



US97 BEND NORTH CORRIDOR TRANSPORTATION TECHNICAL MEMO

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FINAL



PRODUCTION TEAM

CLIENT

Oregon Department of Transportation

Region 4

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1 INTRODUCTION

The US97 Bend North Corridor Project will develop and implement improvements along US97 between Bowery Lane and Empire Avenue and on US20 between Cooley Road and Empire Avenue. The Project will consist of intersection improvements, new or modified structures including under/overpasses, realignments of roadway, improvements to pedestrian and bicycle facilities, freight and transit accommodations and other corridor improvements. The Project is identified in the City of Bend's Transportation System Plan (TSP) and the US97 Bend North Corridor Final Environmental Impact Statement (FEIS).

The purpose of this memorandum is to document the safety analysis, operations analysis and multimodal analysis results for existing conditions and future conditions. This memo will be reviewed and finalized for concurrence by the Oregon Department of Transportation (ODOT) Region 4.

1.1 PROJECT DESCRIPTION

The proposed alternative would reroute US97 east of its current alignment, adjacent to the existing railroad tracks. Where US 97 is realigned, the current US 97 roadway would be used as a portion of the extension of 3rd Street. In addition, a new US97 southbound on-ramp from Robal Road and a US97 northbound on-ramp from Cooley Road would be built. Other design elements of the preferred alternative would include enhanced pedestrian and bicycle improvements within the study area. This alternative is consistent with the FEIS for impacts and locations of the impacts along the proposed US97 bypass. Figure 1 below shows the proposed design.

The development of the proposed design alternative involved a thorough screening process that serves similar functions or better functions compared to an IAMP. The design currently meets all standards including but not limited to meeting the US97 design speed, ramp terminal to intersection spacing, ramp taper to at-grade intersection spacing and at-grade intersection spacing between new interchanges on US97.

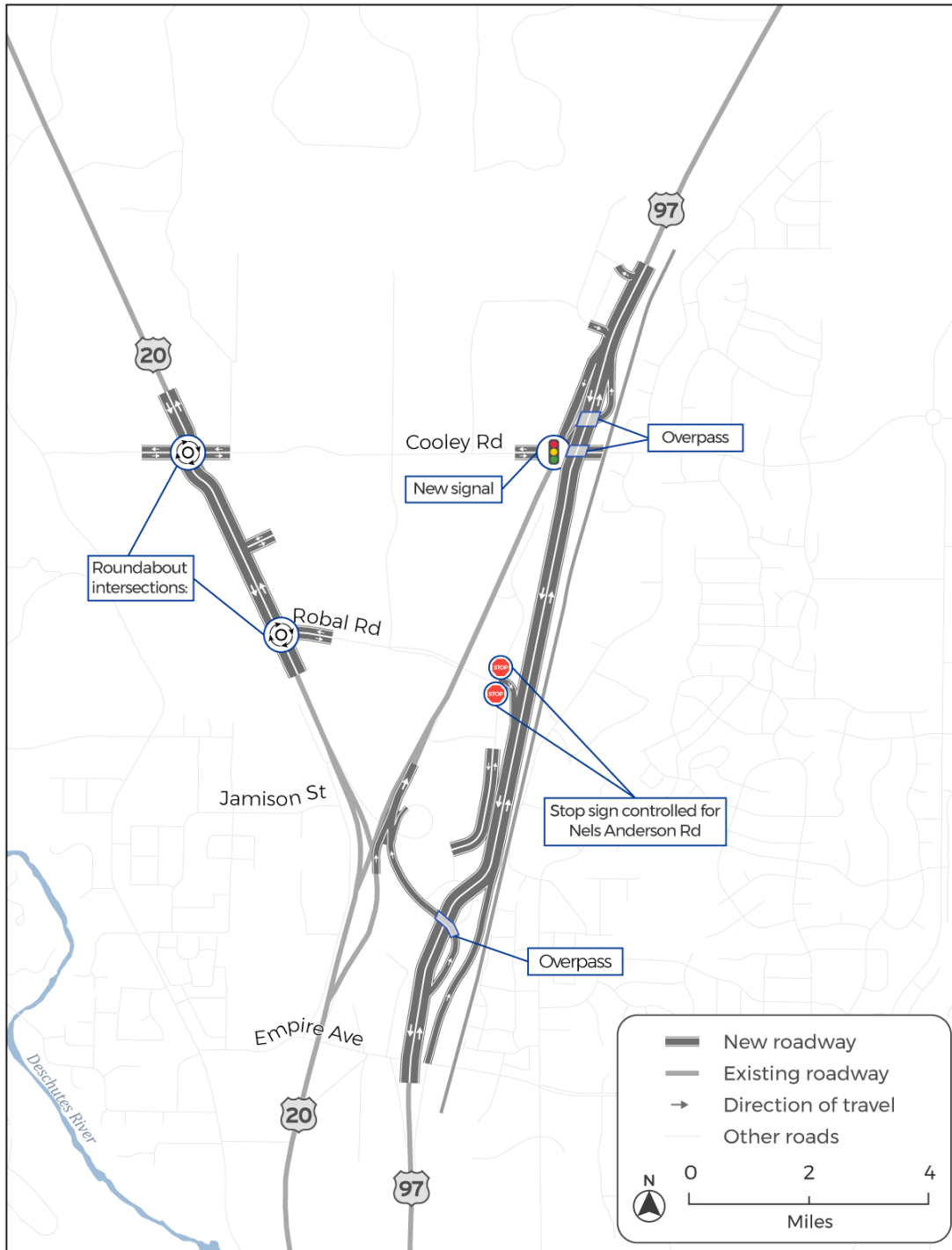
The proposed design allows to potentially have fundable phases that provide incremental operations and safety benefits at US97/Cooley Road and US97/Robal road intersections within the medium-term planning period and would also benefit operations along US97. For example, enhancement of signal operations by installing infrastructure that will better support detection and functionality could be performed prior to the construction of the new US97 bypass route. Additionally, the new infrastructure will support connected and autonomous vehicles which would also improve safety along the corridor. The proposed design would serve as an access-controlled expressway by removing all access of commercial area that currently exist on US97 by providing a bypass. Because the bypass follows along the railroad, it does not provide any additional limitations of access through its construction.

The proposed design provides more support to the surrounding commercial and future commercial developable lots by pulling through traffic out of the major access points, but still providing good connections to these areas. The proposed design performs better than the original FEIS in supporting economic vitality in the surrounding areas by reducing congestion and improving access throughout the area and by enhancing pedestrian and bicycle infrastructure from surrounding neighborhoods to the commercial areas. There would be minimal impacts to a few dead-end local streets. However, these impacts would be mitigated by providing enhanced alternative modes of travel.



Hence, the proposed alternative is recommended for the design-build process. The current estimated project costs are expected to be less than 150million.

