17th Avenue South Corridor Study

APRIL 2019

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EXECUTIVE SUMMARY

BACKGROUND

Fargo's 17th Avenue is a heavily used corridor that stretches the entire length of the city and into West Fargo. While it is primarily residential, the corridor supports some of the most intense retail and commercial development in the metro, including West Acres. It serves many major bicycle and pedestrian generators including schools and parks in West Fargo, Fargo, and Moorhead. This corridor is an important roadway for all modes of transportation.

The purpose of this study is to understand the current and long-term vision of 17th Avenue to identify and analyze the impacts of potential improvements which will address declining operations and the identified need for a cross-town bicycle route. To develop and assess the most appropriate alternatives, the study area was broken into two segments:

- The west segment from the western City of Fargo limits at 51st Street to 38th Street, which includes residential, commercial, and retail land uses. This segment is primarily three- and four-lane sections.
- The east segment from 38th Street to 5th Street, which includes predominately residential land uses with limited commercial. This segment is primarily a two-lane section.

The overall goals of the study were identified by the project's Study Review Committee and public via value profiles which helped the study team calibrate needs and expectations of the corridor evolved from east to west, shown in Figure 1.3.

Approach

The approach to the 17th Avenue Corridor Study included three phases, as shown in Figure 1.1. The study spanned approximately 21 months from beginning to end. It kicked off in July 2017 and concluded in April 2019. The general study timeline is shown in Figure 1.2. A separate timeline for public engagement is shown later. The majority of the study was completed by June 2018, but the final approval process delayed final completion until mid-year 2019.

Figure 1.1: Study Approach

Figure 1.2: Study Timeline of Deliverables

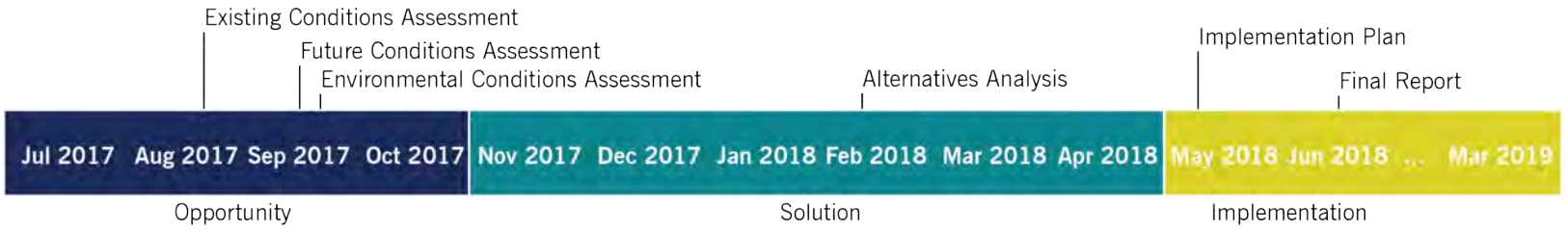
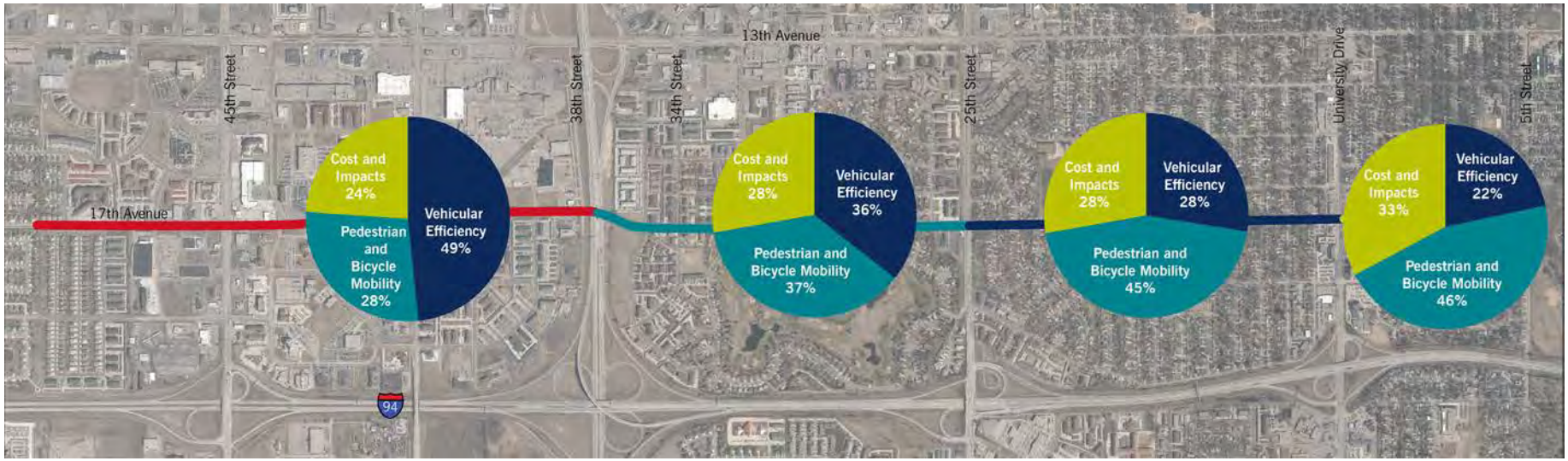


Figure 1.3: Study Area



The value profile weights shown above were established by the Study Review Committee and the public at the first public input meeting.

PUBLIC AND STAKEHOLDER INVOLVEMENT

Public and stakeholder involvement occurred regularly throughout the study process and brought together a diverse set of stakeholders and opinions. The following includes a summary of the different stakeholders, processes, and marketing plan used.

Timeline and Process

MONTHLY METRO COG STATUS REPORT

Every month during the study process, the project team briefed the Fargo-Moorhead Metropolitan Council of Governments' (Metro COG) with a formal status report.

STUDY REVIEW COMMITTEE MEETINGS

Five times throughout the process, the project's Study Review Committee met to discuss, review, and refine methods, assumptions, and technical analysis. Members of the Study Review Committee included Fargo Engineering, Planning, Public Works, MATBUS, Metro COG, NDDOT, and Federal Highway Administration. West Fargo planning was also part of the Study Review Committee. The four meetings covered various topics, discussed below.

- The Project Kick Off meeting discussed the overall intent and purpose of the project, the public engagement process, the existing conditions and a future scenario workshop.
- The second SRC meeting reviewed the future conditions scenarios and refined the traffic projections as well as reviewed the environmental conditions. At this meeting the SRC completed the Value Profile exercise used to weight the alternatives analysis.
- The third SRC meeting included a presentation of the alternatives and allowed the SRC to review, refine, and rank the alternatives.
- The fourth SRC meeting summarized the public comments and collaboratively developed an implementation plan.
- The fifth SRC meeting reviewed the public input received from the third open house to finalize the corridor study and recommend next steps.

