eastbound approach to the northbound/southbound approaches in conjunction with a 6th Street / 7th Street extension

- Eastbound: LT / T / RT (no changes)
- Westbound: LT / T / RT (new leg)
- Northbound: LT / T / RT (no changes)
- Southbound: LT / T / RT (no changes)
- Traffic control: stop-control from the northbound and southbound approaches
- Intersection LOS (AM/PM): A / A
    - Worst-case stop-controlled approach LOS (AM/PM): B / C

Volumes entering this intersection drop significantly with the Gurley Avenue overpass closed. Stop-control is recommended to be switched from the eastbound approach to the northbound / southbound approaches to provide free movements for the prioritized east / west 6th Street corridor.

No change to pavement width is required on the north, west, and south legs with the addition of an east leg as part of the potential 6th Street / 7th Street connection. The additional movements would be accommodated within the existing lanes. If the connection is not constructed, no changes to existing lane configuration are recommended.

Gurley Avenue & 4th Street

Recommended modifications: switch stop-control from eastbound/westbound approach to the northbound/southbound approaches

- Traffic control: stop-control from the northbound and southbound approaches
- Intersection LOS (AM/PM): A / A
    - Worst-case stop-controlled approach LOS (AM/PM): A / A

North/south volumes entering this intersection also drop significantly with the Gurley Avenue overpass closed (assumes north leg is maintained to provide local property access). Stop-control is recommended to be switched from the eastbound / westbound approaches to the northbound / southbound approaches as patterns would change to east / west travel being more of the predominant movement.

Douglas Highway / 6th Street

Recommended intersection configuration: intersection modifications

- Eastbound: LT, T / RT
- Westbound: LT, T / RT
- Northbound: LT, T, T / RT (no change)
- Southbound: LT, T, T / RT (no change)
- Traffic control: traffic sign
- Intersection LOS (AM/PM): A / B

Maintaining a stop-controlled intersection, with stop signs from the 6th Street approaches, results in LOS F in both the AM and PM peak hours. A traffic signal will be needed to improve side-street operations and meet study LOS C goals. A signalized intersection will also help establish the 6th Street corridor as an accessible and convenient east/west corridor for local trucks in areas between I-90 and US 14-16.

The need for intersection improvements in this scenario are primarily due to increased traffic from 6th Street corridor improvements and not the Butler Spaeth Road overpass. If improvements to help prioritize the 6th Street corridor outside of this study area do not come to fruition, east / west traffic volumes would be less than shown in this study and the recommended improvements may not be needed.

Douglas Highway / 4th Street and Douglas Highway / 7th Street

Recommended modifications: review traffic signal warrants and consider removal of signal if no longer warranted

Crossroad volumes are anticipated to decrease with the removal of the Gurley Avenue grade-separation and prioritization of 6th Street as an east/west local truck route. Traffic signals at these intersections may be removed if they no longer meet warrants.

Brooks Avenue / US 14-16 Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT / T, T / RT (no change)
- Westbound: LT / T, T / RT (no change)
- Northbound: LT, T, RT (no change)
- Southbound: LT, LT / T, RT
- Traffic control: traffic signal
- Intersection LOS (AM/PM): B / C

Even with a Butler Spaeth overpass, the closure of the Gurley Avenue overpass results in increased southbound left turn and westbound right turn traffic volumes to levels that present operational issues at the intersection as currently configured.

To meet LOS C goals identified for this study, one option that does not require additional pavement would be to configure the southbound through lane as a shared LT / T lane. This requires the signal to be retimed with split phasing for the northbound and southbound approaches. One drawback, however, is that measured southbound left turn queues approach

450 feet and extend beyond the railroad crossing (approximately 165 feet between southbound stop bar and railroad crossing).

Concept 3.b Gurley Avenue Overpass Scenario

Gurley Avenue Corridor Cross-Section

Recommended cross-section: 5-lane section

- 2 through lanes in each direction plus center left turn lane with sidewalk
- Narrowed to 4-lane section across bridge
- Warlow Drive to 6th Street

A 5-lane section is recommended between Warlow Drive and 6th Street due to the projected volumes upwards of 11,000 vpd. This provides a conservative look at potential impacts and will help the City of Gillette plan for future needs if phased implementation is desired. Further, a 5-lane section footprint encompasses width needs for a 3-lane section plus right turn lanes at intersections or major access points. The center left turn lane at intersections and major access points is one of the key features of this cross-section as it allows left turning traffic, which has the greatest potential for stopping and waiting for an adequate gap in opposing traffic, to be removed from a through travel lane. This provides notable benefit to both operations and safety.

The 5-lane section can be reduced to a 3-lane section south of 6th Street as volumes will drop significantly due to turning traffic to / from 6th Street. The City of Gillette has a long-range goal of utilizing 6th Street as a local east / west truck route and minor arterial roadway to provide enhanced east / west connectivity between parallel corridors of US 14-16 and I-90. With increased prioritization, it is anticipated that much of the north / south traffic using the Gurley Avenue overpass will use 6th Street to access Douglas Highway or Butler Spaeth Road.

Gurley Avenue/Warlow Drive Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT, T, T/RT (no change)
- Westbound: LT, T, T, RT (no change)
- Northbound: LT, T, RT (lane drop)
- Southbound: LT, T, RT (no change)
- Traffic control: traffic signal (no change)
- Intersection LOS (AM/PM): B / C

The lone changes to this intersection would occur on the south leg to tie into the proposed 5-lane section heading south. Traffic signal modifications would also be required, including traffic signal heads and pedestrian appurtenances throughout the intersection and poles in the southwest and southeast quadrants.

Reconfiguring the southbound right turn lane as a shared T / RT lane would be an option to improve through movement capacity as two receiving lanes will be available south of the intersection with the 5-lane section. The potential drawback would be a through vehicle stopped at the front of the queue blocking right-turn-on-red traffic.

Gurley Avenue / 4th Street Intersection

4th Street access to Gurley Avenue is closed to provide a flatter grade from the overpass structure to Gurley Avenue address existing sight distance needs.

Gurley Avenue / 6th Street Intersection

Recommended intersection configuration: roundabout (option 1)

- Eastbound: LT / T / RT
- Westbound: LT / T / RT
- Northbound: LT / T / RT
- Southbound: LT / T, RT (bypass, lane drop)
- Traffic control: roundabout
- Intersection LOS (AM/PM): A / A

Recommended intersection configuration: intersection modifications (option 2)

- Eastbound: LT, T / RT
- Westbound: LT, T / RT
- Northbound: LT, T, T / RT
- Southbound: LT, T, RT (lane drop)
- Traffic control: traffic signal
- Intersection LOS (AM/PM): B / B

The roundabout option best accommodates future intersection volumes and only necessitates a single entering lane from the eastbound, westbound, and northbound approaches. In the southbound direction, the outer lane of the multilane section can be dropped as a YIELD right turn bypass lane that does not enter the roundabout circle. In addition to providing better peak hour intersection operations than a traditional intersection (stop-controlled or signalized), a roundabout would also provide less delay during the off-peak hours as vehicles would not need to come to a full stop at a stop sign or wait for the signal to turn green.

For a traditional intersection, the high volume eastbound to northbound left turn movement was found to result in LOS F when stop-controlled. Signalization was required to provide adequate gaps in traffic to decrease movement and overall intersection delay.

Truck turning movements, particularly between the north and west legs, will be important considerations in the design feasibility of each option and will be investigated further during conceptual design.

Douglas Highway/6th Street Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT, T / RT
- Westbound: LT, T / RT
- Northbound: LT, T, T / RT (no change)
- Southbound: LT, T, T / RT (no change)
- Traffic control: traffic signal
- Intersection LOS (AM/PM): B / B

The recommended lane configuration with stop signs from the 6th Street approaches resulted in LOS F in both AM and PM peak hours. A traffic signal will be needed to improve side-street operations. A signalized intersection will also help establish the 6th Street corridor as an accessible and convenient east / west minor arterial corridor for local trucks in areas between parallel routes of I-90 and US 14-16.

Douglas Highway / 4th Street Intersection

Recommended modifications: review traffic signal warrants and consider removal of traffic signal if no longer warranted

Following closure of the 4th Street access to Gurley Avenue, east / west traffic between Douglas Highway and Gurley Avenue will shift to 6th Street. It is recommended that traffic warrants be reviewed at the Douglas Highway / 4th Street intersection in consideration of future removal of the traffic signal if no longer warranted. No changes to lane configurations will be required as existing turn lanes will continue to provide operational and safety benefits.

Douglas Highway / 7th Street

Recommended modifications: review traffic signal warrants and consider removal of traffic signal if no longer warranted

The 6th Street segment corridor is anticipated to be a focal east/west corridor with future Gurley Avenue and 6th Street corridor improvements. It is recommended that the traffic signal at Douglas Highway / 7th Street traffic signal be relocated to Douglas Highway / 6th Street intersection due to anticipated volume increases along the 6th Street corridor. Traffic signal warrants should be reviewed as part of this process. No changes to lane configurations will be required as existing turn lanes will continue to provide operational and safety benefits.

No Build Scenario

The No Build scenario shifts a considerable amount of new traffic to the Brooks Avenue (from US 14-16 northward) and Douglas Avenue (between US 14-16 to 6th Street) corridors. Thus, these areas would be the focus of potential mitigation and associated improvements if the Gurley Avenue overpass was closed and removed.

Brooks Avenue / US 14-16 Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT / T, T / RT (no change)
- Westbound: LT / T, T, RT
- Northbound: LT, T, RT (no change)
- Southbound: LT, LT / T, RT
- Traffic control: traffic signal
- Intersection LOS (AM/PM): B / C

Closure of the Gurley Avenue overpass, and no Butler Spaeth overpass, results in significant increases to southbound left turn and westbound right turn traffic volumes.

The resulting impact to traffic operations is considerably greater than anticipated in the Butler Spaeth Road overpass scenario and will require additional lanes to meet operational goals. In addition to converting the southbound through lane to a shared LT / T lane, a westbound right turn lane is also required to meet LOS C in the PM peak hour. Signal timings would be updated

for split phasing on the northbound and southbound approaches as well as incorporating a westbound right turn overlap with the southbound split phase. The westbound right turn lane would need to be expended far enough west so that the westbound through traffic does not block the turn lane to realize the full benefit of that improvement.

Queues would be a concern throughout the intersection, particularly the southbound left turn queues extending north through the railroad crossing. On US 14-16, it will become increasingly difficult to find acceptable gaps in opposing traffic to complete a left turn with permissive phasing. As these left turns occur from a shared lane, this can create operational and safety issues at the intersection.

Douglas Highway / 6th Street Intersection

Recommended intersection configuration: intersection modifications

- Eastbound: LT, T / RT
- Westbound: LT, T / RT
- Northbound: LT, T, T / RT (no change)
- Southbound: LT, T, T / RT (no change)
- Traffic control: traffic signal
- Intersection LOS (AM/PM): A / B

Recommendations align with the other two scenarios due to increased traffic volumes on a prioritized 6th Street corridor. Further, increases in north / south traffic volumes through the intersection due to the Gurley Avenue overpass closure will make it more difficult for side-street traffic to find adequate gaps to cross or turn left. The side-street approaches all measured LOS F in both peak hours. While not analyzed, there would likely be considerable route diversion from 6th Street through local residential streets to find a signalized intersection in lieu of waiting for a gap in traffic at this intersection if maintained as stop-control. A signalized intersection with the recommended lane configuration addresses these operational needs

Douglas Highway / 4th Street and Douglas Highway / 7th Street

Recommended modifications: review traffic signal warrants and consider removal of intersection if no longer warranted

Similar to the Butler Spaeth Road overpass scenario, crossroad volumes are anticipated to decrease with the removal of the Gurley Avenue grade-separation and prioritization of 6th Street as an east/west local truck route. Traffic signals at these intersections may be removed if they no longer meet warrants.