Figure 1: Proposed Design

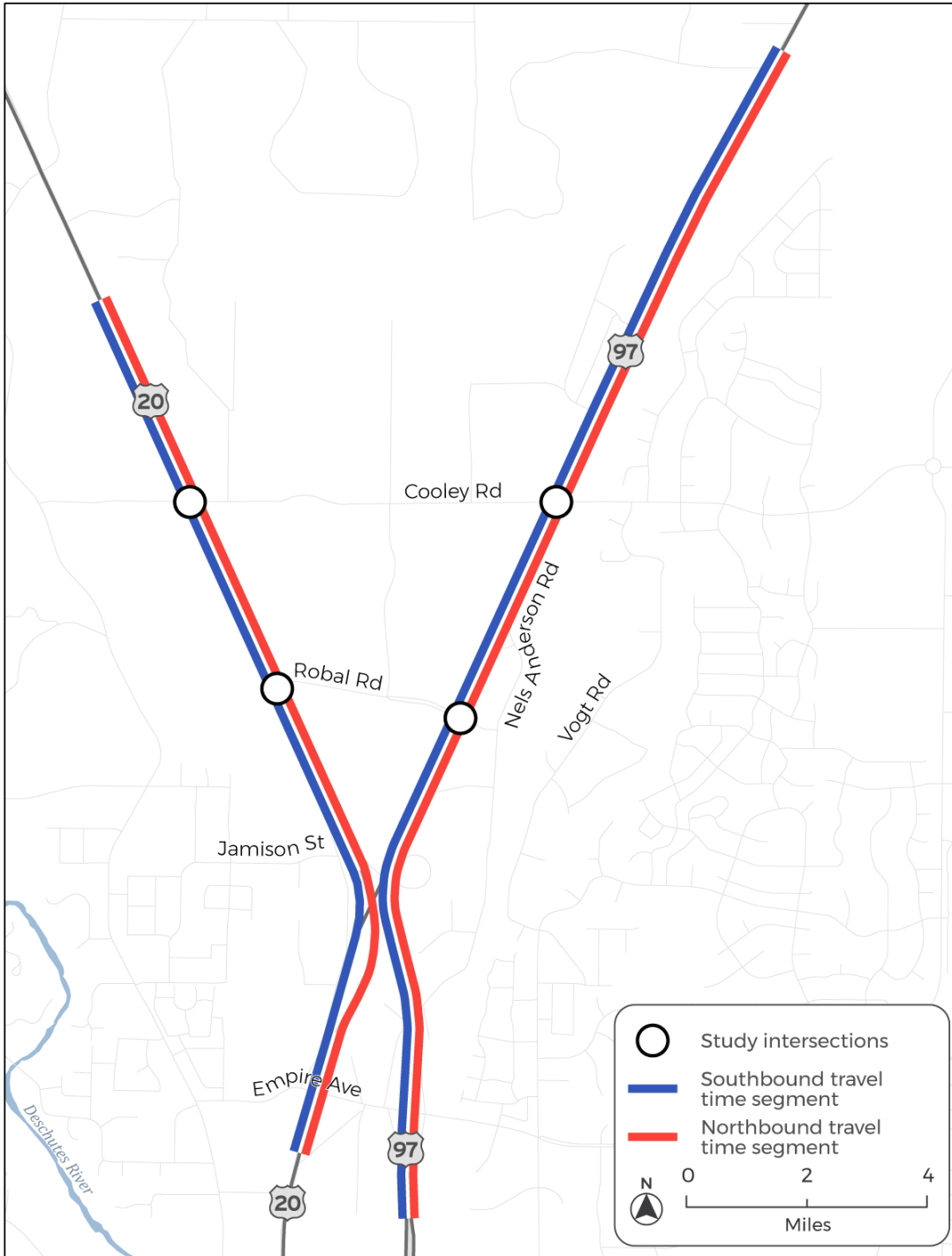


1.2 STUDY AREA

The study area along US97 reflects the targeted segment from Bowery Lane to Empire Avenue and along US 20 from Cooley Road to Empire Avenue. The study area is located within the City of Bend boundaries and Deschutes County.

For the purposes of the transportation report, traffic analysis results for four study intersections and four travel time segments as shown in Figure 2 will be reported.