PUBLIC ENGAGEMENT MEETINGS

The public engagement process included three open houses with formal presentations and a public hearing at the City Commission.

- The first round of public meetings was held in October, 2017 It included two events.
  - A community bike audit allowed members of the public to ride the corridor and identify issues and opportunities. Around 20 people attended the bike audit.

Figure 1.4: Community Bike Audit

  - The public meeting and open house included a formal presentation and issues map to allow the public to identify their key issues and opportunities. More than 50 people attended.

Figure 1.5: Presentation at Public Input Meeting #2

- The second public meeting was held in April, 2018. It included two formal presentations and an open house. Nearly 100 people attended.
- The third public meeting was held in March, 2019. It included a formal presentation and open house. More than 80 people attended.

Figure 1.6: Study Timeline of Public Engagement

Alternatives Preference Survey

An online survey was posted to the project's website to solicit feedback on the alternatives. It was completed by 150 members of the community. Up to 25 additional surveys were collected at the second public meeting, depending on the alternative. The survey was divided by road segment (5th Street to University Drive, University Drive to 25th Street, 25th Street to 38th Street, and 38th Street to 51st Street) and by mode (vehicle, bicycle, pedestrian, transit). This allowed people to provide feedback on as many or as few alternatives as they preferred.

Using the first choice selection, the results were incorporated into the overall score, which averaged the technical score, SRC support score, and Community support score. The full results are included in Appendix A.

Proposed Roadway Improvement Plan Survey

An online survey was posted to the project's website to solicit feed on the proposed roadway improvement plan. It was completed by 590 members of the community, with 20 additional surveys collected at the third public meeting. The survey was divided by road segment (5th Street to University Drive, University Drive to 25th Street, 25th Street to 38th Street, and 38th Street to 51st Street), which allowed people to provide feedback on as many or few locations as they preferred.The full results are included in Appendix A.

WEBSITE

The project website, www.commute17.com, was a repository for all the study's activity and effort. It included the project background, news and articles, reports, videos, and a portal for comments. Over the course of the study, there were more than 5,000 visits to the website.

The website included nearly 25 updates throughout the process, on average once every three weeks, with reduced activity during the approval phase of the process. The updates included public engagement opportunities and summaries, reports, videos, and the following activities:

- The issues mapping exercise allowed the public to identify issues and "like" and comment on other's identification.
- The meeting recordings included segmented videos from the public input meeting presentation.
- Interactive alternatives map allowed users to review the different alternatives and visualizations to see how they would look and feel.
- Surveys were posted asking the public to complete a value profile activity, to weight vehicle mobility and safety, pedestrian and bicycle mobility and safety, and cost and impacts, an alternatives preference survey, and a proposed roadway improvement plan survey.

Figure 1.7: Sample of Website Statistics

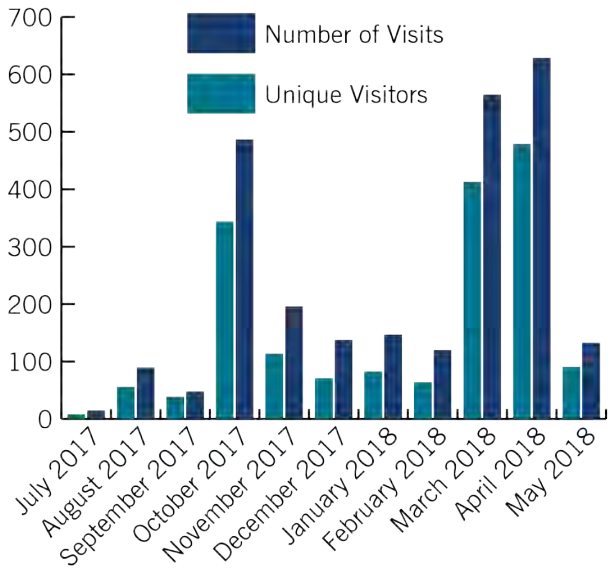
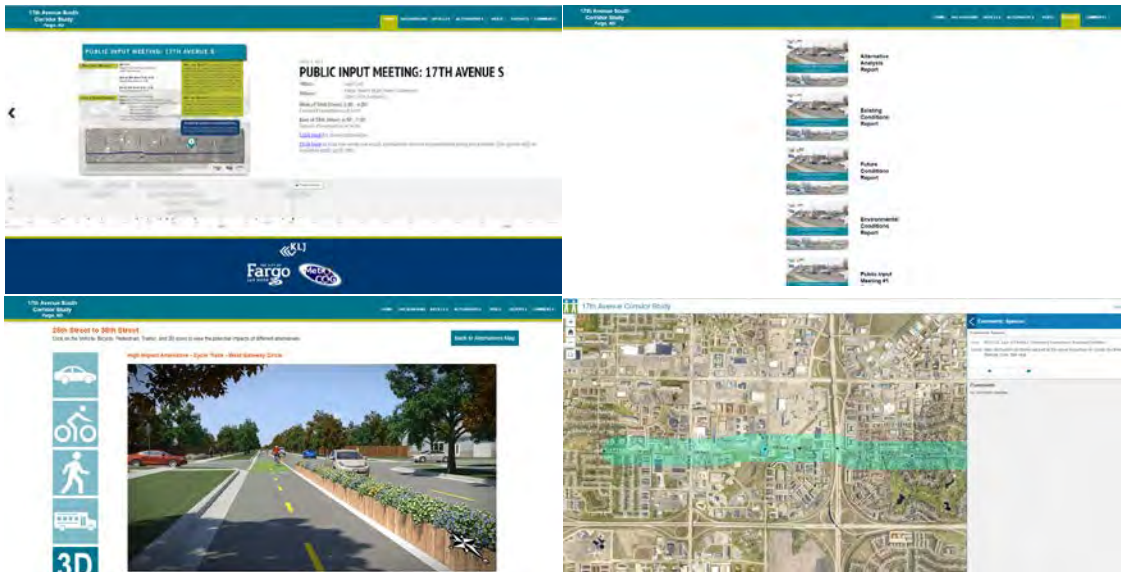


Figure 1.8: Website Pages



5TH STREET TO 25TH STREET

5th Street to University Drive

From 5th Street to University Drive, 17th Avenue is a two lane roadway with sidewalks on both sides of the road. A series of thin overlays have kept the surface quality of pavement in this segment in good condition, however the road has begun to shift and will require reconstruction. The area surrounding the corridor is primarily residential, with limited commercial and institutional uses at the University Drive intersection.

There are no dedicated bicycle facilities along this segment. However, traffic volumes are very low, currently around 3,200 vehicles per day. They are not expected to increase significantly. Future traffic growth projections estimate around 4,000 vehicles per day by 2040. Neither speeding nor crash trends were identified; operations are acceptable through 2040. Analysis at the University Drive intersection was outside the scope of the study.