Gurley Avenue & 4th Street

Recommended modifications: switch stop-control from eastbound/westbound approach to the northbound/southbound approaches

- Traffic control: stop-control from the northbound and southbound approaches
- Intersection LOS (AM/PM): A / A
    - Worst-case stop-controlled approach LOS (AM/PM): A / A

North/south volumes entering this intersection also drop significantly with the Gurley Avenue overpass closed. Stop-control is recommended to be switched from the eastbound/westbound approaches to the northbound/southbound approaches as patterns would change to east/west travel being more of the predominant movement.

Conclusions

Overarching findings from the traffic analysis are summarized as follows:

Overpass Location

- Overpass provides the greatest benefit to Gillette area traffic at Gurley Avenue
- The further east the overpass is located, the less attraction to area traffic due to out-of-the-way travel between origins and destinations
- Gurley Avenue closure (and not Butler Spaeth overpass) would lead to a significant increase in traffic across the Brooks Avenue at-grade crossing
    - Thus, the Gurley Avenue alternative is preferred over the Butler Spaeth Overpass alternative despite the results of the Phase 1 evaluation

Study Area Scenario Recommendations

1.b Butler Spaeth Road to Kluver Extension Scenario

- Butler Spaeth Avenue corridor: 5-lane section to address anticipated traffic growth between Warlow Drive and 6th Street
- 4-lane section across the bridge to provide corridor capacity, redundancy for future maintenance lane closures, and travel reliability
- Intersection recommendations shown in **Figure 18**

3.b Gurley Avenue Overpass Scenario

- Gurley Avenue corridor: 5-lane section between Warlow Drive and 6th Street
- 4-lane section across the bridge to provide corridor capacity, redundancy for future maintenance lane closures, and travel reliability
- Intersection recommendations shown in **Figure 19**

No Build Scenario (Gurley Avenue overpass closed and removed)

- Brooks Avenue / US14-16 intersection would require improvement to address significant increase in traffic volumes, particularly between the north and south legs of the intersection
- Intersection recommendations shown in **Figure 20**

6th Street Corridor Findings

- All scenarios assume a 6th Street / 7th Street that includes improvements to facilitate a prioritized, east/west corridor for local travel
- This increases demand at the Douglas Highway / 6th Street intersection regardless of scenario, though the Gurley Avenue overpass shows the greatest increase in 6th Street corridor volumes
- A potential 6th Street / 7th Street connection between Gurley Avenue and Butler Spaeth Road is best utilized with a Gurley Avenue overpass, compared to a Butler Spaeth overpass

13 Brooks Avenue & US14-16

12 Douglas Highway & 4th Street

Review traffic signal warrants due to changes in traffic patterns. Consider signal removal and installing stop signs on 4th St approaches if no longer warranted.

4 Douglas Highway & 6th Street

Brooks Avenue

Warlow Drive

16 Warlow Drive & Butler Spaeth Road

15 US14-16 & Quadrant Roadway

14 Butler Spaeth Road & Quadrant Roadway

6 Butler Spaeth Road & 6th Street

US14-16

Overpass Lanes

Gurley Avenue

6th Street

7th Street

Review traffic signal warrants and consider:
- Conversion to stop-controlled intersection from 6th St approach
- Relocate signal to Douglas Hwy/ 6th St intersection

6th St / 7th St connection option

3 Gurley Avenue & 4th Street

5 Gurley Avenue & 6th Street

12th Street

Douglas Highway

Butler Spaeth Road

7 Butler Spaeth Road & 7th Street

9 Butler Spaeth Road & 12th Street

lane drop

driveway

TRAFFIC LEGEND

- Study Intersection
- Proposed Road Network Changes
- Access Removed

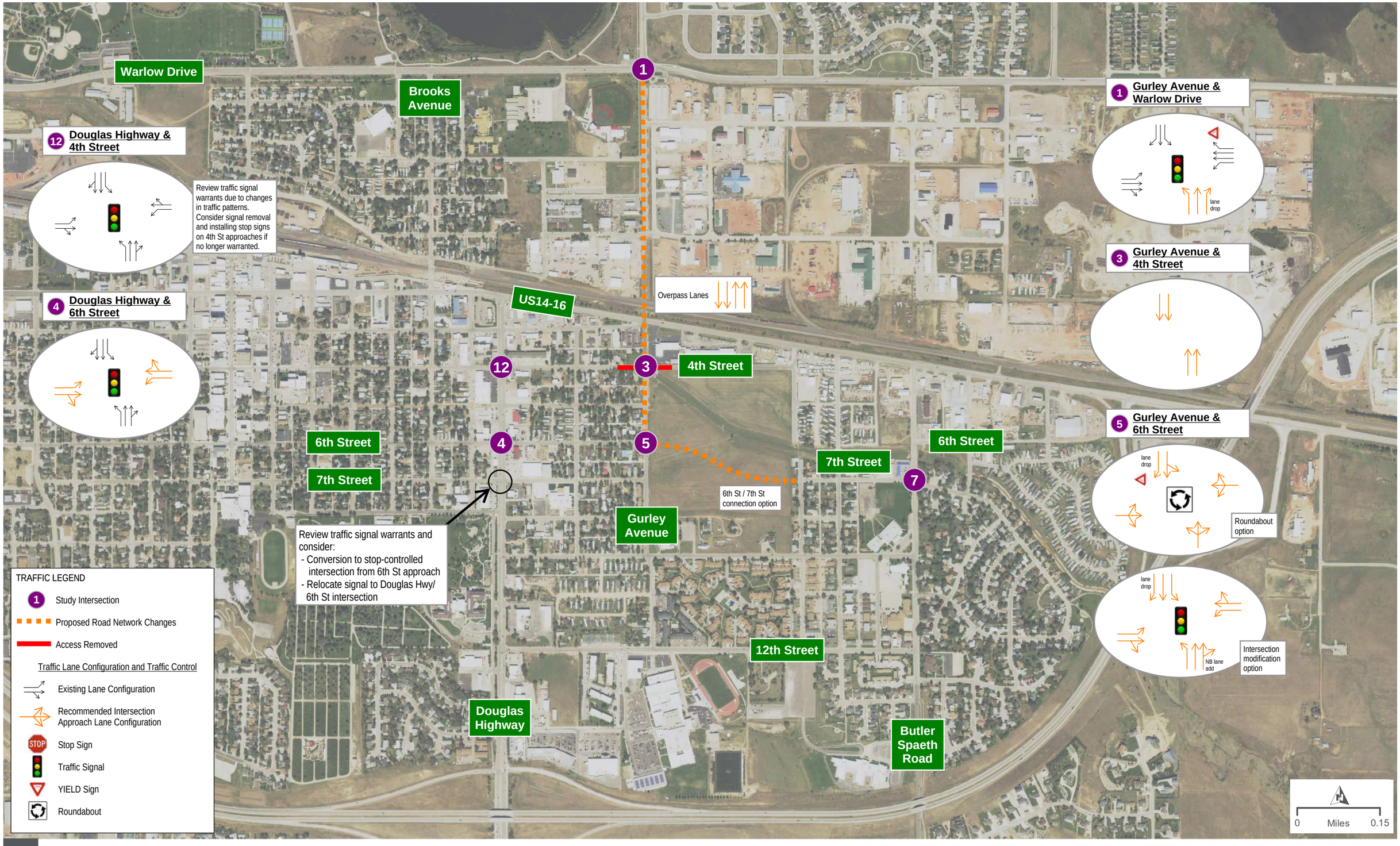
Traffic Lane Configuration and Traffic Control

- Existing Lane Configuration
- Recommended Intersection Approach Lane Configuration
- Stop Sign
- Traffic Signal
- YIELD Sign
- Roundabout

0 Miles 0.15

BUTLER SPAETH ROAD OVERPASS SCENARIO INTERSECTION RECOMMENDATIONS

FIGURE 18



GURLEY AVENUE OVERPASS SCENARIO INTERSECTION RECOMMENDATIONS

FIGURE 19

13 Brooks Avenue & US14-16

Brooks Avenue

Warlow Drive

3 Gurley Avenue & 4th Street

12 Douglas Highway & 4th Street

Review traffic signal warrants due to changes in traffic patterns. Consider signal removal and installing stop signs on 4th St approaches if no longer warranted.

13

US14-16

12

3

Gurley Avenue

4 Douglas Highway & 6th Street

4

6th Street

7th Street

7th Street

6th Street

Review traffic signal warrants and consider:
- Conversion to stop-controlled intersection from 6th St approach
- Relocate signal to Douglas Hwy/ 6th St intersection

12th Street

Douglas Highway

Butler Spaeth Road

TRAFFIC LEGEND

1 Study Intersection

Proposed Road Network Changes

Access Removed

Traffic Lane Configuration and Traffic Control

Existing Lane Configuration

Recommended Intersection Approach Lane Configuration

Stop Sign

Traffic Signal

YIELD Sign

Roundabout

N

0 Miles 0.15

NO BUILD SCENARIO INTERSECTION RECOMMENDATIONS

FIGURE 20

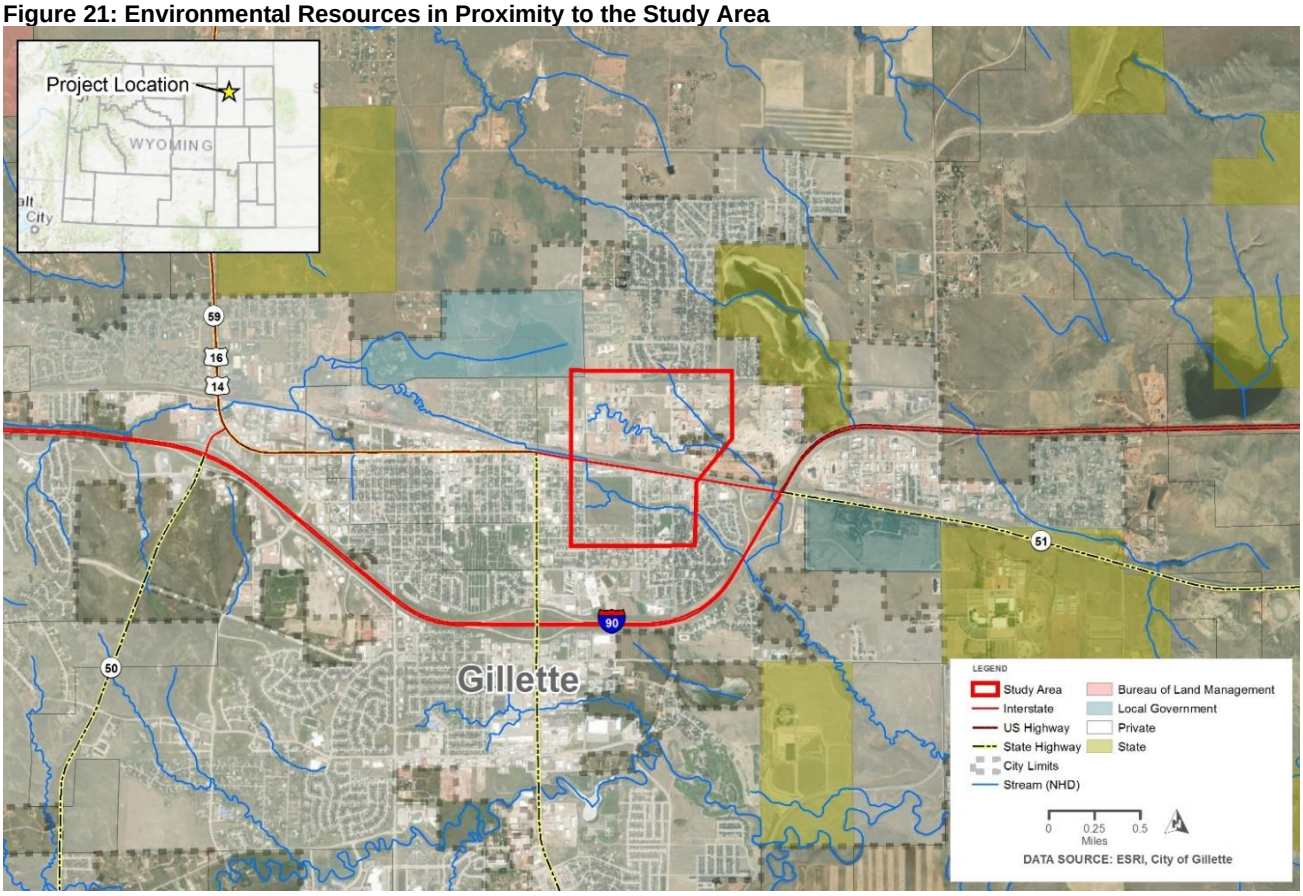
GILLETTE RAILROAD OVERPASS STUDY

Environmental Review

Identification of Environmental Resources

A review of existing literature, maps, and other materials relevant to the proposed options to identify potential environmental program requirements within and adjacent to the study area was conducted and summarized below.