Figure 2: Study Intersections and Study Segments

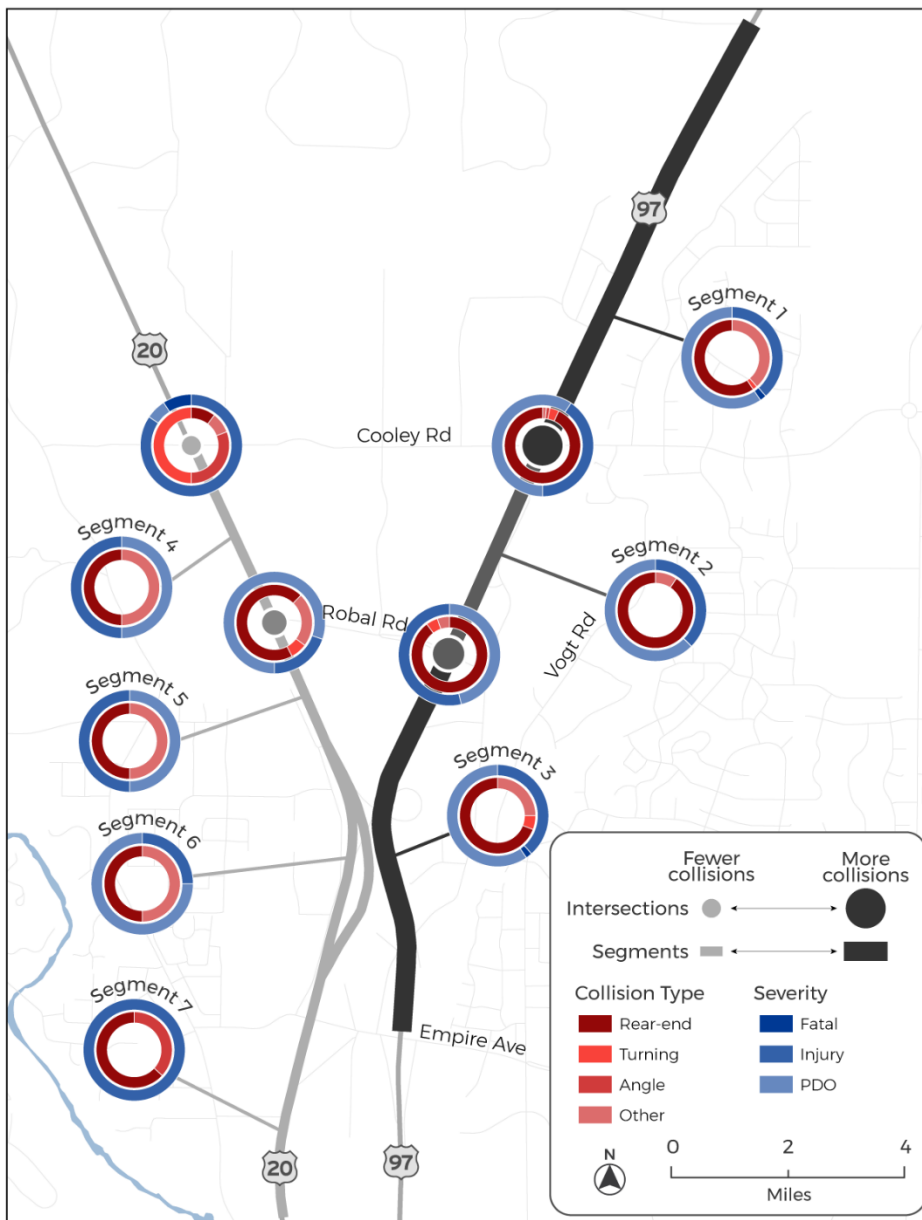


2 SAFETY

2.1 EXISTING CRASH DATA

A summary of crashes occurring between January 1, 2012 and December 31, 2017 within the study area was performed. Figure 3 shows the six-year crash history at the study intersections and study segments.

Figure 3: Study Intersections and Study Segments Existing Crash Data Map

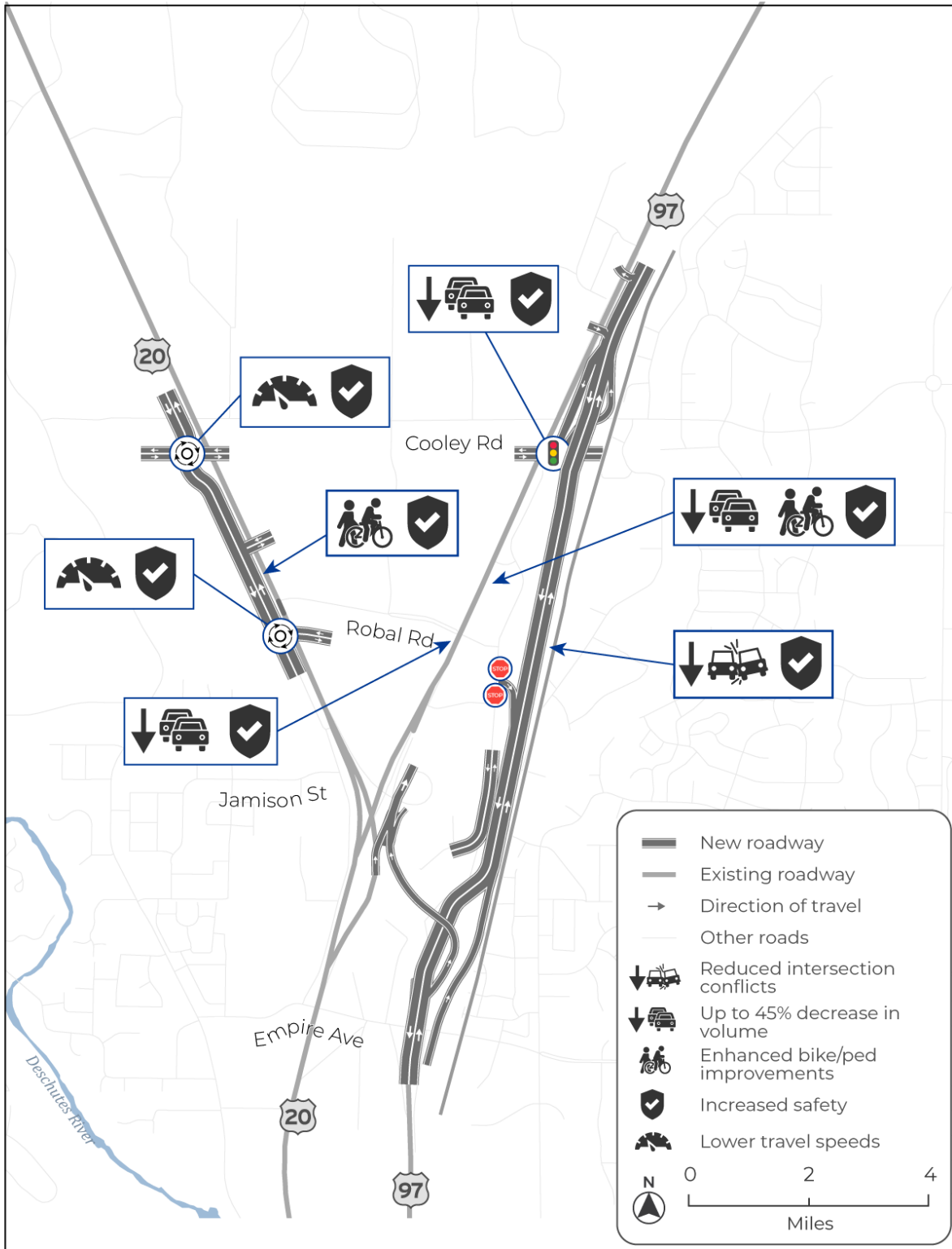


2.2 FUTURE SAFETY IMPROVEMENTS

The proposed design would enable vehicles along the realigned US97 to travel uninterrupted. With the absence of signals, typical intersection conflicts for those vehicles will be significantly reduced along the US97 bypass route. In addition, the proposed design allows to potentially have fundable phases that provide incremental operations and safety benefits at US97/Cooley Road and US97/Robal Road intersections within the medium-term planning period. For example, enhancement of signal operations by installing infrastructure that will better support detection and functionality could be performed prior to the construction of the new US97 bypass route. Additionally, the new infrastructure will support connected and autonomous vehicles which would also allow for improvement in safety along the corridor.

With majority of through US97 vehicles using the bypass, the overall traffic volume along 3rd street would be reduced significantly thereby increasing safety at the existing intersections. Enhanced pedestrian and bicycle improvements along existing US97 would help improve safety for the most vulnerable users along 3rd Street and would remove their conflicts with the highway traffic. The proposed design also provides access control on US97 by providing access only through dedicated on/off ramps. There would be no direct driveway or local street access. Figure 4 below highlights the safety improvements on US97, US20 and on 3rd Street under the proposed alternative.

Figure 4: Proposed Alternative Safety Improvements Map



3 TRAFFIC ANALYSIS

Synchro 10 software and Vissim 11.00-11 was used to perform the 2019 existing year and 2040 Future Year No Build and Build operational analysis. Intersection delays at study intersections and travel times on US97 and US20 study segments were reported from summarizing Vissim travel time results for ten simulation runs.

3.1 EXISTING CONDITIONS (2019)

Based on the existing conditions operations analysis, intersection delays at all study area intersections is less than a minute per vehicle under the existing conditions during PM peak hour. Figure 5 and Figure 6 shows the turning movement volumes and operational analysis results for existing conditions PM Peak hour respectively.