The primary needs identified in this segment include:

- Dedicated bicycle facilities
- Improved pedestrian crossing at Essentia Health

Neither the technical analysis nor the public engagement identified vehicular needs.

IMPROVEMENT STRATEGIES

Bicycle Alternatives

From 5th Street to University Drive, the High Impact: Cycle Track alternative received the greatest overall score. The public gave the same number of first choice votes (29) to the Medium Impact: Bike Lanes and High Impact: Cycle Track alternatives.

Table 1.1: Summary of 5th Street to University Drive Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				6.8
Medium Impact: Bike Lanes				5.2
Do Nothing				3.6
Low Impact: Sharrows				3.0

A cycle track would provide a much safer bicycling experience, with research finding a 30 to 40 percent reduction in all crash types. Cycle tracks have also been found to attract higher ridership; up to 171 percent increase compared to no dedicated bicycle facilities.

- Cycle Track: $160,000

Figure 1.9: 17th Avenue between 5th Street and University Drive

Pedestrian Alternatives

The high impact alternative to install post and overhead flashing beacons with a raised crosswalk at the Essentia Health crossing was the highest ranked alternative. It received the most first choice votes from the public and had unanimous support from the SRC.

Table 1.2: Summary of 5th Street to University Drive Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Post and Overhead RRFB with Raised Crosswalk				6.8
Medium Impact: Post and Overhead RRFB				3.3
Low Impact: Do Nothing				3.2

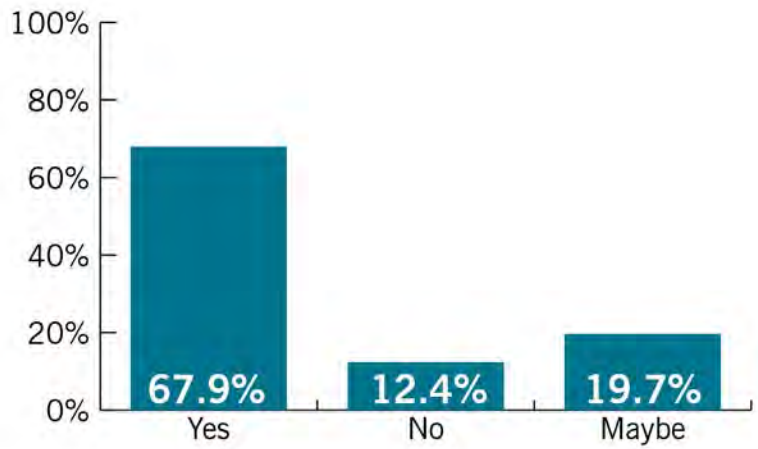
Research has found flashing beacons have a compliance rate between 72 and 96 percent and a 30 percent increase in yielding distance of 10 feet or more. Flashing beacons have also been found to reduce vehicle-pedestrian crash potential by 69 percent. Raised crosswalks have been found to reduce vehicle-pedestrian crashes 33 to 48 percent and reduce 85th percentile speeds between six and 13 miles per hour.

- Post and overhead mounted RRFBs with raised crosswalk: $90,000

PUBLIC SUPPORT FOR PROPOSED ROADWAY IMPROVEMENT PLAN

Nearly 68 percent of respondents support the proposed roadway improvement plan for 17th Avenue from 5th Street to University Drive. Twenty percent of respondents said they maybe support the proposed plan. When asked for questions, comments, or concerns, the top themes included crossing University Avenue, unfamiliarity with cycle tracks, impacts to vehicular traffic, snow removal, and cost.

Figure 1.10: Public Support for Proposed Roadway Plan between 5th Street and University Drive



University Drive to 25th Street

From University Drive to 25th Street, 17th Avenue is a two lane roadway with sidewalks on both sides of the road. A series of thin overlays have kept the surface quality of pavement in this segment in good condition, however the road has begun to shift and will require reconstruction. The area surrounding the corridor is primarily residential, with limited commercial at the University Drive intersection. South High School and Lewis and Clark Elementary are also located along this segment of 17th Avenue.

Traffic volumes are relatively low and grow from east to west. On the east side of this segment, around 4,500 vehicles per day use the corridor, expected to grow to about 6,000 by 2040. On the west side of this segment, around 7,700 vehicles per day use the corridor, expected to grow to about 9,500 by 2040. Crash trends were noted at the 25th Street intersection, but this intersection was outside the scope of the study. It should continue to be monitored as part of other studies and projects.

Speeding was a noted problem along this segment of the corridor. Around 90 percent of vehicles are speeding, with the 85th percentile speed more than seven miles per hour over the posted speeds. This creates safety concerns for cyclists and pedestrians.

There are no dedicated bicycle facilities along this segment.

Figure 1.11: 17th Avenue between University Drive and 25th Street

The primary needs identified in this segment include:

- Dedicated bicycle facilities
- Improved pedestrian crossing at South High School
- Traffic calming to reduce speeds

IMPROVEMENT STRATEGIES

Bicycle Alternatives

From University Drive to 25th Street, the bicycle alternatives received varying support. The High Impact: Cycle Track alternative received the most first choice votes from the community. Ultimately, 74 percent of people who voted preferred improved bicycle facilities.

Table 1.3: Summary of University Drive to 25th Street Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				**6.5**
Medium Impact: Buffered Bike Lanes				4.4
Do Nothing				3.2
Low Impact: Bike Lanes				3.2

A cycle track would provide a much safer bicycling experience, with research finding a 30 to 40 percent reduction in all crash types. Cycle tracks have also been found to attract higher ridership; up to 171 percent increase compared to no dedicated bicycle facilities.

- Cycle Track: $190,000

Pedestrian Alternatives

The high impact alternative to install pedestrian actuated rectangular rapid flashing beacons at the Fargo South High School crossing received the highest overall score. It received the most first choice votes from the community (57 percent) and the SRC.

Table 1.4: Summary of University Drive to 25th Street Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Pedestrian Actuated RRFB				6.1
Medium Impact: In-Roadway Sign				4.0
Low Impact: Do Nothing				3.2

Research has found flashing beacons have a compliance rate between 72 and 96 percent and a 30 percent increase in yielding distance of 10 feet or more. Flashing beacons have also been found to reduce vehicle-pedestrian crash potential by 69 percent.

» Pedestrian actuated RRFB: $15,000

Implementation Strategies

The projects identified through this segment of 17th Avenue are very low cost and could be implemented at any time. However, without improvements between 25th Street and 38th Street, the cycle track provides limited connectivity and may not be widely utilized.

Extending the improvements from 38th Street to 25th Street to include the bicycle and pedestrian improvement from 25th Street to 5th Street would complete a south-side bicycle facility along 17th Avenue through Fargo. Even without changes to the segment west of 38th Street, the cycle track could tie into the existing shared use path until such time that a project is identified and constructed.

» Additionally, poor pavement on this section of the corridor will require rehabilitation. Opportunities to combine pavement rehabilitation with the other multimodal improvements should be evaluated to limit impacts to the corridor.