Figure 21: Environmental Resources in Proximity to the Study Area



Land Ownership

The study area includes primarily private property within Gillette, WY. There are no federal or state-owned lands that would be crossed by the proposed corridors. U.S. Hwy 14/16 is located within the study area, and the right-of-way is owned by the Wyoming Department of Transportation (WYDOT). There is city-owned property located northwest of the study area.

Land Use and Land Cover

The land use within the study area is predominantly commercial and industrial development. City of Gillette zoning within the study area is Agricultural (A), General Commercial (C-1), Single and Two Family Residential (R-2), Single and Multiple-Family Residential (R-3), Single Family Residential (R-1), Mobile Home (M-H), Multiple Family Residential (R-4), Planned Neighborhood Business (C-P), Light Industrial (I-1), and Heavy Industrial (I-2) (City of Gillette, 2021).

According to the land cover designations in the National Land Cover Dataset (NLCD), the proposed study area includes primarily developed areas, from open space to high density, and grasslands and shrub/scrub (USGS, 2012).

A zoning change permit may be required based on the location of the chosen alternative. Coordination with the City of Gillette would be completed in future phases to determine any zoning permit needs.

Socioeconomic

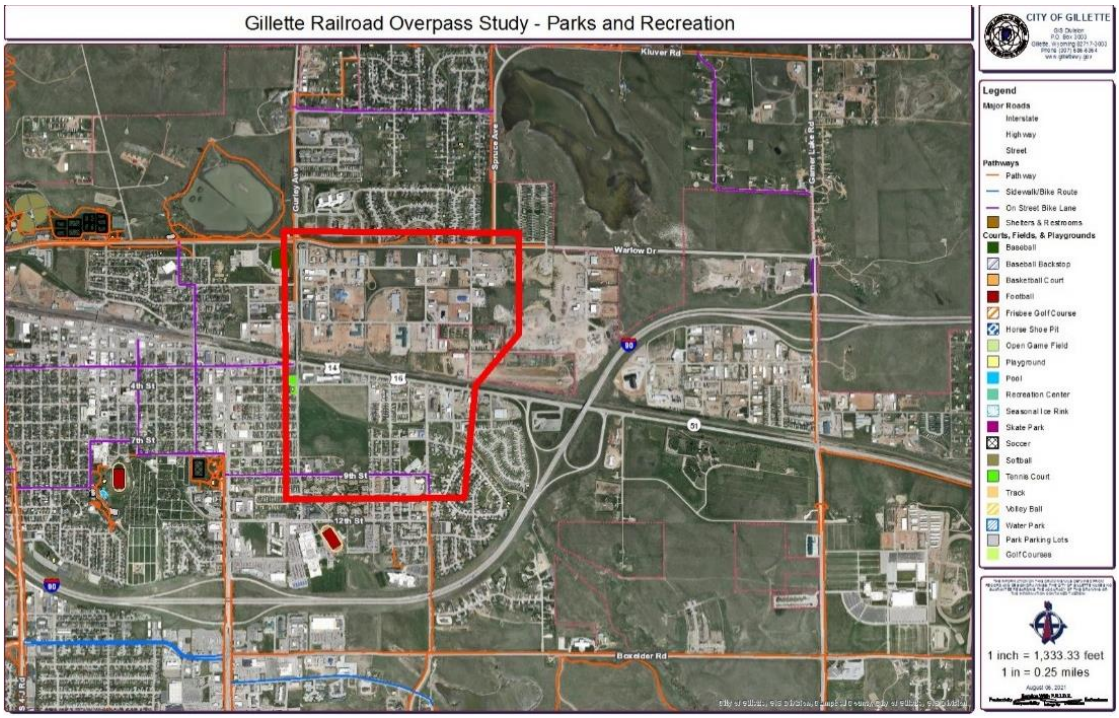
Population and Ethnicity

The Gillette area is more densely populated than most of the state of Wyoming. The population of Gillette was estimated to be 32,030 in 2019, where the total population of Campbell County was estimated to be 46,341 for the same year. The population of Gillette is primarily white (93.0%), Hispanic or Latino (11.0%), and two or more races (3.2%) with less than 2% each of: Black or African American (0.5%), American Indian or Alaskan Native (1.8%), Asian (0.6%), or Native Hawaiian and other Pacific Islander (0.2%) (US Census Bureau, 2021). Based on the population of the study area, it is not anticipated that any low-income, minority or tribal populations would be disproportionately impacted. However, additional review and analysis would need to be completed in future phases of the project, if required.

Public Lands and Recreation

Parks and public recreation areas are located within the study area as seen in **Figure 22**. Gurley Park is located along Gurley Avenue, north and south of 4th Street. On the southwest corner of Gurley Avenue and Warlow Drive is Riders Baseball Field. North of Warlow Drive is Lakeland Hills Park. Pathways are present on Gurley Avenue and Warlow Drive (City of Gillette, 2021). Additional review would be completed on the selected alternative to determine if there would be any impacts to parks and public recreation areas.

Figure 22: Parks and Recreation Areas



Hazardous Materials

The EPA provides a database of documented hazardous materials and Superfund sites within the United States. This database was reviewed for information pertaining to the study area (EPA, 2021). Information from the Superfund Enterprise Management System (SEMS) database was reviewed. In addition to the SEMS database, the EPA's MyEnvironment Interactive Mapping tool was reviewed. The mapping tool provides information regarding toxic releases, emissions, hazardous waste, and emergency incident records within the United States.

Documented hazardous waste sites were reviewed for the study area. Sites in the area are primarily related to industrial or commercial developments. No Superfund or Brownfield sites were identified within one mile of the study area. The Wyoming DEQ VRP WebViewer website notes historic spills, including information on spills that have occurred and information on above/below ground storage tanks in the vicinity of the proposed project (Wyoming Department of Environmental Quality, 2021). No issue areas were identified at this time.

Air Quality

Based on information available from the Environmental Protection Agency and Wyoming Department of Environmental Quality (DEQ), the study area is in attainment for all criteria pollutants.

Noise

There are residential areas located along the perimeter of the study area. If the location and alignment of the proposed overpass is shifted, additional noise analysis would likely be required. A noise screening analysis would be prepared in future phases of the project and additional noise analysis with traffic noise measurements may be required.

Cultural Resources

A review of the Wyoming State Historic Preservation Office (SHPO) WyoTrack database (WyoTrack) was conducted on March 25, 2021, in order to identify known cultural resources and previous cultural resource surveys that have been conducted within one mile of the study area. The WyoTrack review indicated 15 previously conducted cultural resources surveys and five archaeological sites located within these sections and in approximately one mile of the study area.

The review indicated one site (48CA6880 – historic Gillette Post Office) as listed on the National Register of Historic Places (NRHP). It is located on the corner of East 3rd Street and Gillette Avenue. One site (48CA265 – Chicago, Burlington & Quincy Railroad) is recommended as eligible with SHPO concurrence and it is most likely within all project alternative locations. Although the entire linear alignment of the historic railroad is eligible for listing in the NRHP, segments of the railroad line are assessed for integrity based on NRHP criteria individually. Segments of the historic linear resource will be recommended as either supporting or non-supporting, or contributing or non-contributing, segments for eligibility of the entire resource.

Based on the previous inventories that have been completed in the vicinity of the study area and identified sites, there is a potential that eligible cultural resources would be impacted by the project. It is recommended that a Class III Cultural Resources Inventory be completed for the project

Hydrology/Water Resources

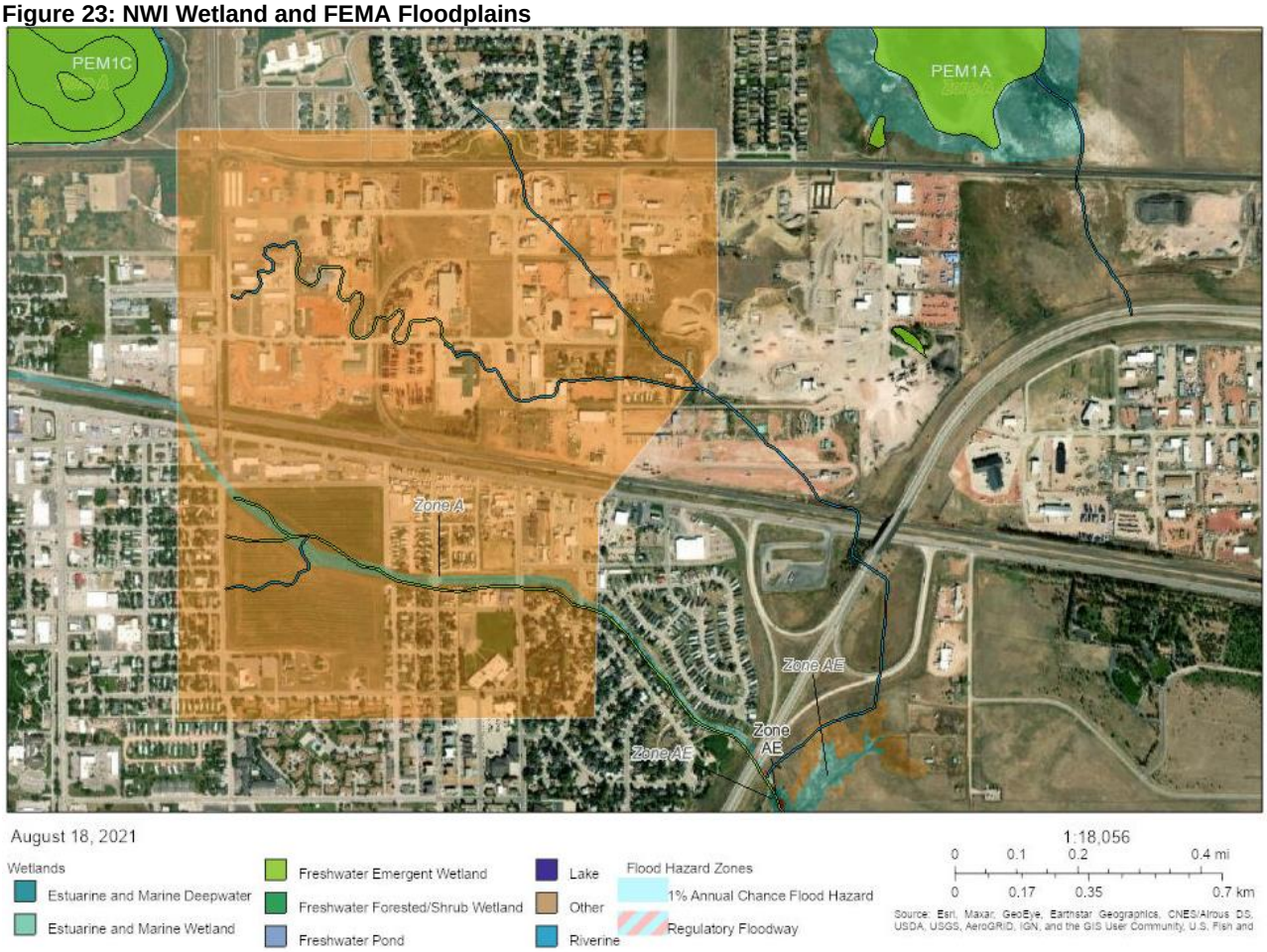
Wetlands

The study area falls within the boundaries of the Powder River Basin region of the Northwestern Great Plains Level III Ecoregion. The study area is located within the Upper Donkey Creek (101202010503) and Little Rawhide Creek (100902080102) watersheds. According to the National Hydrography Dataset (NHD), the study area contains four intermittent stream channels, including Stonepile Creek. Wetland areas are present within the study area according to the National Wetland Inventory (NWI) data shown in **Figure 23**. It is recommended that additional review be completed for potential wetland areas that would be crossed by any final potential routes.