3.2 FUTURE NO BUILD CONDITIONS (2040)

Future No Build conditions operations analysis indicates that all study intersections would operate with delays greater than 90 seconds/vehicle except US97 and Robal Road intersection which would operate with delays greater than a minute per vehicle. Vehicles traveling along US97 and US20 would also experience significant congestion and increased travel times in both directions. Figure 7 and Figure 8 shows the turning movement volumes and operational analysis results for Future No Build conditions PM Peak hour respectively.

3.3 FUTURE BUILD CONDITIONS (2040)

Future Build conditions operations analysis indicates that both US97 and US20 corridors would experience significant travel time benefits under Future Build conditions. With significant number of US97 through vehicles using the new bypass, the overall traffic volume along 3rd street would be reduced significantly thereby improving operations and reducing congestion along 3rd Street. As a result, 3rd Street and Cooley Road intersection would operate with significantly lower intersection delay compared to the No Build conditions. With future improvements to lane geometry and signal modifications, the 3rd street and Robal Road intersection would also operate with significantly lower intersection delay compared to the No Build conditions.

Roundabouts would be constructed at US20 and Cooley Road and US20 and Robal Road intersections in future. Under the Future Build conditions, both intersections would operate with significantly lower delays compared to the No Build conditions. Figure 9 and Figure 10 shows the turning movement volumes and shows the operational analysis results for Future Build conditions PM Peak hour respectively.