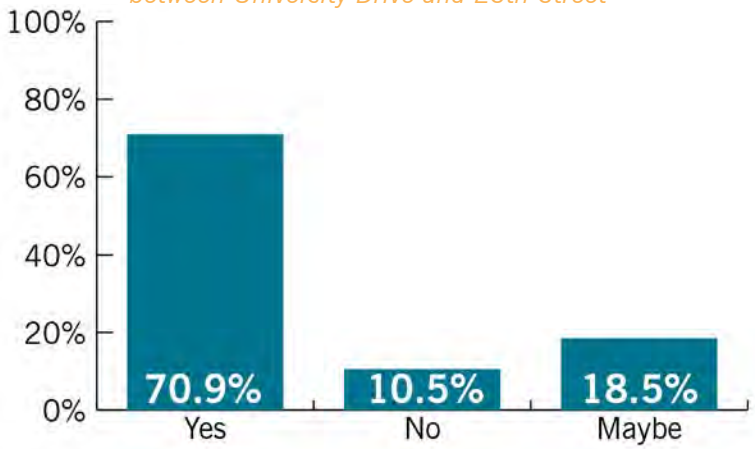
PUBLIC SUPPORT FOR PROPOSED ROADWAY IMPROVEMENT PLAN

Nearly 71 percent of respondents support the proposed roadway improvement plan for 17th Avenue from University Drive to 25th Street. Nineteen percent of respondents said they maybe support the proposed plan. When asked for questions, comments, or concerns, the top themes included impacts to traffic operations, pedestrian safety, snow removal, use of bicycle facilities, and cost and property impacts.

25TH STREET TO 38TH STREET

From 25th Street to 38th Street, 17th Avenue is a primarily two lane roadway with turn lanes at the major intersections. All-way stop control is placed at 38th Street, 34th Street, and 32nd street intersections. There are sidewalks on both sides of the road. A series of thin overlays have kept the surface quality of pavement in this segment in good condition, however the road

Figure 1.12: Public Support for Proposed Roadway Plan between University Drive and 25th Street



has begun to shift and will require reconstruction. The area surrounding the corridor is almost exclusively residential.

Traffic volumes continue to increase from east to west through this segment, carrying around 10,000 vehicles per day currently, growing to around 12,100 vehicles per day by 2040. The all-way stop control creates significant congestion during peak hours resulting in stop and go traffic and driver frustration. The crash trends identified in this segment are also related to poor operations when queues extend across adjacent intersections resulting in rear end crashes. Poor distribution of mainline to sidestreet traffic can contribute to non-compliance and speeding after the stop as drivers may feel it was unnecessary.

There are no dedicated bicycle facilities along this segment of 17th Avenue. The higher volumes and poor operations make cycling on the road difficult.

Figure 1.13: 17th Avenue between 25th Street and 38th Street

The primary needs identified in this segment include:

- Poor vehicular operations at the all-way stop controlled intersections
- Dedicated bicycle facilities
- Improved pedestrian crossing at West Gateway Circle

Improvement Strategies

BICYCLE ALTERNATIVES

From 25th Street to 38th Street, the bicycle alternatives received varying support. The High Impact: Cycle Track alternative received 36 percent of first choice votes. Ultimately, 71 percent of people who voted preferred improved bicycle facilities.

Table 1.5: Summary of 25th Street to 38th Street Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				5.3
Medium Impact: Shared Use Path and Bike Lanes				3.3
Do Nothing				2.1
Low Impact: Shared Use Path				1.8

A cycle track would provide a much safer bicycling experience, with research finding a 30 to 40 percent reduction in all crash types. Cycle tracks have also been found to attract higher ridership; up to 171 percent increase compared to no dedicated bicycle facilities.

- Cycle Track: $675,000

VEHICLE ALTERNATIVES

From 25th Street to 38th Street, the vehicle alternatives received varying support. The SRC was split between the High Impact: Roundabouts alternative and Medium Impact: Traffic Signals. From the community support perspective, the traffic signals alternative received just one more first place vote than the roundabout alternative. Ultimately, 79 percent of people who voted preferred improved traffic control. However, if right-of-way and utility impacts are too great, traffic signals may be considered.

Table 1.6: Summary of 25th Street to 38th Street Vehicle Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Roundabouts				5.5
Medium Impact: Traffic Signals				5.0
Do Nothing				2.3
Low impact: Stop Control with Merge Lanes				2.1

Roundabouts have been found to reduce total crashes by 35 percent and injury crashes by 76 percent. The curvature in roundabouts also reduce speeds to about 15 to 25 miles per hour. Raised splitter islands on each approach allow pedestrians to cross the road in two stages. Roundabouts also provide opportunities to include landscaping and aesthetic features.

- Roundabouts: $1,100,000

PEDESTRIAN ALTERNATIVES

The high impact alternative to install pedestrian actuated rectangular rapid flashing beacons received the highest overall score for the West Gateway Circle intersection. It received the most first choice votes from the community (63 percent).

Table 1.7: Summary of 25th Street to 38th Street Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Pedestrian Actuated RRFB				6.3
Medium Impact: In-Roadway Sign				3.9
Low Impact: Do Nothing				3.1

Research has found flashing beacons have a compliance rate between 72 and 96 percent and a 30 percent increase in yielding distance of 10 feet or more. Flashing beacons have also been found to reduce vehicle-pedestrian crash potential by 69 percent.

- Pedestrian actuated RRFB: $15,000

Implementation Strategies

Poor vehicular operations and lack of dedicated bicycle facilities give this segment of 17th Avenue the highest existing needs. The highest ranked alternatives for this segment would incorporate mini roundabouts at the 32nd Street and 34th Street intersections and a full roundabout at the 38th Street intersection. A cycle track would be constructed on the south side of the road.

This segment of the corridor has poor pavement conditions which may necessitate a full reconstruction. This reconstruction should include the multimodal improvements identified in this study to minimize future impacts to the corridor. The cost estimates included in this study do not account for a full reconstruction.

PUBLIC SUPPORT FOR PROPOSED ROADWAY IMPROVEMENT PLAN

More than 58 percent of respondents support the proposed roadway improvement plan for 17th Avenue from 25th Street to 38th Street. Twenty percent of respondents said they maybe support the proposed plan. When asked for questions, comments, or concerns, the top themes included unfamiliary with cycle track and/or roundabout operations, traffic operations, use of bicycle facilities, snow removal, and cost and property impacts.