Floodplains

A review of the Federal Emergency Management Agency (FEMA) floodplain mapping indicates that the study area contains areas mapped as Zone A along Stonepile Creek, primarily through the undeveloped parcel south of US Hwy 14/16. Additional analysis would be required as options are further developed to determine if a Floodplain Development Permit would be needed. If required, the permit would need to be obtained through the Floodplain Development Manager with the City of Gillette.

Figure 23: NWI Wetland and FEMA Floodplains



Biological Resources

The study area is within the limits of the City of Gillette, Wyoming, and consists of industrial development, with undeveloped areas along the alignment. The undeveloped areas are primarily grassland. Wildlife species have the potential to occur in within the study area, based on an analysis utilizing the Species of Concern and Habitat Analysis Tool for the Wyoming State Wildlife Action Plan. The project would not occur within any areas identified as Crucial Range or Seasonal Range, such as those identified for antelope and white-tailed deer (State of Wyoming, 2021). It is anticipated that due to the project being located in a developed area, the probability of the study area containing any state-listed Species of Concern is low. However, a field survey should be conducted during the future phases of the project for the proposed route to determine if suitable habitats for listed species are present.

The nearest recorded raptor nest is located approximately 2.5 miles northwest of the study area (State of Wyoming, 2021).

Federally-Listed Species

Under the federal Endangered Species Act and state laws, species are “listed” in an effort to protect them and their habitat. Species of concern have also been identified within Campbell County. Two federally-listed species have the potential to occur near the study area in Campbell County as shown in **Table 5**.

Table 5: Federally-Listed Species of Concern with Potential to Occur in the Study Area

Common Name	Scientific Name	Status	Likelihood of Occurrence in Study Area
Mammals			
Northern Long-eared Bat	*Myotis septentrionalis*	FT	Potentially – Northern long-eared bats may utilize bridges or man-made structures. Development and disturbance in the area may discourage presence.
Flowering Plants			
Ute Ladies’-tresses	*Spiranthes diluvialis*	FT	Potentially – the study area does cross the species’ Area of Influence, which are adjacent to streams. However, development and disturbance in the area would likely indicate that the species is not present.

Overview of Environmental Requirements

Based on review of existing documents and desktop mapping, a number of environmental permits are expected. Early coordination with the regulatory agencies during permitting would identify key issues, potential conflicts, and mitigation strategies, and streamline the review process. Agencies would need to be contacted in future phases of the project to determine requirements. Table 2 provides an overview of the permits and timelines.

Environmental Review Timelines

No Federal Nexus

If no federal funding, approvals, or federal permits are required for the project, National Environmental Policy Act (NEPA) documentation would not be required. However, State and local permits would still need to be obtained prior to construction.

Federal Nexus

If federal funding, approvals, or federal permits are required for the project, then NEPA documentation would be needed. Based on initial project review, the most likely federal involvement in the project would result in funding from the Federal Highway Administration (FHWA) through the WYDOT, or a Section 404 permit from the USACE.

A general example project outline is shown below based on typical requirements and documentation needs. If the NEPA documentation is a categorical exclusion (CatEx), then the overall timeline for completion is approximately 6 to 12 months. If the NEPA documentation is an Environmental Assessment (EA), then the overall completion time is approximately 12 to 16 months. Timelines will vary based on design schedule, agency requirements, field studies, and public involvement needs.

1. Project Kick-off
2. Coordination and Stakeholder Engagement
    a. Public Involvement
    b. Landowner and Business Owner Meetings
    c. Agency Coordination
    d. Tribal Coordination
3. Data Collection and Field Work
    a. Aquatic Resources Inventory
    b. Biological Resources Evaluation
    c. Cultural Resources Survey
    d. Noise Analysis
    e. Phase I Environmental Site Analysis
4. Existing Environmental Resources Context Development
    a. Desktop Analysis
    b. Field Reporting
5. NEPA Documentation
    a. Purpose and Need
    b. Alternatives Analysis
    c. Resource Analysis and Impact Assessment
        i. Section 106 Consultation with State Historic Preservation Office (SHPO)
        ii. Section 7 Consultation with U.S. Fish and Wildlife Service (USFWS)
    d. Draft NEPA Document
        i. Review and comment from Lead Federal Agency
    e. Final NEPA Document
        i. Approved by Lead Federal Agency
6. Permitting
    a. USACE Section 404 Permit (if needed)
    b. FEMA Floodplain Permitting (if needed)

Appendix C contains more detail concerning the NEPA permit and approval process.

Planning – Level Construction Costs

Planning-level construction and network improvement costs were estimated for the Gurley Avenue Overpass with MSE walls and the Butler Spaeth to Kluver Road Extension with MSE walls alternatives and are shown in **Table 6** and **Table 7**. Costs shown in the tables reflect current year (2021) dollars and do not account for inflation related to the COVID-19 pandemic.

As seen in **Table 6**, the Butler Spaeth to Kluver Road Extension is estimated to have a total planning-level cost of $34.68 million, with $25 million of the total relating to the structure and the remaining $9.6 million stemming from the network improvements. For the Butler Spaeth Overpass structure, a portion of the estimated cost comes from the Warlow to Lincoln Street reconstruction element that is estimated to be just under $7 million. When compared to the Gurley Avenue Overpass alternative, the Butler Spaeth network improvement costs are estimated to be about $3 million less; as with the Gurley Avenue Overpass network improvements, these are not required elements for replacing the existing overpass structure. These costs do not include financial and schedule impacts that would be associated with permitting a new crossing of the BNSF rail line.

Table 6: 3.b Butler Spaeth to Kluver Road Extension Planning-Level Construction Costs

Segment Number	Project Segment	Unit	Segment Cost
Structure Costs			
1	Warlow to Lincoln Street Reconstruction	TOT	$6,889,000
2	Butler Spaeth Overpass Structure	TOT	$14,443,000
2A*	Butler Spaeth Appurtenances (Beautification)	TOT	$710,100
3	Butler Spaeth Reconstruction (6th to 7th St)	TOT	$4,159,000
4	Utility Adjustments & Relocations	TOT	$1,380,000
Base Structure Subtotal			**$27,581,100**
Network Improvement Costs			
4	6th / 7th Street Intersection & Extension West	TOT	$6,725,000
5	6th Street & Highway 59 Signalization Reconfiguration	TOT	$576,000
6	Replace Existing Gurley Overpass Deck	TOT	$2,434,000
Base Network Improvements Subtotal			**$9,735,000**
Overall Alternative Cost Estimate			**$37,316,100**

**Includes estimated costs for aesthetic improvements such as decorative fences, lighting, railings, and other surficial upgrade

As seen in

Table 7, the Gurley Avenue Overpass alternative is estimated to have a planning-level cost of $28.2 million, with $15.5 million of the cost relating to the construction of the overpass structure and the remaining $12.7 million coming from network improvements. It is noted that the costs for the structural portion of the alternative are based on a phased construction in which a portion of the structure remains open during construction. A decision to fully close the overpass during the construction phase could result in cost savings of approximately $2.2 million. Network improvements shown in the table are recommended but not required to complete the replacement of the existing overpass.

Table 7: 3.b Gurley Avenue Overpass Planning-Level Construction Costs

Segment Number	Project Segment	Unit	Segment Cost
Structure Costs			
1	Demolition of Existing Bridge Structure	TOT	$1,084,000
3	Gurley Overpass Structure	TOT	$12,501,000
3A*	Gurley Overpass Appurtenances (Beautification)	TOT	$900,600
4	4th Street Cul-de-Sacs	TOT	$258,000
5	Utility Adjustments & Relocations	TOT	$735,000
Base Structure Subtotal			**$15,478,600**
Network Improvement Costs			
6	Warlow to Lincoln Street Reconstruction	TOT	$2,528,000
7	5th Street to 9th Street Reconstruction	TOT	$2,528,000
8	6th / 7th Street Intersection & Extension East	TOT	$7,086,000
9	6th Street & Highway 59 Signalization Reconfiguration	TOT	$576,000
Base Network Improvements Subtotal			**$12,718,000**
Overall Alternative Cost Estimate			**$28,196,600**

*Includes estimated costs for aesthetic improvements such as decorative fences, lighting, railings, and other surficial upgrades

Potential Funding Sources

The purpose of this chapter is to initiate the funding analysis component of the Gurley Railroad Overpass Planning Study. Specifically, this chapter provides summary descriptions of existing and potential federal, state, and local funding sources, which the City could use to support investments in the replacement of the existing overpass.

Previous Funding Activities

The City began setting aside $1 million annually of its share of Campbell County's Optional 1 percent Sales Tax Fund in 2019 to help fund the overpass replacement. Cost estimates for the project developed as part of a 2008 study ranged from $9 million to $13 million, although the actual cost of the new overpass in current year dollars is likely to be much greater.

Preparing for Funding Asks

There are a limited number of existing funding opportunities for a locally owned, bridge/overpass project. To maximize the possibility for successfully obtaining funds for the overpass replacement, there is a significant advantage in conducting upfront analysis to understand how the project would fit within the criteria of different potential funding programs.

Understanding Trade-Offs

Nearly all public-sector sources described in this memo involve the use of federal dollars, which carry with them additional regulatory requirements (such as those associated with the National Environmental Policy Act [NEPA]). This process can be costly and time-consuming, although it also greatly expands the pool of available funds.

Some funding programs are broad enough to match well with the overall project, while others are targeted to a very specific functional category (roadway or active transportation). In either case, the City and its partners can improve their chances of securing outside funding by developing a clear understanding of what sets apart a given alternative, whether it is serving a critical population or addressing a clear deficiency of the transportation network.

Information to address funding program evaluation criteria generally fall within three categories: existing conditions, planning process, and the anticipated benefits of proposed improvements. These categories are summarized in the following sections. The data needed to address the program evaluation criteria evolves as specific investments move through the project development process. For the proposed overpass replacement, the work associated with data collection, planning, and project definition described in the sections below dates to at least the 2008 study exploring options for a BNSF crossing within Gillette and will continue to be refined as the overpass replacement study advances.

The goal of the following sections is to provide a framework for obtaining information and developing key messages that will support targeting the most promising funding opportunities for the future overpass replacement.

Existing Conditions

Existing conditions include metrics related to operations of the existing transportation facility, such as crash rates, delay, usage (across all modes), and demographic conditions. It is also important to understand likely changes in the future (such as forecasts for population, employment, and travel demand). These are important data points for several reasons:

1. Many funding programs prioritize projects that serve specific kinds of communities. For example, the United States Department of Transportation (USDOT) Infrastructure for Rebuilding America (INFRA) discretionary program for fiscal year (FY) 2021 awarded projects that serve Opportunity Zones, Empowerment Zones, Promise Zones, or Choice Neighborhoods. The USDOT's Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary program for FY 2021 focused on Areas of Persistent Poverty – namely, those areas that consistently had greater than or equal to 20 percent of the population living in poverty or were located in any territory or possession of the United States.
2. These existing data points form the basis for defining and estimating the benefits expected to result from planned infrastructure improvements (No Build versus Build comparison). For example, the most common method of determining safety benefits is through crash modification factors (CMF), which use existing quantitative research to anticipate a reduction in crashes associated with a given improvement. This methodology requires an understanding of both the rate and type of existing crashes.
3. The adopted land-use forecast (and associated travel demand model) can also address questions likely to be asked by funding programs. These forecasts help determine the likely users of a given facility in the future, and funding applications frequently request specific forecasts for population and employment bases as well as expected demand on facilities.