Figure 5: Existing Conditions (2019) Turning Movement Volumes – PM Peak Hour

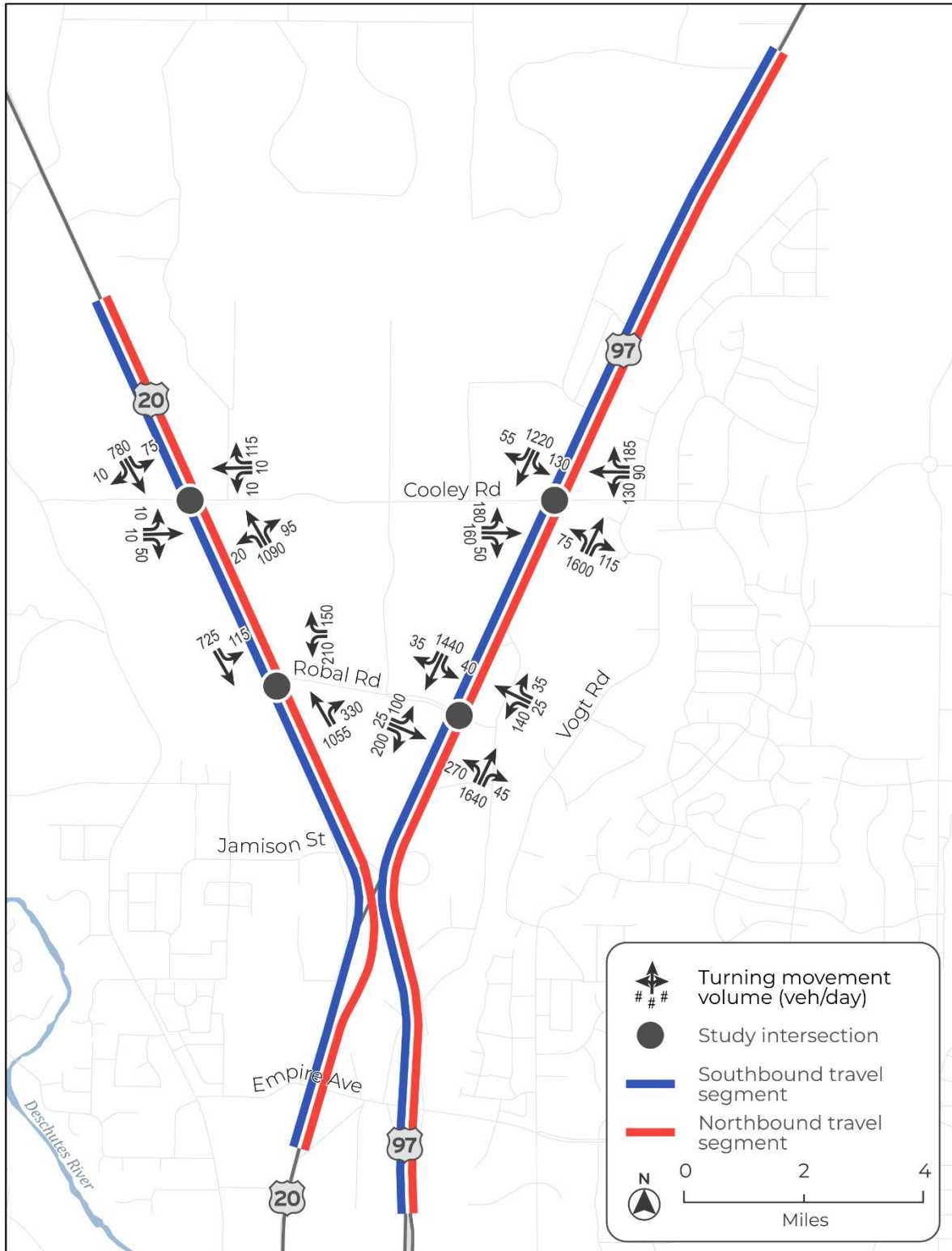


Figure 6: Existing Conditions (2019) Operational Analysis Results – PM Peak Hour

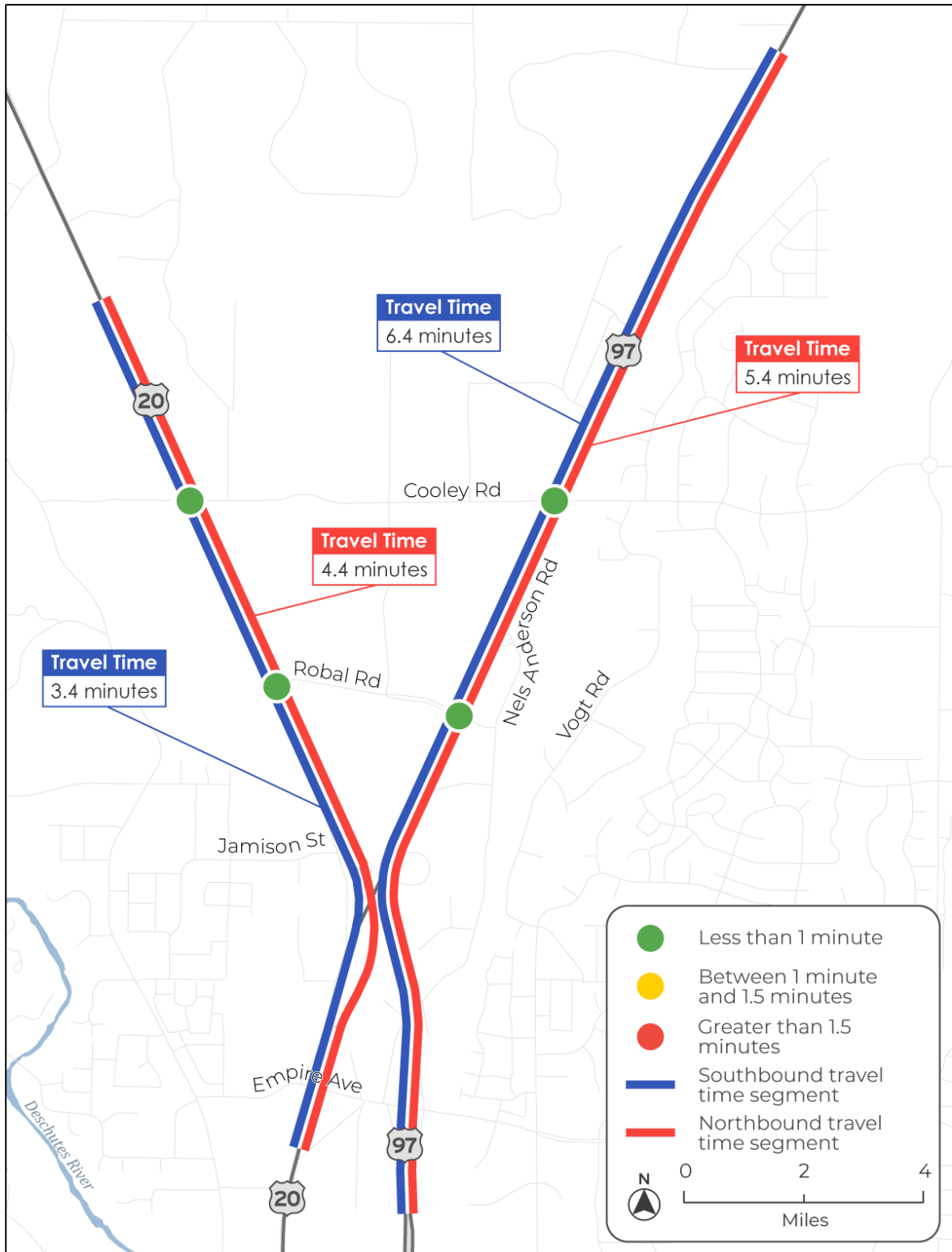