Figure 1.14: Simulation of Cycle Track Alternatives on 17th Avenue between 25th Street and 38th Street

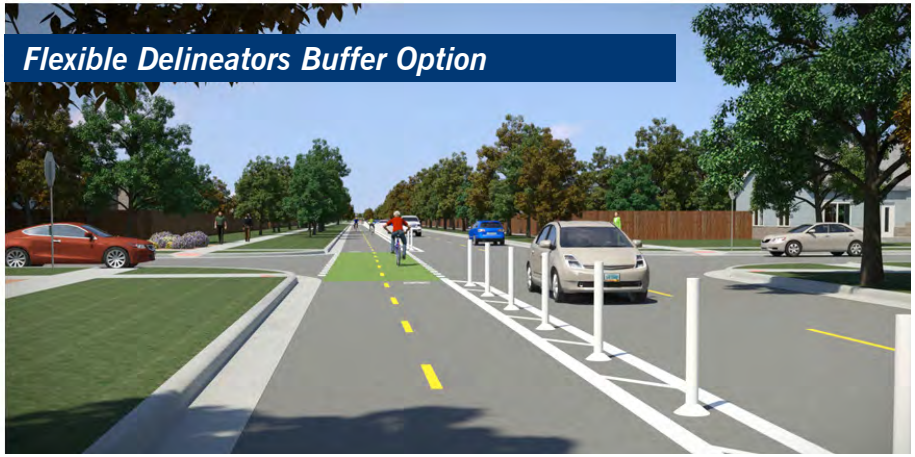


Figure 1.15: Simulation of Roundabout at 17th Avenue and 34th Street Intersection

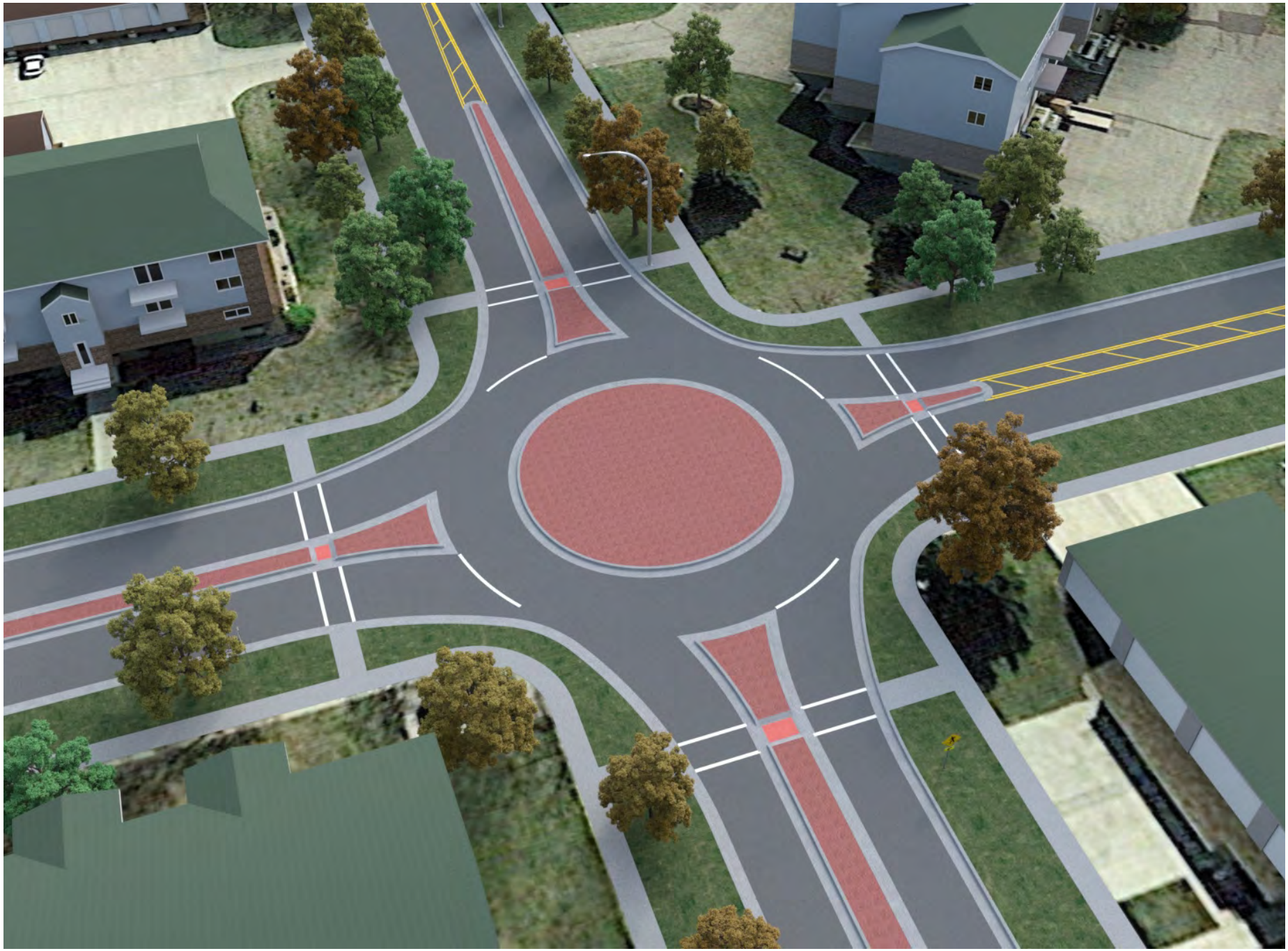
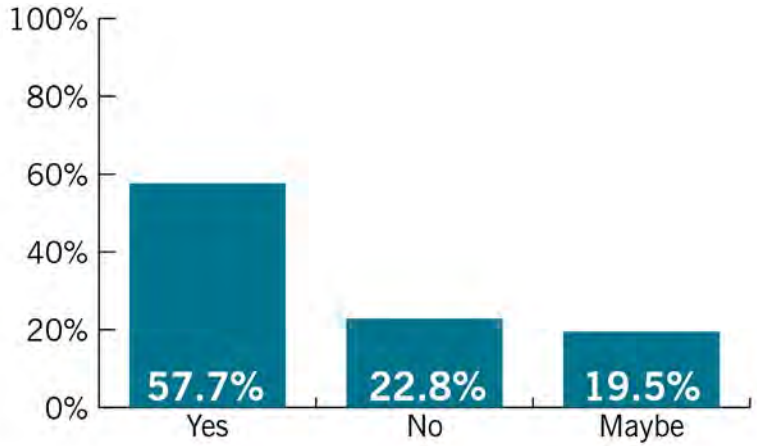


Figure 1.16: Public Support for Proposed Roadway Plan between 25th Street and 38th Street



38TH STREET TO 51ST STREET

From 38th Street to 51st Street, 17th Avenue is a three or four lane section: from 38th Street to 42nd Street, 17th Avenue is a three lane section with one lane in each direction and a center left turn lane and from 42nd Street to 45th Street, 17th Avenue is a four lane section with two lanes in each direction. This segment of 17th Avenue stretches through some of the most intense commercial development in the metro area. The pavement in this segment is in mostly good condition and does not require reconstruction in the short term.