Typical data sources:

- **Crash Rates:** Including specific crash types or causes and severity of crashes.
- **Demographics:** Specific socioeconomic variables and desired geographies vary from program to program, but the focus of data collection should be on communities directly affected by the project, either through proximity to the project area or connection to the new infrastructure.
- **Delay:** Many programs – especially those with any kind of formal benefit-cost analysis (BCA) – are interested in the likely travel time savings associated with improvements (for all modes).
- **Travel Patterns:** Including existing traffic volumes, transit ridership, and/or bicycle and pedestrian counts, as applicable. These data points can be used both to set the baseline for expectations about what might change because of the project and to quantify the impact of the project in terms of affected transportation facility users.

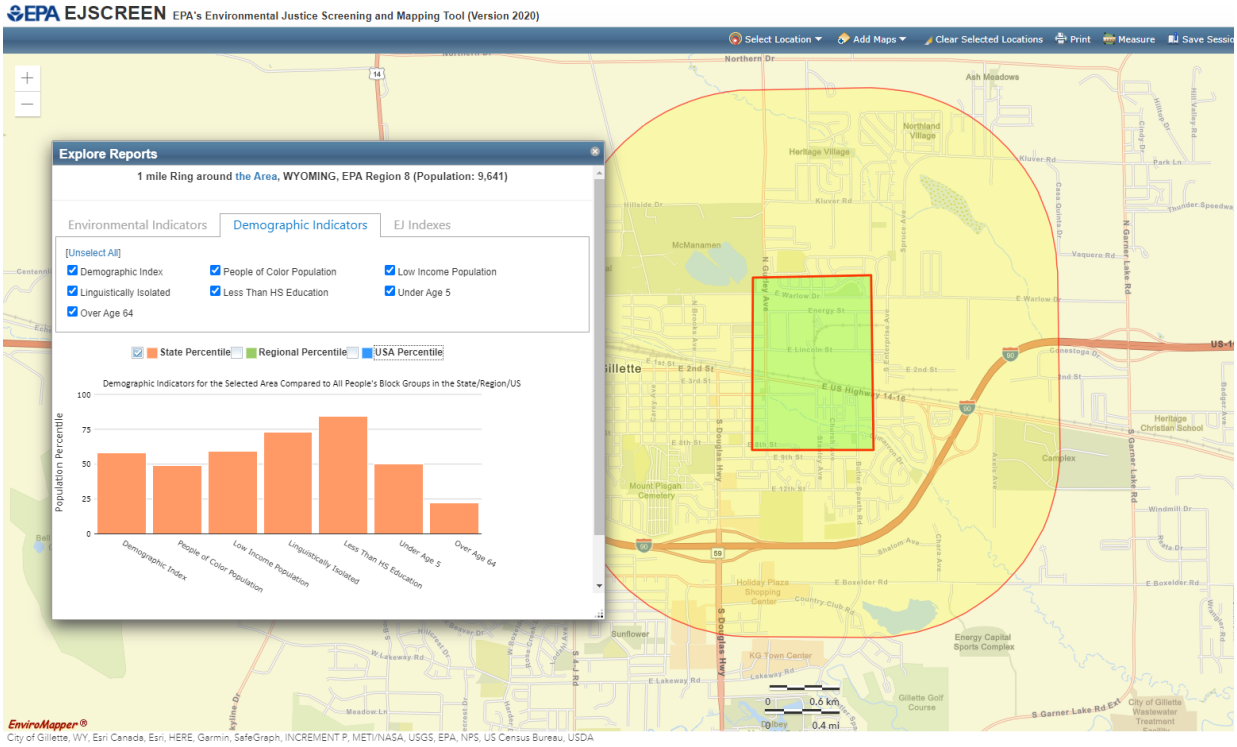
Planning Process

Many funding programs evaluate the process by which the capital project has been identified and defined. The typical emphasis of this evaluation focuses on how the project sponsor has built support with the community, partner agencies, and/or the private sector.

This support can be demonstrated through documentation of the public engagement process, as well as documented outcomes such as funding commitments or letters of support. Both elements can be much easier to strategize during project development – if a particular funding source is a likely target, project sponsors should work to understand the goals of that source or program. Often, even if the project itself is not a perfect match for the criteria of a specific funding program, the engagement or partnership building efforts of the project can offer a pathway to alignment. For example, many state and federal programs focus on the involvement and empowerment of disadvantaged communities. As the project team engages with these communities through the study process, maintaining clear and concise records of that engagement can greatly facilitate future grant applications or funding requests.

Demonstration of the commitment of various partners is also critical in securing funds. This can take the form of obtaining or establishing a pathway toward required approvals (such as NEPA clearances or secured right-of-way). It can also be more generalized support for the project – the more "binding" the agreement, the better. Commitment of funding support or formalized agreement (e.g. intergovernmental agreements) are valuable, but even simply thinking through possible letters of support writers can be helpful. Additionally, recent USDOT competitive grant applications have requested documentation that projects incorporate considerations of climate change and environmental justice in the planning stage and in project delivery. This would include use of environmental justice tools such as EJSCREEN to minimize adverse impacts to relevant communities. The EJ Screen tool was developed by the EPA and allows for a snapshot analysis of environmental and demographic factors that might align with specific grant criteria or funding priorities. For example, as shown in **Figure 24**, the area near the Gurley overpass has a significantly higher concentration of people without a high school education than the state as a whole.

Figure 24: Example EJSCREEN Output for the Vicinity of the Proposed Overpass



Typical data Sources:

- Documentation that local funding sources (matching funds) have been or will be approved.
- Documentation of public engagement efforts, including summaries of the process undertaken, the participants and their roles, and any significant findings.
- Racial equity impact analysis.
- Project is included in applicable regional planning and programming documents:
    - TIP
    - State Transportation Improvement Program (STIP)
    - State Long Range Transportation Plan (LRTP)
    - State Freight Plan
    - Local/State Climate Action Plan
    - Local/State Equitable Development Plan
    - Local/State Energy Baseline Study
- Equity and inclusion program related to project procurement, material sourcing, construction, inspection, hiring, or other project delivery and implementation activities.

Proposed Improvements

The final component of positioning for funding sources is clearly defining what the project intends to do – the physical improvements, the anticipated cost, and the expected use of the facility. This involves developing a very clear Build scenario to be compared against a No-Build scenario derived from the existing conditions analysis.

The first aspect of defining the proposed improvements is establishing a project definition that is approved by the necessary stakeholders (in many cases, just the sponsor agency). This should include as much detail about the project scope as possible, but at a minimum, it is important to document the specific improvements proposed as well as the exact location and alignment of the project. Many funding sources prioritize certain kinds of improvements – for example, nearly all federal discretionary programs reward “innovative” project elements such as intelligent transportation systems (ITS) and transportation system management and operations (TSMO).

Eligibility for most funding sources also requires a clear implementation plan, focused on capital cost estimates and a milestone implementation schedule (NEPA/Preliminary Engineering, final design, right-of-way (ROW), utilities, procurement, and construction). These details help make the case for the “shovel readiness” of a project, which is key to demonstrating the quality of the investment from the perspective of the agency responsible for allocating funds.

Clear documentation of anticipated operations and maintenance (O&M) costs for the proposed investment, as well as a plan for paying these lifecycle costs (such as a dedicated O&M fund and/or asset management plan), is another common requirement.

Finally, defining the anticipated benefit categories and level of benefit is critical to making the case of the project in most funding applications. More specifically, the ability to provide quantitative or monetized analysis results provides a stronger justification than qualitative discussions on potential benefits. The quantitative results are typically generated through a BCA based on the data sources listed below. While monetized benefits are critical to conducting a formal BCA, most funding programs also consider clearly articulated qualitative benefits as well.

With regards to the overpass replacement project, the anticipated benefits discussion could be enhanced based on a life-cycle cost analysis. Understanding that based on the current condition of the bridge deck, the city's preference is to stop the on-going maintenance investments on the existing overpass. However, to support the benefits discussion, a lifecycle cost analysis could provide quantitative analysis results that compare both economic costs (rehabilitation vs replacement costs) and societal costs (travel time and operating cost impacts for frequent detours associated with continuous rehabilitation vs. a one-time detour as part of the replacement project).

Typical Data Sources

- **Project definition**: the more specific or advanced, the better, although even a defined scope of work is sufficient for some metrics.
- **Project costs**: including capital and O&M costs as well as implementation schedules. Again, specificity is helpful, but even general estimates broken down by major design elements (such as utility relocation, ROW acquisition, and overall construction costs) and a generalized cost curve (i.e., how much of the cost is expected to be incurred per year of construction) are often enough to allow for defensible BCA.
- **Anticipated benefits**: typically in the form of forecasted *demand* for the improvement demonstrating how many users (auto, bike, pedestrian, transit, freight) would benefit from the project, as well as the calculations of the actual benefit such as minutes saved per user or number of crashes reduced per VMT.

Summary of Potential Funding Sources

Table 8 through **Table 10** provide an overview of the potential federal, state, and local funding sources identified to date. For each source, a brief description is provided along with an indication of the investment category that is eligible for the funding (roadway or active transportation).

- **Table 8: Existing Federal Competitive Grant Programs**: Provides a brief description of each program, eligible costs, key evaluation criteria, most recent or current application schedule, a summary of the range of funding that may be available, and a preliminary indication of the type of project that might be eligible. As shown in the tables, Federal competitive grant programs are largely administered by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and the USDOT.

- **Table 9: Existing Relevant State-Administered Funding Programs**: Provides a brief description of programs administered by the Wyoming Department of Transportation (WYDOT) for use on facilities off the state highway system (including the Gurley overpass and all proposed alternatives). The table includes a description of each program and eligible expenses, budgeted or programmed funding levels, and a preliminary indication of the investment categories that would be eligible.

- **Table 10: Other Potential Revenue Sources**: Provides a brief description of other revenue sources that have been considered or used in other parts of the country to support implementation of transportation infrastructure. The categories of other potential revenue sources include value capture mechanisms, one-time revenue generating event (property sale), developer impact fees, and private sector contributions.