Figure 7: Future No Build Conditions (2040) Turning Movement Volumes – PM Peak Hour

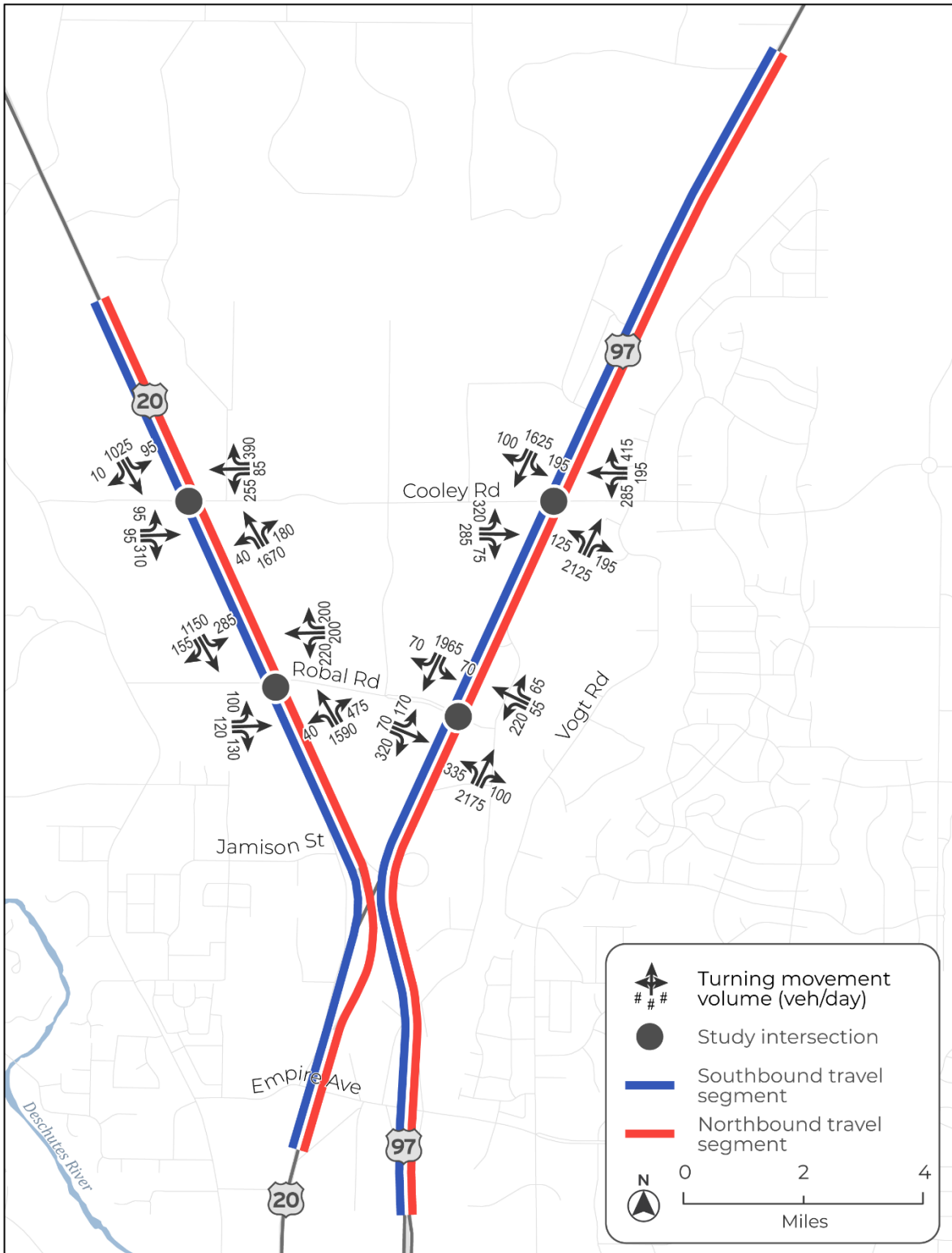


Figure 8: Future No Build Conditions (2040) Operational Analysis Results – PM Peak Hour