Half of all crashes along 17th Avenue in Fargo occur between 42nd Street and 45th Street. Most crashes are associated with the four-lane section resulting in rear end crashes due to left-turning vehicles. There are also critical crash rates at three intersections along this segment: 42nd Street, 44th Street, and 45th Street. The dense access spacing and driveways west of the 45th Street intersection also elevate crash potential as queues block site lines from the driveways.

This segment of 17th Avenue also carries the most traffic, between 12,800 and 14,300 vehicles per day currently. Redevelopment and infill development could push traffic volumes close to 20,000 vehicles per day between 42nd Street and 45th Street. Vehicular operations in this segment are primarily constrained by the 42nd Street and 45th Street intersections currently. However, future traffic growth may require additional roadway capacity.

A shared-use path on the south side of 17th Avenue provides basic east-west bicycle mobility. However, high volume intersections reduce bicycle crossing safety. Because there is only a shared-use path on the south side of 17th Avenue, vehicles may not look right for westbound bicycles, resulting in crossing challenges.

The primary needs identified in this segment include:

- Poor vehicle operations at the 42nd Street and 45th Street intersections
- Access management west of 45th Street
- Vehicular safety
- Improved bicycle facilities
- Improved pedestrian crossing at 40th Street

Improvement Strategies

BICYCLE ALTERNATIVES

From 38th Street to 51st Street, the High Impact: Cycle Track bicycle alternative received the highest overall score. The community preferred the High Impact: Cycle Track alternative with 36 percent of first choice votes. Ultimately, 60 percent of people who voted preferred improved bicycle facilities (the medium and high impact alternatives).

Figure 1.17: 17th Avenue between 42nd Street and 45th Street

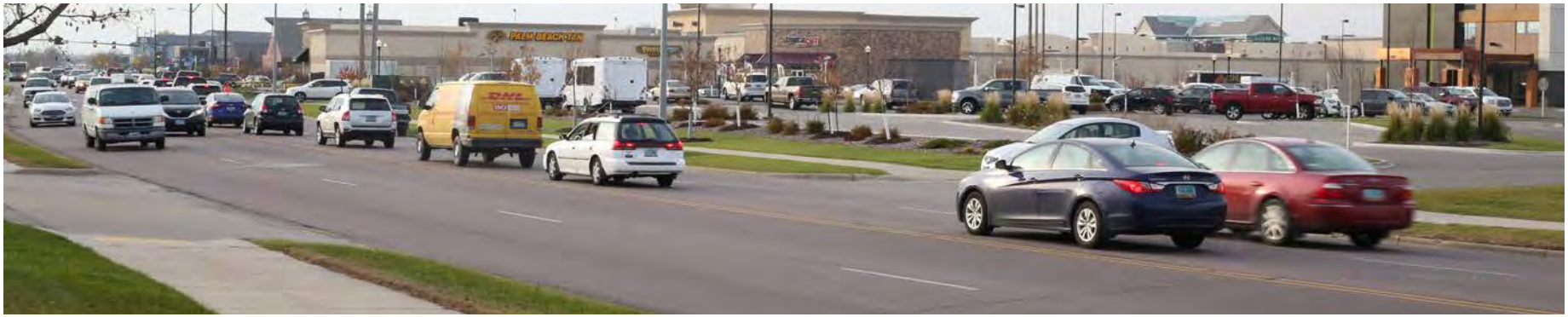


Table 1.8: Summary of 38th Street to 51st Street Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				5.1
Medium Impact: North Side Shared Use Path				3.3
Do Nothing				2.6
Low Impact: Intersection Safety Improvements				1.9

A cycle track would provide a much safer bicycling experience, with research finding a 30 to 40 percent reduction in all crash types. Cycle tracks have also been found to attract higher ridership; up to 126 percent increase compared to regular bicycle facilities (shared use path, sharrows, bike lanes).

» High Impact: Cycle Track: $3,925,000

VEHICLE ALTERNATIVES

From 38th Street to 51st Street, the High Impact: Widen to Median Divided Section from 38th Street to 47th Street vehicle alternative received the highest overall score. The SRC supported the High Impact: Widen to Median Divided Section and the Road Diet: 3-Lane Section with Buffered Bike Lanes equally (43 percent). The community most supported the High Impact: Widen to Median Divided Section (34 percent). The Do Nothing (21 percent) and the Road Diet: 3-Lane Section with Buffered Bike Lanes (20 percent) also received support.

Table 1.9: Summary of 38th Street to 51st Street Vehicle Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Widen to Median Divided Section from 38th Street to 45th Street with Access Management and Spot Improvements				4.8
Road Diet: 3-Lane Section with Buffered Bike Lanes				3.2
Medium Impact: Widen 42nd Street to 45th Street with Spot Improvements				2.6
Low Impact: Spot Improvements and Access Management				2.0
Do Nothing				1.9

Raised medians have been found to reduce overall crash occurrence by about 40 percent. When combined with additional treatments, like marked crosswalks, medians have been found to reduce vehicle-pedestrian conflicts by 46 percent. Medians also reduce access risk by converting driveways to right-in/right-out. This access management would reduce access risk by 44 percent. This alternative will mitigate deficient operations expected by 2040.

» High Impact: Widen to Median Divided Section: $5,545,000

It is important to note that there is a significant amount of overlap with the Cycle Track alternative and the Widen to Median Divided Section alternative, so the costs should not be added together.

PEDESTRIAN ALTERNATIVES

The high impact alternative to install pedestrian actuated rectangular rapid flashing beacons received the highest overall score for the 40th Street intersection. It received the most first choice votes from the community (55 percent).

Table 1.10: Summary of 38th Street to 51st Street Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Refuge Island and RRFB				7.0
Medium Impact: Refuge Island				3.3
Low Impact: Do Nothing				3.0

Pedestrian refuge islands reduce the unprotected crossing length for pedestrians by allowing them to cross one direction of traffic at a time. Pedestrian refuge islands have been found to reduce vehicle-pedestrian conflicts up to 46 percent at unsignalized intersections on multi-lane roads. The addition of RRFBs increases stop compliance up to 96 percent, increases

Figure 1.18: Simulation of Cycle Track on 17th Avenue between 42nd Street and 45th Street

yielding distance up to 30 percent, and reduces vehicle-pedestrian crash potential by 69 percent.

» Pedestrian actuated RRFB and refuge island: $45,000

Implementation Strategies

SHORT TERM SPOT IMPROVEMENTS

Until significant development occurs along the corridor, this segment of 17th Avenue will not need additional capacity. In the short term, a series of smaller projects can help address the safety and operational needs of the corridor.

Implementing the spot improvements at 45th Street and 42nd Street intersections would mitigate some of the congestion and queueing.

» At 45th Street, change the westbound approach from a single left-turn lane with two through lanes and a right turn lane to a double left turn lane with one through, and a shared through/right lane. This mitigates long queues on the westbound approach that impacts driveways east of 45th Street. This spot improvement would also extend the lane drop to 47th Street, instead of the Happy Harry's driveway, and extend the median approximately 200 feet to minimize conflict at the driveways.