Table 8: Federal Competitive Grant Programs

Federal Competitive Grants	Description	Key Criteria	Total Funds Available / Typical Award	Applicable Project Categories
USDOT RAISE Grant	Projects that leverage resources, encourage partnership, catalyze investment and growth, fill a critical void in the transportation system or provide a substantial benefit.	Merit criteria include safety, environmental sustainability, quality of life, economic competitiveness, state of good repair, innovation, and partnership. Priority is given to projects that can demonstrate improvements to racial equity, reduce impacts of climate change, and create good-paying jobs.	Total available nationwide (last cycle): $900 million; historically the largest awards have been approximately $20 million, and the average award has been $10 to $12 million.	Capital: Roadway, and Active Transportation
USDOT INFRA Grant	Projects that address critical issues facing our nation's highway and bridges, specifically highway and freight projects of national or regional significance.	Criteria focus on economic vitality, climate change and environmental justice, racial equity, leveraging Federal funding to attract non-Federal sources, innovation, and performance.	Total available nationwide (last cycle): $889 million in 2021 funds, and up to $150 million remaining from prior authorizations; 2020 awards ranged from $6 million to $35 million (20% to 56% of total costs) in the Small Project category, and from $25 million to $135 million (4% to 60% of total costs) in the Large Project category	Capital: Roadway (specifically improving freight and goods movement)
FHWA Competitive Highway Bridge Program	Funds are restricted to states with a population density less than 100 people / square mile. Wyoming is one of the 25 states that qualify. The funds must be used for highway bridge replacement or rehabilitation projects on public roads that leverage the efficiencies associated with "bundling" at least two highway bridge projects into a single contract.	Selection criteria include innovation, support for economic vitality, lifecycle cost and state of good repair, and project readiness.	Total available nationwide (last cycle): $225 million 2019 awards ranged from $2 million to $33 million	Capital: Roadway. Note could be considered if there is another bridge that would be implemented at the same time as the overpass replacement.
FRA Consolidated Rail Infrastructure & Safety Improvements (CRISI)	Funding to address congestion; increase rail capacity; add or upgrade the condition, clearances, and capacity of rail mainlines; enhance capacity and service with less conflict between freight and intercity passenger rail; reduce delays and risks of highway-rail grade crossings; and provide more effective rail equipment; enhance multimodal connections or facilitate service integration between rail service and other modes.	Selection criteria include economic vitality, leveraging Federal funding, preparing for future O&M and other lifecycle costs, innovation, and performance.	Total available nationwide (last cycle): $312 million 2020 awards ranged from $0.2 million to $47.6 million	Capital: Primarily Freight rail and intercity passenger rail but could discuss project with FRA to see if the overpass project meets any of the eligibility requirements

Table 9: WYDOT Off the System Revenue Allocation Programs

WYDOT Off the System Revenue Allocation Programs	Description / Eligible Expenses	Annual Funding Estimates	Applicable Project Categories
Surface Transportation Program – Urban (STPU)	Provides funds for urban areas (population greater than 5,000) for constructing new streets or widening, improving, or reconstructing existing streets classified as Federal Aid Eligible (FAE) freeways, highways, arterials, or collectors. Funds can also be used for bridge replacement; intersection improvements; projects which reduce traffic demand, such as transit capital improvements and active transportation; and other projects as provided for in federal law.	Programmed Funding (Statewide) • FY 2021: $6.2 M *90% of funds derive from FHWA; WYDOT provides a 10% match.*	Capital: Roadway and Active Transportation
Bridge Replacement Off-System (BROS)	A program to replace eligible bridges that are unsafe due to structural deficiencies, physical deterioration, and/or functional obsolescence. The program applies to structures not on the federal-aid system.	Programmed Funding (Statewide) • FY 2021: $3.5 M *90% of funds derive from FHWA (53% - Bridge funding, 37% - STP funding); WYDOT provides a 10% match.*	Capital: Roadway
Highway Safety Rail-Highway Crossings (Section 130)	The Section 130 program funds are eligible for projects at all public crossings including roadways, bike trails and pedestrian paths. Fifty percent of a State's apportionment under 23 USC 130(e) is dedicated for the installation of protective devices at crossings. The remainder of the funds apportionment can be used for any hazard elimination project, including protective devices.	Programmed Funding (Statewide) • FY 2021: $1.4 M *90% of funds derive from FHWA; WYDOT provides a 10% match.*	
Transportation Alternatives Program (TAP)	Provides funding for projects that enhance safety and expand options for non-drivers, mitigate environmental impacts, and convert former interstate facilities to new uses. Examples include on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities (historic preservation and vegetation management, and environmental mitigation related to storm water and habitat connectivity); recreational trail projects; and safe routes to school projects.	Programmed Funding (Statewide) • FY 2021: $2.5 M *90% of funds derive from FHWA; WYDOT provides a 10% match.*	Capital: Active Transportation

Table 10: Other Potential Local Sources

Existing Taxes	Description
Property Tax	For a specific project or projects, increase city-wide property tax to fund the improvements.
Value Capture Sources	**Description**
Tax Increment Financing (TIF) District	Property tax or sales tax revenues generated beyond an established baseline are pledged specifically for infrastructure-related improvements within an area or district.
Development Mitigation / Impact Fees	A one-time charge imposed by local governments to mitigate the impact on local infrastructure caused by new development. Growth in the form of new homes and businesses requires expansion or enlargement of public facilities to maintain the same level and quality of public services for all residents of a community. Impact fees help fund expansion of public facilities necessary to accommodate new growth
Land Contribution or Other Asset Sales	Revenues generated from the disposition of excess land owned by counties, cities, or local agencies. Right-of-way contributions are also possible.
Private Sector Contribution	**Description**
Developer Contributions	Private developers along project alignments may pay for enhanced access/connection to transportation facilities. Especially applicable to adjacent retail or industrial developments that would directly benefit from the public investment in transportation infrastructure.

Potential Federal Sources

This section provides descriptions of potential federal funding sources that could support implementation of roadway, transit, active transportation, and freight improvement projects. The sources reflect both discretionary (competitive) and formula programs.

The current federal transportation authorization legislation for the existing discretionary / competitive programs (Fixing America's Surface Transportation Act, or the FAST Act) expired in September 2020. A Continuing Resolution was passed in October 2020 which maintained all existing transportation funding programs at their current levels through September 2021. Congress is currently negotiating transportation reauthorization legislation. Potential programs that are in the Senate and House versions of the reauthorization bill that could provide additional funding opportunities for the overpass project if included in the final legislation are also described.

Potential Programs in Reauthorization Bill

Congress is currently working on the multi-year surface transportation funding legislation to replace the FAST Act. The Senate and the House of Representatives have each passed their own versions of the "Infrastructure Bill" and are in the process of negotiating a compromise for the final version that will be implemented (hopefully in the coming month).

The Senate version of the reauthorization bill primarily maintains existing transportation funding programs. One new competitive grant program included in the Senate version that the overpass project would be eligible for is the Local and Regional Project Assistance Program. If this program is included in the final version of the bill it would provide $1.5 billion annually for local and regional roadway, bridge, transit, and active transportation projects. There would be separate grant categories for urban and rural areas and the smallest grant award for rural areas is $1.0 million.

The House of Representative's version had a larger number of potential new funding programs and expanded funding for several existing programs which are summarized in **Table 11**.

Table 11: Potential Programs in Reauthorization Bill

Status	Name	Description
New Program	Section 107 - Member Designated Project Authorizations	Authorizes projects designated by members of Congress for allocation from amounts made available under Section 103.
New Program	Section 1204 - Railway Crossings	Establishes a standalone railway crossing program, based on the railway-highway grade crossing set aside, raising the overall level of investment in safety projects under the bill. Requires railroads to contribute the share for projects that provide a benefit to the railroad and removes the statutory cap on these contributions. Expands eligibilities to projects to mitigate lost access from a crossing closure and strategies to prevent or reduce trespasser fatalities and injuries along railroad rights-of-way. Clarifies that replacement of functionally obsolete protective devices is eligible under the program. Allows railway crossing funds to be used toward the cost of projects selected for the FRA's CRISI discretionary grant program.
Expand Existing Program	Section 1205 - Surface Transportation Program	Adds eligibilities for resilience improvements, natural infrastructure, reducing carbon pollution, bus frequency and ridership enhancement projects, and wildlife crossings. Allows for up to 15 percent of STP funds suballocated to rural areas and small cities to be expended on local roads and rural minor collectors.
Expand Existing Program	Section 1206 - Transportation Alternatives Program	Provides funding for the Transportation Alternatives Program (TAP) as a 10 percent set-aside out of STP. Increases the share of the program's funds that must be suballocated to areas of the state based on population from 50 percent to 66 percent. A state may suballocate up to 100 percent of its TAP funding if certain conditions are met and upon approval of the Secretary. Boosts the recreational trails set-aside in proportion to the increase for TAP. Requires states to provide sufficient obligation authority over the life of the bill to ensure this suballocation can be obligated in a timely manner, consistent with the requirement under STP.
New Program	Section 1302 - Community Transportation Investment Program	Establishes a $600 million per year grant program to support local investments in projects to improve safety, state of good repair, accessibility, and environmental quality through infrastructure investments. Sets aside a minimum of 25 percent of program funds for projects in rural communities and a minimum of 25 percent of program funds for projects in communities between 50,000 and 200,000 in population.
New Program	Section 1309 - Active Transportation Connectivity Grant Program	Provides $1.0 billion over the life of the bill for a grant program to support infrastructure investment in connected active transportation networks. Requires 30 percent of the funds to develop active transportation networks to connect points within a community, and 30 percent of the funds to be used for active transportation spines to connect communities to one another, including nationally and regionally significant greenway trails. Supports the development of complete streets and the use of safe systems approaches to enhance safety for vulnerable road users. Includes considerations for the environmental justice and equity impacts of a project and the extent to which the project improves connectivity to public transportation.

Existing Federal Discretionary / Competitive Grants

As the preferred alternative for the overpass replacement is defined and starts to move through the planning, environmental and design process, there may be opportunities to leverage federal funds for entire projects or specific cost elements of projects through competitive grant opportunities offered by the USDOT, FHWA, and FRA. A brief overview of competitive grant programs used to support the planning, engineering, and/or construction of roadway, active transportation, and freight investments is provided below.

Finally, as indicated in the descriptions, there are a limited number of competitive federal grant programs and due to the volume of applications received from across the country, grant awards are typically less than $15 million for individual projects.

USDOT RAISE Grant Program (Formerly known as the BUILD & TIGER Grant Program)

Description

The RAISE discretionary grant program, provides a unique opportunity for the USDOT to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) discretionary grants, Congress has dedicated over $9.0 billion for twelve rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact. The eligibility requirements of RAISE allow project sponsors at the state and local levels to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional USDOT programs.

As shown in **Table 12**, the RAISE/BUILD/TIGER program is extremely competitive with 9,700 applications submitted to USDOT requesting $175 billion in RAISE/BUILD/TIGER funds over the program's twelve rounds. USDOT has awarded a total of $9.6 billion to 624 projects, which is approximately six percent of all applicants. **Table 12** illustrates overall supply and demand for the program since it was first authorized under the American Recovery and Reinvestment Act of 2009 (ARRA). While there have been annual appropriations for RASIE/BUILD/TIGER every FY since 2009, including the most recent BUILD Notice of Funding Opportunity (NOFO) released in April 2021, the program is not specifically authorized in federal legislation and must be approved each year as part of the annual federal budget process.

Relevance to Gurley Overpass

Roadway, Active Transportation, and Freight

Revenue Potential

Despite the program's $25 million statutory maximum grant amount, the typical grant awarded to projects is between $10 and $15 million. USDOT rarely awards close to the maximum allowed award of $25 million to any one project.

Most recent application cycle

July 12, 2021

Table 12. RAISE/BUILD/TIGER Program Size, Applicants, and Projects Funded (FY 2009-2020)

Fiscal Year (FY)	Program Size	Applicants	Projects Funded	Percent of Projects Funded
2009	$1.5 billion	1,366	51	3.7%
2010	$600 million	1,639	75	4.6%
2011	$510 million	833	46	5.5%
2012	$500 million	708	47	6.6%
2013	$474 million	583	52	8.9%
2014	$600 million	798	72	9.0%
2015	$500 million	627	39	6.2%
2016	$500 million	585	41	7.0%
2017	$500 million	452	40	8.8%
2018	$1.5 billion	851	41	4.8%
2019	$900 million	666	55	8.3%
2020	$1.0 billion	656	70	10.7%

Source: USDOT

Additional Federal discretionary and competitive grant opportunities available are summarized in **Table 13**.