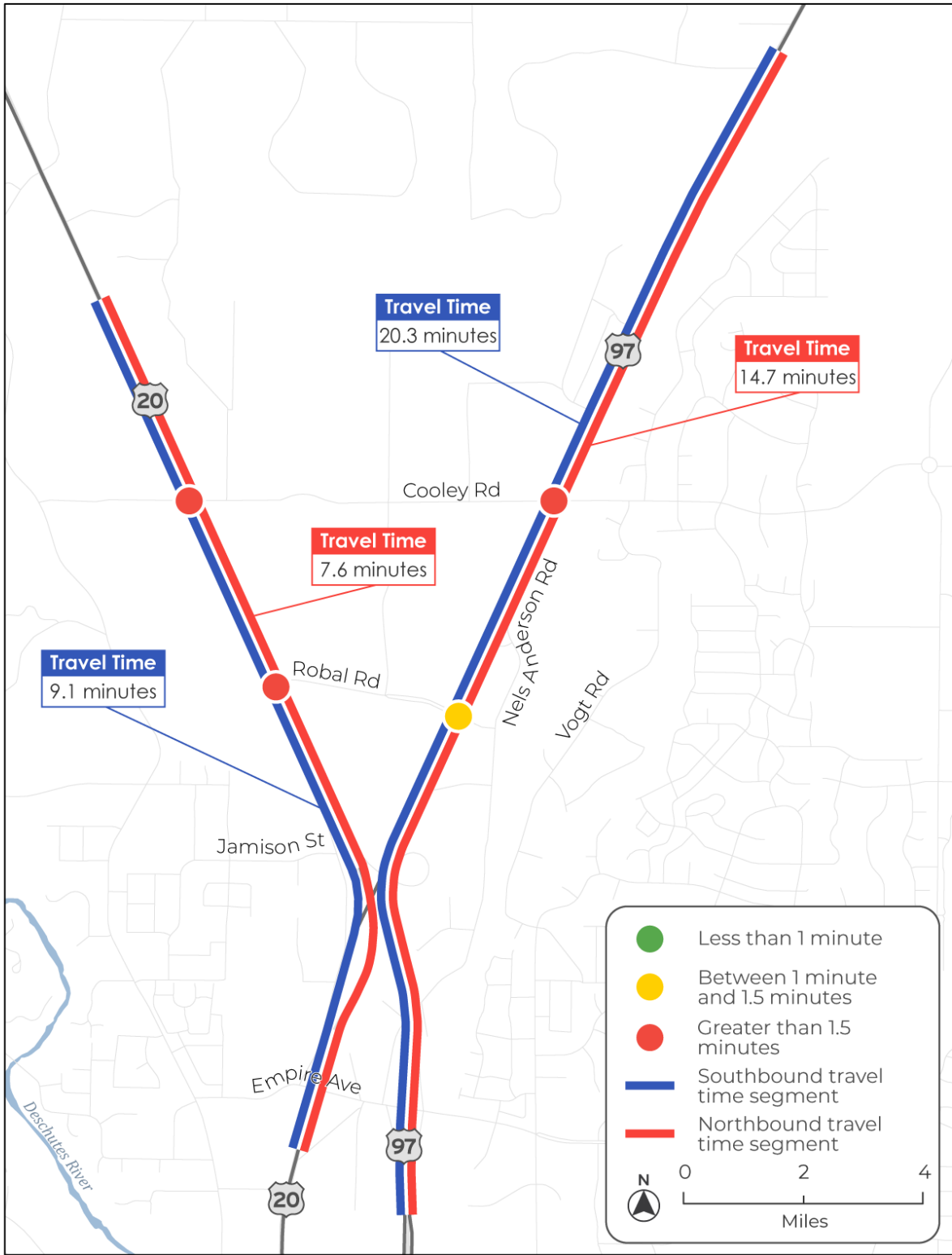


Figure 9: Future Build Conditions (2040) Turning Movement Volumes – PM Peak Hour

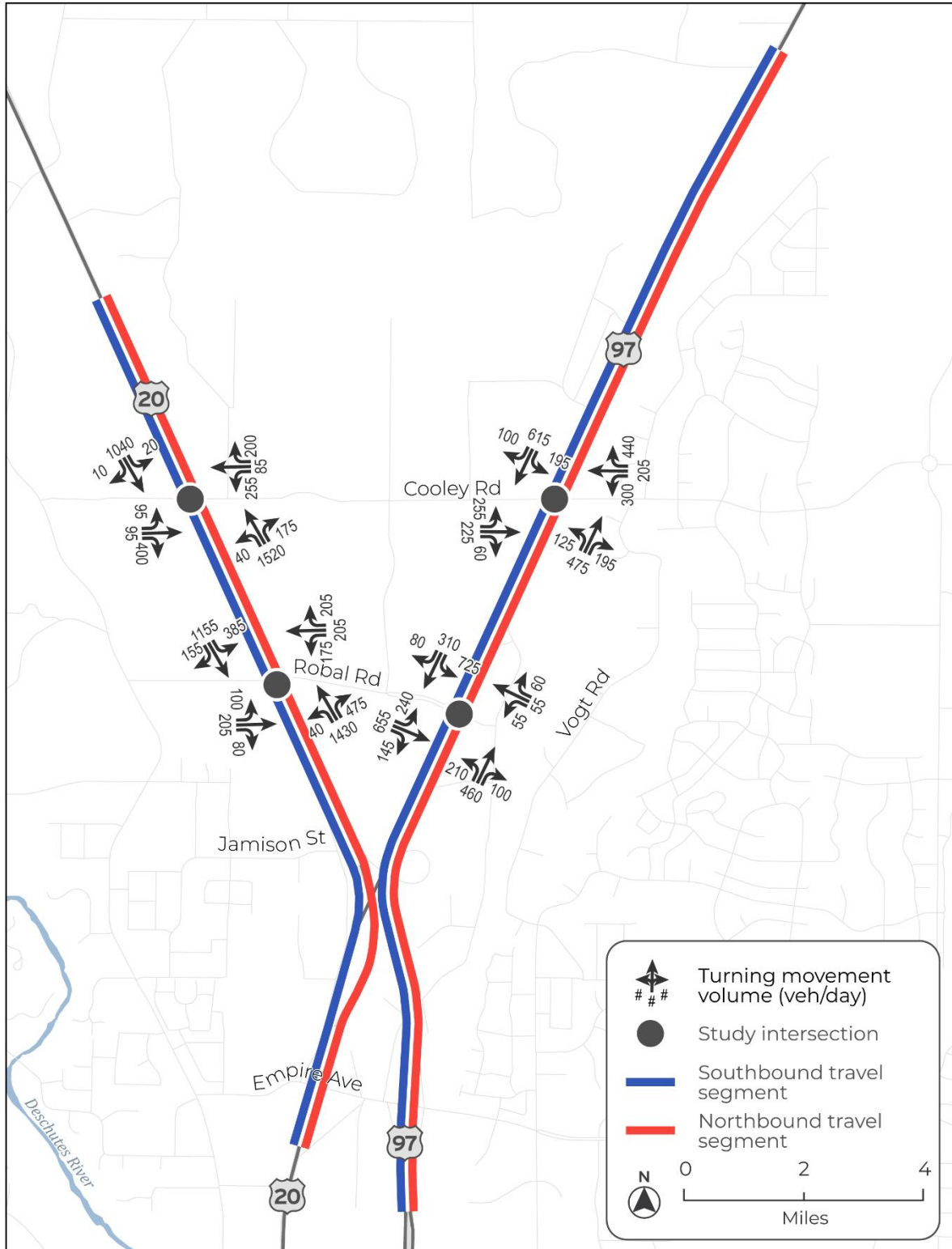
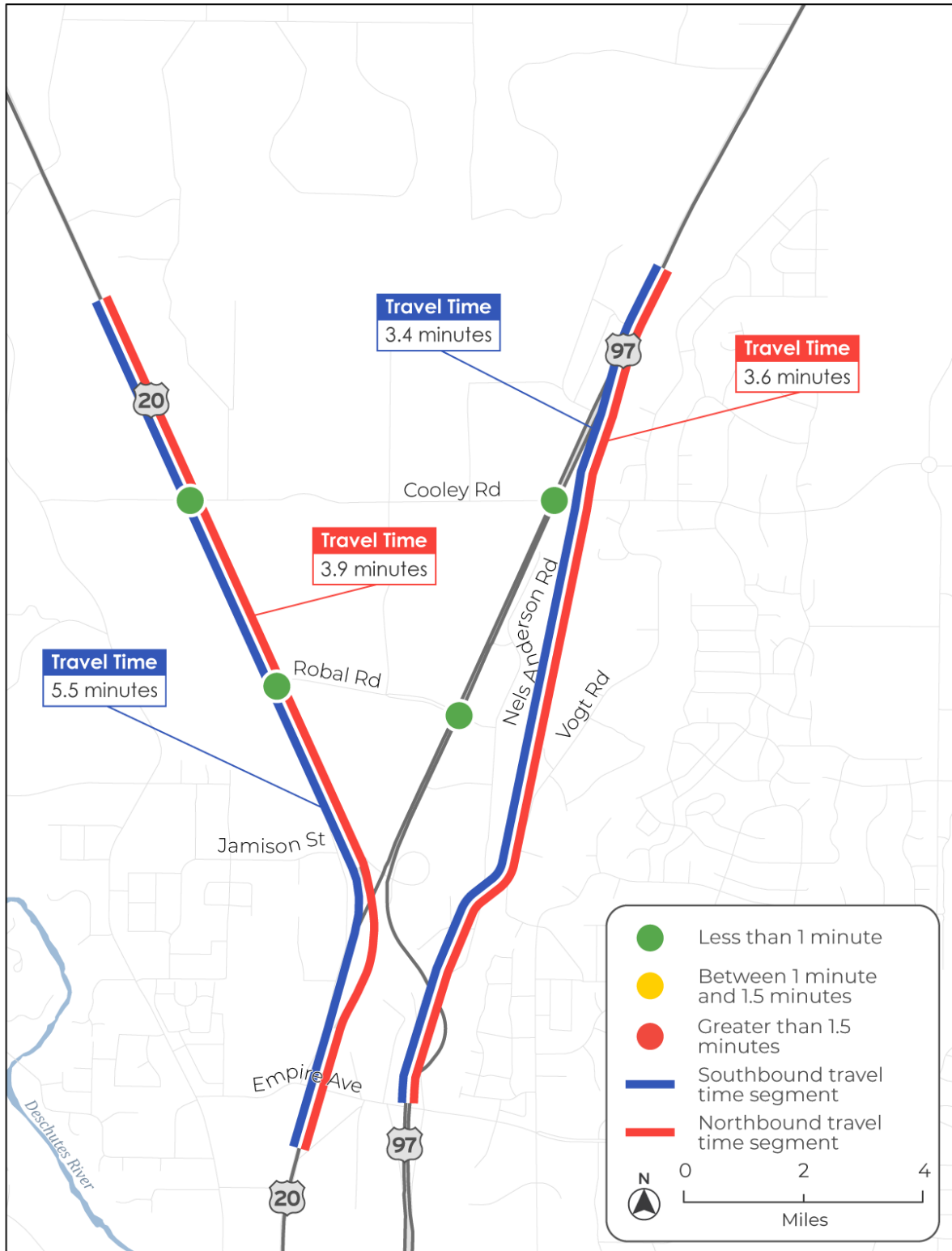


Figure 10: Future Build Conditions (2040) Operational Analysis Results – PM Peak Hour