» At 42nd Street, change the second eastbound through lane that drops after the intersection to a right-turn lane.

Other improvements that should be constructed in the short term include:

» RRFB and pedestrian refuge island at the 40th Street intersection to improve crossing safety for pedestrians

SHORT TERM ROADWAY RECONFIGURATION

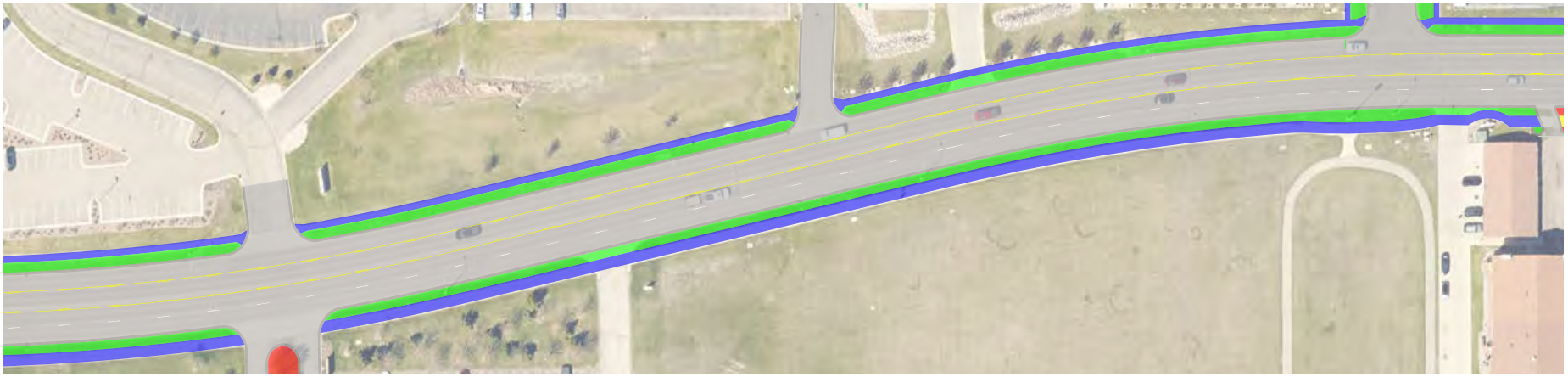
In addition to the intersection and pedestrian improvements discussed in the short term spot improvements implementation strategies above, a 2+1+1 roadway configuration between 44th Street and 42nd Street was developed to address the safety needs of this segment, as shown in Figure 1.19. This alternative would maintain the two eastbound lanes from 45th Street to 42nd Street, but would convert the inside westbound lane to a center left-turn lane, and maintain one lane for westbound traffic.

A three-lane road diet alternative was presented analyzed and presented to the public at the second public input meeting. This alternative included on-street bicycle facilities between 42nd Street and 45th Street, but none from 42nd Street to 38th Street, where they would connect to the cycle track, as discussed above. The short segment of bicycle facility that would force a cyclist from the street to the shared-use path back to the street is likely to have limited appeal to cyclists. The three-lane section would also not be able to accommodate the southbound double left-turn lane at the 45th Street intersection because it would lack a second receiving lane and/or require a merge maneuver, similar to the west approach in front of Happy Harry's. For these reasons, the 2+1+1 configuration was developed. This configuration combines elements of the five-lane section and the road diet, which received strong support from the community and the Study Review Committee.

The 2+1+1 concept was developed to effectively utilize the existing roadway space and improve safety and operations. The 2+1+1 concept

» reflects prevailing traffic conditions. The eastbound movement carries 14 to 22 percent more traffic on a typical weekday and weekend day, respectively. The eastbound direction carries, on average, 20 percent more traffic between 7:00 AM and 8:00 PM, when nearly 90 percent of daily traffic occurs.

Figure 1.19: 2+1+1 Concept on 17th Avenue Between 44th Street and 43rd Street



- would provide acceptable operations (LOS "D" or better) at the study intersections under current traffic volumes. This segment of 17th Avenue carries around 13,400 vehicles currently and with significant development along the corridor, discussed in the Future Conditions section of this report, daily traffic could increase to around 19,400 vehicles per day. Traffic operations analysis for the road diet alternative found delay is expected to increase just 12 percent compared to the current configuration. While dependent on a variety of factors, most three-lane sections can carry between 10,000 and 17,000 vehicles per day, with most four-lane sections carrying between 12,000 and 20,000 vehicles per day.
- would improve safety. Nearly half the total crashes along 17th Avenue, occur between 42nd Street and 45th Street (221 over the last five years). The center left-turn lane in the 2+1+1 alternative would reduce the rear-end crash potential through this section by allowing vehicles to move out of the through lane to safely wait for an acceptable gap. Rear-end crashes made up 28 percent of all crashes along this segment of 17th Avenue. Road diets have been found to reduce most crash types up to 46 percent.
- maintain the existing bicycle facilities on the shared-use path on the south side of the roadway.

Figure 1.20: Simulation of Median Divided Five Lane Section on 17th Avenue between 42nd Street and 45th Street

This alternative improves safety and maintains mobility in the short-term with an estimated cost of $425,000, which includes the 45th Street and 42nd Street intersection improvements. This is a low cost improvement that is expected to have significant positive impacts to safety along the 17th Avenue corridor. This was completed Summer 2019.

The implementation of the 2+1+1 concept will address many of the most pressing needs of this segment of 17th Avenue. However, growth should be continually monitored to determine if, or when, further expansion is needed. Additionally, once the cycle track is completed on the east segment of 17th Avenue (38th Street to 5th Street), the buffered cycle track can be revisited in this segment as well.

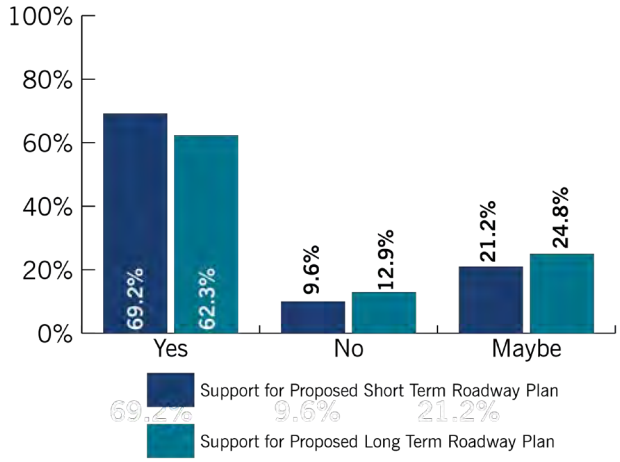
MID TO LONG TERM

Many of the capacity needs along this segment of 17th Avenue are contingent on future development surrounding the corridor. At such time operational conditions warrant, construct a median divided five-lane section from 38th Street to 47th Street. This construction project would incorporate a buffered two-way cycle track on the south side of 17th Avenue to connect to the two-way cycle track east of 38th Street and the shared use path on the south side of 17th Avenue west of 45th Street. This would complete the high quality bicycle facility across the City of Fargo.