Table 13: Federal Discretionary and Competitive Grant Opportunities

Funding Source	Description	Project Types Funded	Statewide Revenue Potential
USDOT INFRA Grant Program (Formerly known as the FASTLANE Grant Program)	Provides dedicated, discretionary funding for projects that address critical issues facing our nation's highway and bridges. Most specifically, the INFRA program provides Federal financial assistance to highway and freight projects of national or regional significance. Eligible costs include reconstruction, rehabilitation, acquisition of property, environmental mitigation, construction contingencies, equipment acquisition, and operational improvements directly related to system performance.	Roadway, Freight	In FY 2020, USDOT awarded over $900 million in INFRA awards to 20 projects, or an average award of $45 million. Each year, 90 percent of available INFRA funds are awarded to large projects, or those with a minimum grant size of $25 million. The remaining 10 percent of available funds are reserved for small projects, which have a minimum grant size of $5 million.
Competitive Highway Bridge Program	The Competitive Highway Bridge Program provides $225 million for highway bridge replacement and rehabilitation projects on public roads. Applicants must demonstrate cost savings through bundling multiple bridge projects. Funding is only eligible to states with a population density of less than 100 people per square mile; Wyoming falls well below this threshold. Only state DOTs are eligible to apply. Selection criteria include innovation, support for economic vitality, lifecycle cost and state of good repair, and project readiness.	Roadway	For FY 2019, $225 million was available nationwide
Consolidated Rail Infrastructure & Safety Improvements	Provides a comprehensive solution to leverage private, state, and local investments to support safety enhancements and general improvements to infrastructure for both intercity passenger and freight railroads. The CRISI program invests in a wide range of projects to improve railroad safety, efficiency, and reliability; mitigate congestion at both intercity passenger and freight rail chokepoints; enhance multi-modal connections; and lead to new or substantially improved intercity passenger rail transportation corridors. Additionally, the program includes rail safety projects, such as grade crossing enhancements (as in the Gurley Overpass project). Evaluation criteria include key FRA objectives such as supporting economic vitality; leveraging federal funds to attract other sources of funding; preparing for project life-cycle costs; using innovative approaches to improve safety and expedite project delivery; and holding recipients accountable for achieving specific, measurable outcomes.	Freight and Roadway at-grade crossings	The CRISI program does not have any minimum or maximum thresholds for awards. The FY 2020 application cycle resulted in 29 awards totaling nearly $320 million, or an average award of $11.0 million.

Existing State Off the System Funding Allocation Programs

The following section provides an overview of programs administered by WYDOT that might apply to the Gurley Overpass project. Because the overpass will carry a local road, regardless of the alternative, this section includes a subset of WYDOT's Off the State System programs.

Off the System Funding

While the vast majority of WYDOT funding is allocated to roadway facilities on the state's highway system, there are several programs dedicated to off the system projects (including the Gurley Overpass). In FY 2021, the state's off the system program includes $20.3 million in total funds – $20,269,520 from federal sources and $120,000 in state funds.

The programs described in this section include funding suballocated by WYDOT from FHWA formula grant programs, which could be pursued separately or in combination with the previously described competitive grant programs. While there is no limitation on the number of programs which contain federal funding that can be included in a project's financial strategy, the maximum federal funding participation that can be used on a project is 80 percent of the total capital costs.

If there is interest to pursue funding from any of these programs, the City will need to coordinate with WYDOT. Use of these funds is typically identified several years in advance and is documented in the state's transportation planning and programming documents, including the statewide transportation plan (STIP). More specifically, the current Wyoming STIP programs federal funds for the 2021 to 2026 period. If the State programs are to be targeted for the overpass replacement, the funds would have to be programmed after the current STIP period (2026), or there would need to be coordination with WYDOT to reprogram and transfer funds from projects in the current STIP.

Finally, in addition to the federal aid, WYDOT receives revenue from a variety of sources, including fuel taxes, vehicle registrations, and several other taxes and fees. In addition to the potential opportunities described below, WYDOT distributes funds through a variety of other programs, including several that allocate funding to directly to cities, towns, and counties. The direct funding allocated to the City or County could be another potential opportunity for the overpass replacement. The total statewide amount of WYDOT funding available to local agencies varies from year to year but is typically in the vicinity of $70 million ($68.5 million in FY 2021). **Table 14** summarizes these off the system funding allocation programs.

Potential Local and Private Sources

Potential local and private funding sources are summarized in **Table 15**.

Table 14: Summary of Potential Off-System Sources

Funding Source	Description	Project Types Funded	Statewide Revenue Potential
Surface Transportation Program - Urban (STPU)	The STP is a federally mandated program that provides flexible funding to states and localities for projects to preserve and improve the conditions and performance on: • Any Federal-aid highway, bridge, and tunnel projects on any public road • Pedestrian and bicycle infrastructure • Transit capital projects, including intercity bus terminals.	Roadway, Freight, Active Transportation	$6.2 million (FY 2021)
Bridge Replacement Off-System (BROS)	The BROS program is a federally funded bridge replacement program to reduce the number of deficient off-system bridges. It applies to bridges owned by cities, towns and counties, located on a non-federal aid roadway and open to the public. In Wyoming, the matching fund ratio for BROS projects is currently 90.49 percent federal-aid funds and 9.51 percent local funds. WYDOT is responsible for administration and management of all BROS projects.	Bridge Replacement	$3.5 million (FY 2021)
Highway Safety Rail - Highway Crossings (Section 130)	The Railway-Highway Crossings (Section 130) program was established in 1987 to fund the elimination of hazards at railway-highway crossings. Projects are prioritized and selected by the state DOT using a data-driven process, and these priorities must be included in the Statewide Rail Plan. Specific formulas and processes used to determine Section 130 priorities vary from state to state, but they are generally focused on addressing safety issues (and not full benefit-cost analysis).	Railway Crossing (Vehicular and pedestrian / bicycle)	$1.4 million (FY 2021)

Table 15 Continued

Funding Source	Description	Project Types Funded	Statewide Revenue Potential
Transportation Alternatives Program (TAP)	The TAP is a program established under Section 1122 of MAP-21 and continued as a set-aside under Section 1109 of the FAST Act. The TAP provides funding for bicycle, pedestrian, historic, scenic, and environmental mitigation transportation projects. Eligible activities include but are not limited to: • Construction, planning, and design of facilities for pedestrians and bicyclists • Construction of turnouts, overlooks and viewing areas, and preservation of historic transportation facilities • Some environmental mitigation activities, including vegetation management, and archeological and storm water mitigation related to highway projects • The recreational trails program	Railway Crossing (Vehicular and pedestrian / bicycle)	$2.5 million (FY 2021)

Table 15: Potential Local and Private Funding Sources

Funding Source	Description	Project Types Funded
Temporary Mill Levy Increase for Specific Projects	Temporarily increase the local mill levy for a specific transportation improvement. This approach has been used successfully in other states to implement transportation projects.	Roadway, Active Transportation
Tax Increment Financing (TIF)	Tax Increment Financing (TIF) is a mechanism for capturing the future tax benefits of real estate improvements, in order to pay for the present cost of those improvements. TIF is generally used to channel funding toward improvements in distressed or underdeveloped areas where development would not otherwise occur. In other states, TIF has been a popular development finance tool generally used to address blight, promote neighborhood stability and inspire district-oriented development. Wyoming statue allows the use of TIF but based on preliminary research for this memo, it has not been a widely used revenue generator throughout the state. Within Wyoming, TIF revenue can be either incremental property taxes or sales taxes generated by new development to finance costs related to the development such as public infrastructure, land acquisition, demolition, and planning. The life of a district can be anywhere from 10 to 25 years, or enough time to pay back the costs or bonds issued to fund the improvements. The tax increment from a TIF district is created without raising taxes, and also without dipping into the base tax revenues present at the time of adoption. The increment thus becomes a repayment stream for debt used to finance some aspects of what is driving the increase. Finally, within Wyoming only Downtown Development Districts (upon approval of the municipality) can create the TIF district.	Roadway, Active Transportation
Development Mitigation / Impact Fees	An impact fee is a one-time charge imposed by local governments to mitigate the impact on local infrastructure caused by new development. Growth in the form of new homes and businesses requires expansion or enlargement of public facilities to maintain the same level and quality of public services for all residents of a community. Impact fees help fund expansion of public facilities necessary to accommodate new growth.	
Land Contribution or Other Asset Sales	Revenues generated from the disposition of excess land owned by cities or local agencies, including right-of-way contributions. Disposition agreements by affected agencies should dedicate proceeds from sales toward specific projects.	Roadway, Active Transportation
Developer Contributions	Developers along or adjacent to a proposed infrastructure alignment that offer to provide right-of-way to the project to support implementation.	Roadway

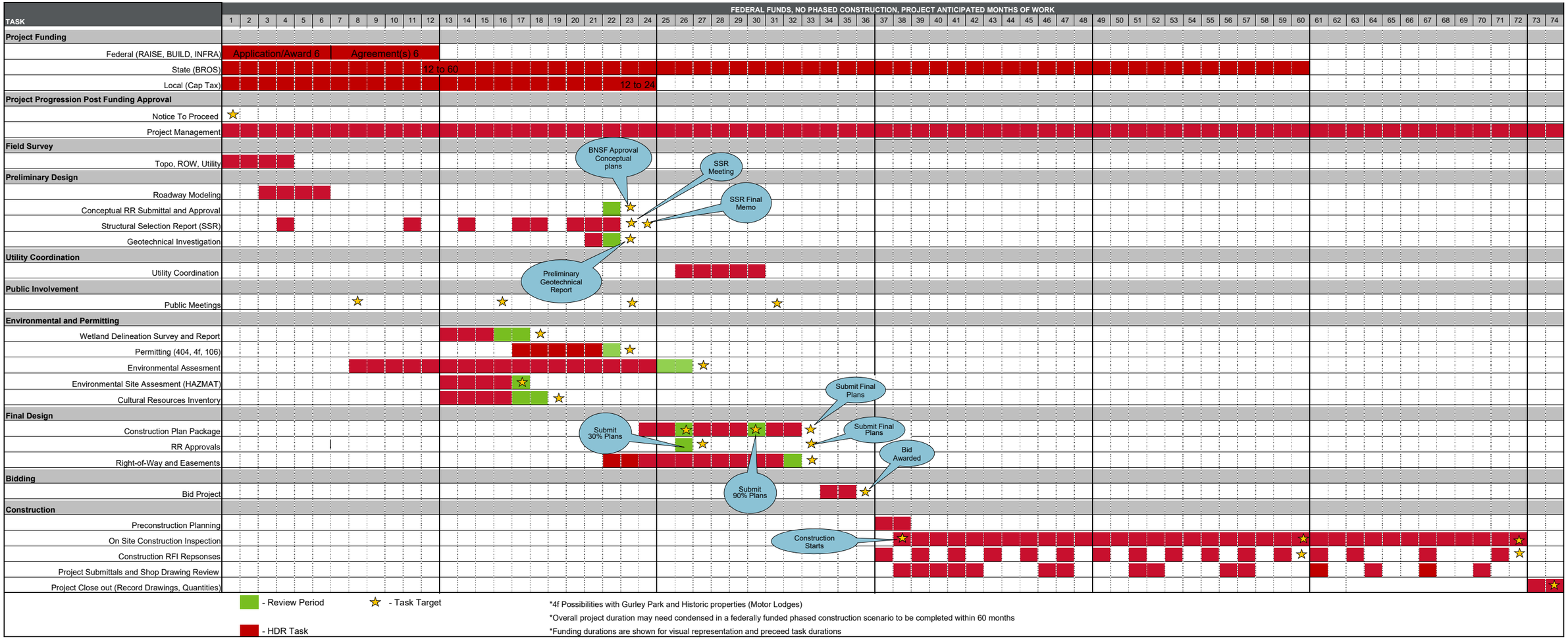
Federal Funding Roadmap

Transportation projects that use Federal funds are subject to a series of regulations that dictate how the funds can be used as well as the processes that shall be followed during project design and implementation. Due to uncertainty associated with various potential federal sources, a general project timeline was developed as guide for the City of Gillette to aid in navigating the project design and implementation phases. The timeline includes information on:

- Federal funding source-specific requirements
- National Environmental Policy Act requirements
- Project Implementation (Design & Construction)

Attention to the anticipated durations of this timeline is critical for project delivery as failing to meet Federal deadlines may require certain implementation steps to be done over, resulting in substantial financial and schedule costs for the City and other project stakeholders.