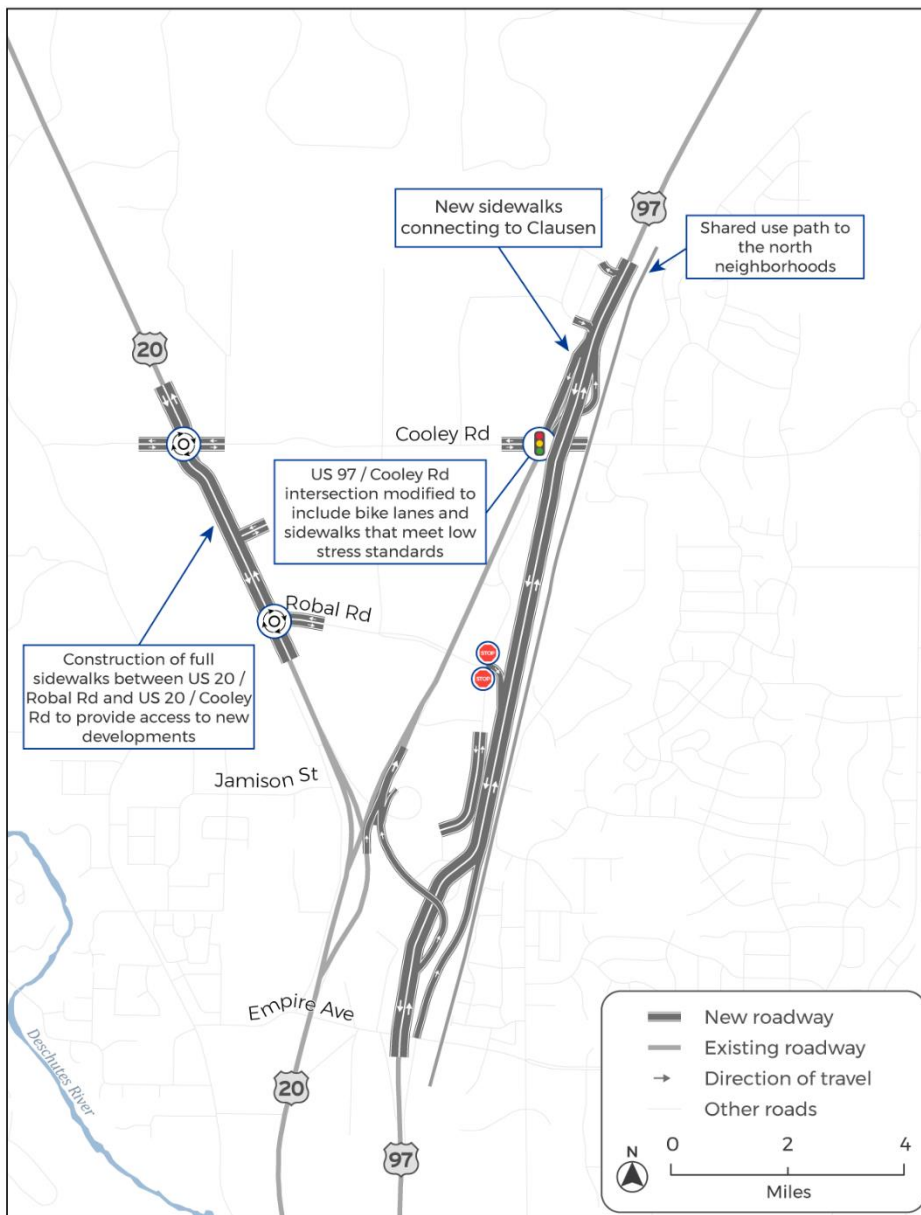


4 MULTIMODAL

4.1 PEDESTRIAN AND BICYCLE

The proposed alternative would provide enhanced bicycle and pedestrian facilities within the project study area as shown in Figure 11 below.

Figure 11: Pedestrian and Bicycle Improvements

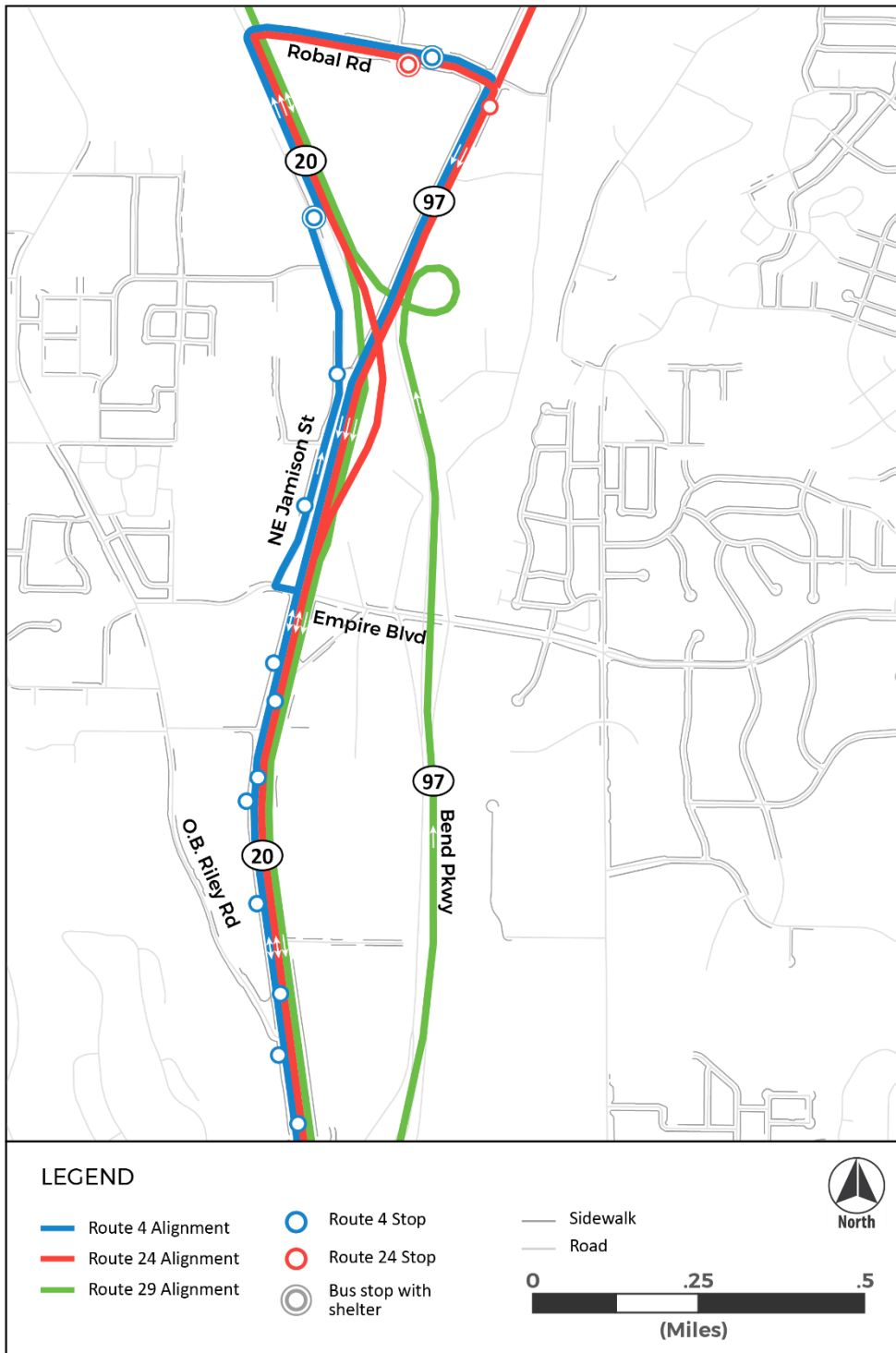


4.2 TRANSIT

Transit currently exists along the US 97 and US 20 corridor in north Bend. Local service Route 4 runs from Hawthorne Station in downtown Bend to Cascade Village in north Bend with 12 bus stops within the project corridor. The bulk of Route 4 exists along U.S. 20 with only a small portion running along US 97, from Robal Road to the US 97/US 20 junction. Route 24 is another transit route along the corridor and serves as a regional connector between Bend and Redmond. The route currently only has four stops total, with only two (northbound and southbound) at Robal Road in the project corridor. Route 29 is a third transit route that connects Sisters, OR and downtown Bend. It utilizes the project corridor but contains no stops within the area.

The proposed alternative would improve transit travel times for all the three bus routes that travel through the project corridor. Figure 12 shows the current transit routes within the project study area.

Figure 12: Current Transit Routes



5 CONCLUSION

The traffic analysis for the Future Build conditions indicate that both US97 and US20 corridors and all study intersections would experience significantly lower delays and improved travel times for all users. The project additionally will provide the following:

- Supports approximately 70,000 annual daily traffic traveling through the study area
- Improves safety by reducing the number of conflicts for motor vehicles in the high-volume areas by reducing accesses
- Provides enhanced infrastructure for vulnerable users such as bikes and pedestrians
- Reduces congestion throughout the study area over the no-build scenario in 2040
- Improves transit travel times for all the three bus routes that travel through the project corridor
- Provides easy and safe access to new developments with improved bike and pedestrian facilities along US20
- Provides further support to the surrounding commercial and future commercial developable lots
- Supports economic vitality in the surrounding areas by reducing congestion and improving access throughout the area

The above-mentioned benefits will be accomplished while still meeting ODOT standards for ramp and interchange spacing and design standards.