Figure 25: Federal Funding for a Phased Construction Project

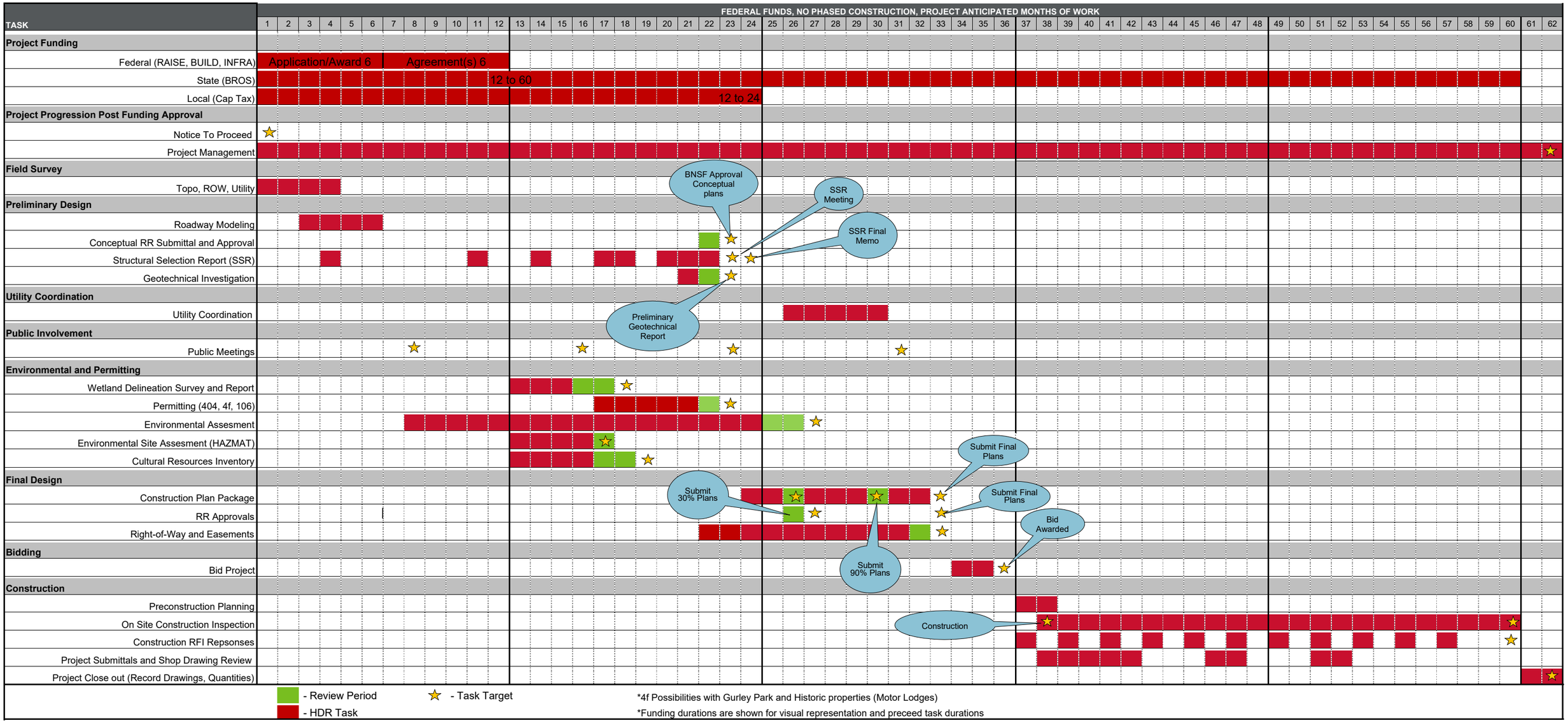


*4f Possibilities with Gurley Park and Historic properties (Motor Lodges)

*Overall project duration may need condensed in a federally funded phased construction scenario to be completed within 60 months

*Funding durations are shown for visual representation and preceed task durations

Figure 26: Federal Funds for a No Phased Construction Project



Non-Federal Funding Roadmap

An absence of Federal funds will likely streamline the implementation of an overpass due to a reduction in certain oversight and permitting processes that are required with the use of Federal funding. A high-level time table was also developed for a non-Federal funding scenario and is shown below:

Figure 27: Non-Federal Funding for a Phased Construction Process

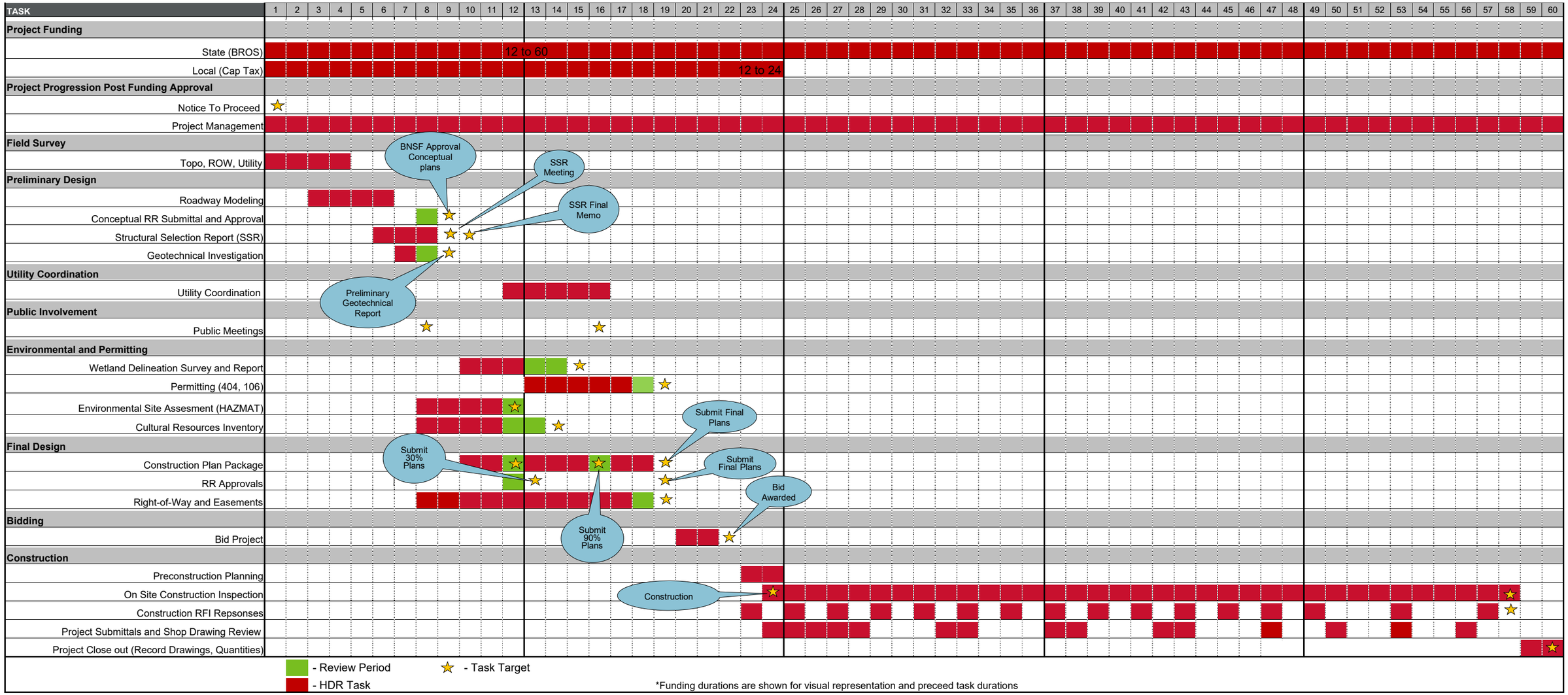
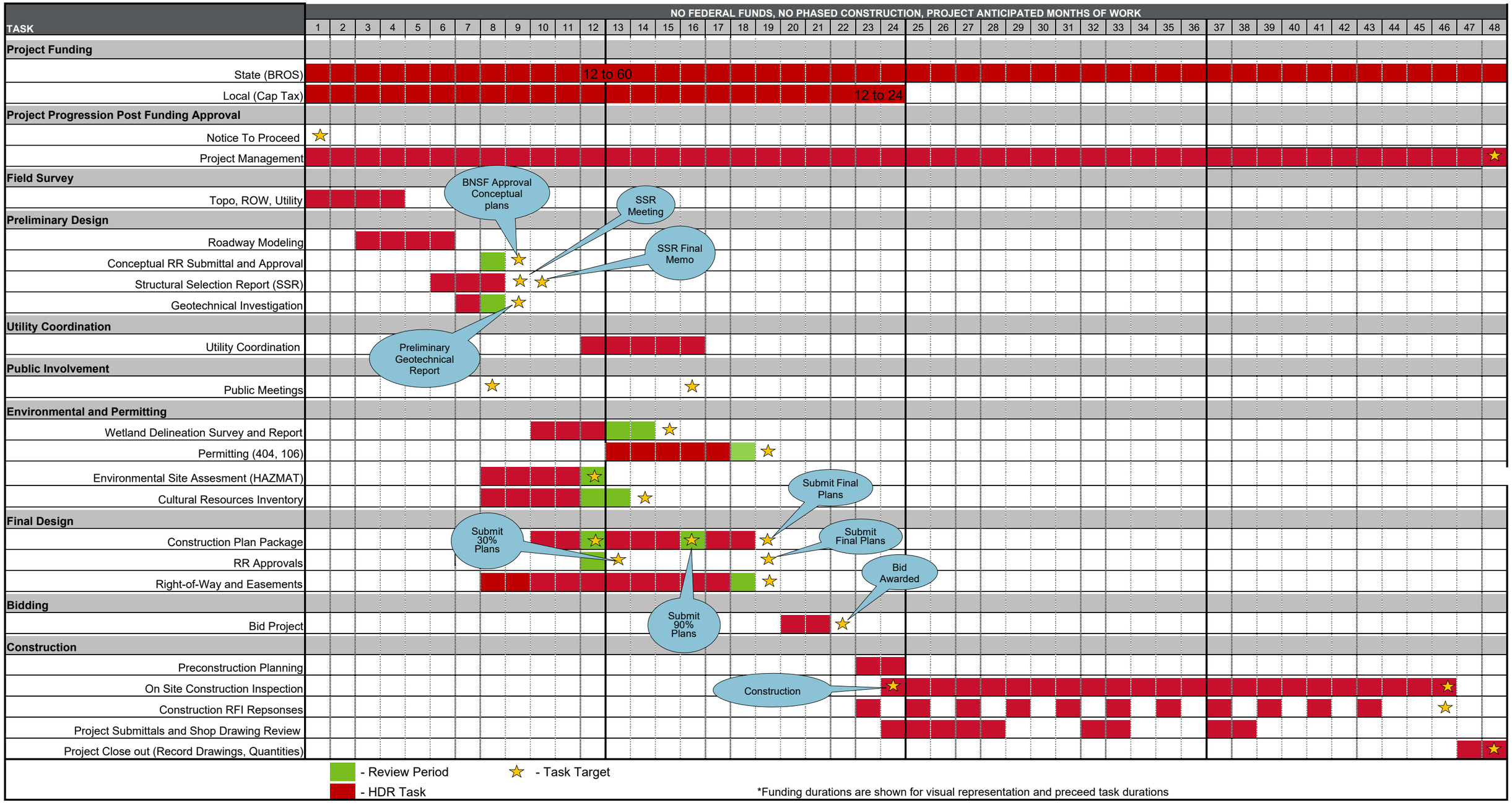


Figure 28: Non-Federal Funding for a No Phase Construction Process



Appendix A
Phase 1 Concept Evaluation

Appendix B
Traffic Operations Analysis

Appendix C
Environmental Resources

Appendix D
Potential Funding Opportunities

Appendix E
Right of Way Evaluation