PUBLIC SUPPORT FOR PROPOSED ROADWAY IMPROVEMENT PLAN

More than 69 percent of respondents support the proposed short term roadway improvement plan for 17th Avenue from 38th Street to 51st Street and 62 percent of respondents supported the proposed long

Figure 1.21: Public Support for Proposed Roadway Plans between 38th Street and 51st Street



term roadway improvement plan. When asked for questions, comments, or concerns, the top themes included improved bicycle and pedestrian safety, traffic operations, access management, and cost.

TRANSIT

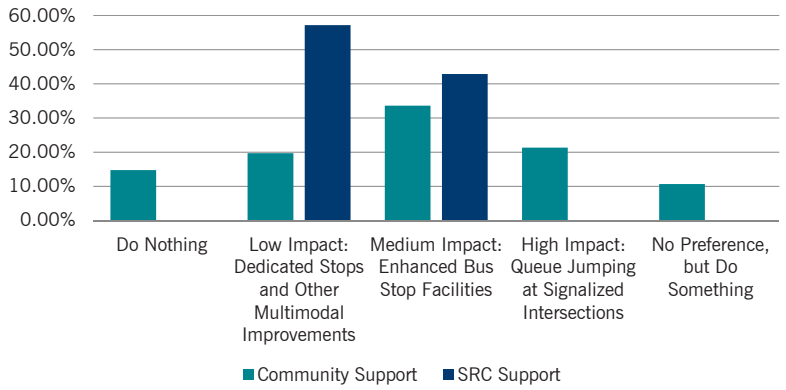
Fargo is served by Metro Area Transit (MAT). Currently, 23 fixed routes serve the metro area. MAT Bus does not run on dedicated stops, a transit rider can request a ride at any corner along a route. The 17th Avenue corridor is serviced by Route 24 between 45th Avenue and the West Acres Shopping Center (via east of 42nd Street) and by Route 16 between the West Acres Shopping Center (via 38th Street) and 5th Street. Additional routes (14, 15, 21, and 22) have transfer points at the West Acres hub.

Almost all areas along the study corridor with residential densities of seven per acre or higher are within one-quarter mile of the existing Route 16, which runs bi-directionally on 17th Avenue with hourly service.

Improvement Strategies

Support was split for the transit alternatives. The community most supported the Medium Impact: Enhanced Bus Stop Facilities (34 percent), while the SRC most supported the Low Impact: Dedicated Stops and Other Multimodal Improvements (57 percent). MAT Bus is currently undergoing a study to develop new stop level designs so no costs are available at this time.

Figure 1.22: Summary of Transit Alternatives



Implementation Strategies

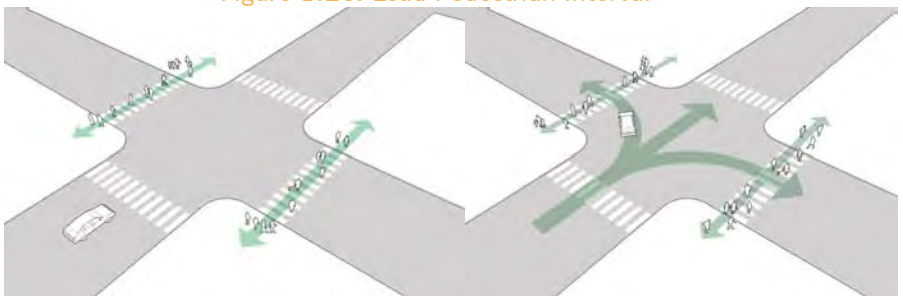
A variety of transit improvements were identified and ranked in this study, many of which have been identified in previous studies and are in process for implementation. MAT Bus has ultimate authority over the implementation of transit improvements. The City should continue to work with them to encourage the implementation of dedicated stops and providing enhanced bus stop facilities at strategic locations. The City can continue to improve the multimodal connections to bus stops to expand access to transit.

BARRIER CROSSINGS

Even with marked crosswalks and protected crossings, the major signalized intersections (45th Street, 42nd Street, 25th Street, University Drive) remain a barrier for bicycle and pedestrian traffic. Improvements to the signalized intersections that may be considered include:

» Lead pedestrian intervals which give pedestrians a small amount of time, typically three to five seconds, to begin crossing the street before a green light is given to vehicles. This allows pedestrians to enter the crosswalk and improve visibility before vehicles can begin making their movements. Lead pedestrian intervals have been found to reduce pedestrian-vehicle crashes by 60 percent. Lead pedestrian intervals are demonstrated in Figure 1.23.

Figure 1.23: Lead Pedestrian Interval



» Bicycle signal heads give bicyclists a small amount of time to begin crossing the street before a green light is given to vehicles, improving visibility. Bicycle signal heads are shown in Figure 1.24.

Figure 1.24: Bike Signal Head

NEXT STEPS

Identifying Funding

While identified as a gap in the bicycle network in Metro 2040, the Fargo-Moorhead Long Range Transportation Plan (LRTP), and the 2016 Bicycle and Pedestrian Plan, no projects have been included in a cost-constrained plan. This means there has been no identified funding for 17th Avenue. With two projects identified, the City will need to identify funding opportunities. Federal funds could be available for the 17th Avenue corridor, but are not available until at least 2023 and would require an environmental document be completed. Local funding increases flexibility and accelerates implementation and would rely on normal city funding mechanisms, including assessments.

Summary of Implementation

The projects prioritized in this study would:

- Create a bicycle corridor in Fargo that would extend from the eastern border and the Red River Trail across the city into West Fargo. Protected bicycle facilities reduce crashes up to 40 percent and increase ridership up to 171 percent compared to no bicycle facilities.
- Mitigate congestion at five of the major intersections across the corridor. Reconfiguring lanes at 45th Street and 42nd Street will reduce queues and rear end crash potential. Roundabouts at 38th Street, 34th Street, and 32nd Street will improve operations at these locations and calm traffic speeds through that segment of the corridor. 45th Street was completed in Summer 2019.
- Improve vehicular safety through the addition of turn lanes and medians between 42nd Street and 45th Street. The 2+1+1 lane reconfiguration was completed in Summer 2019.
- Improve pedestrian crossing safety at four key crossing locations.

The summary of implementation is shown in Figure 1.25. This summary is based on the needs established in Table 8.12 in the Implementation Chapter, but specific project ordering will be determined through local programming procedures, funding availability, and adjacent construction plans. Figure 1.26 includes the highest ranked alternatives for the entire corridor.

Figure 1.25: Summary of Implementation

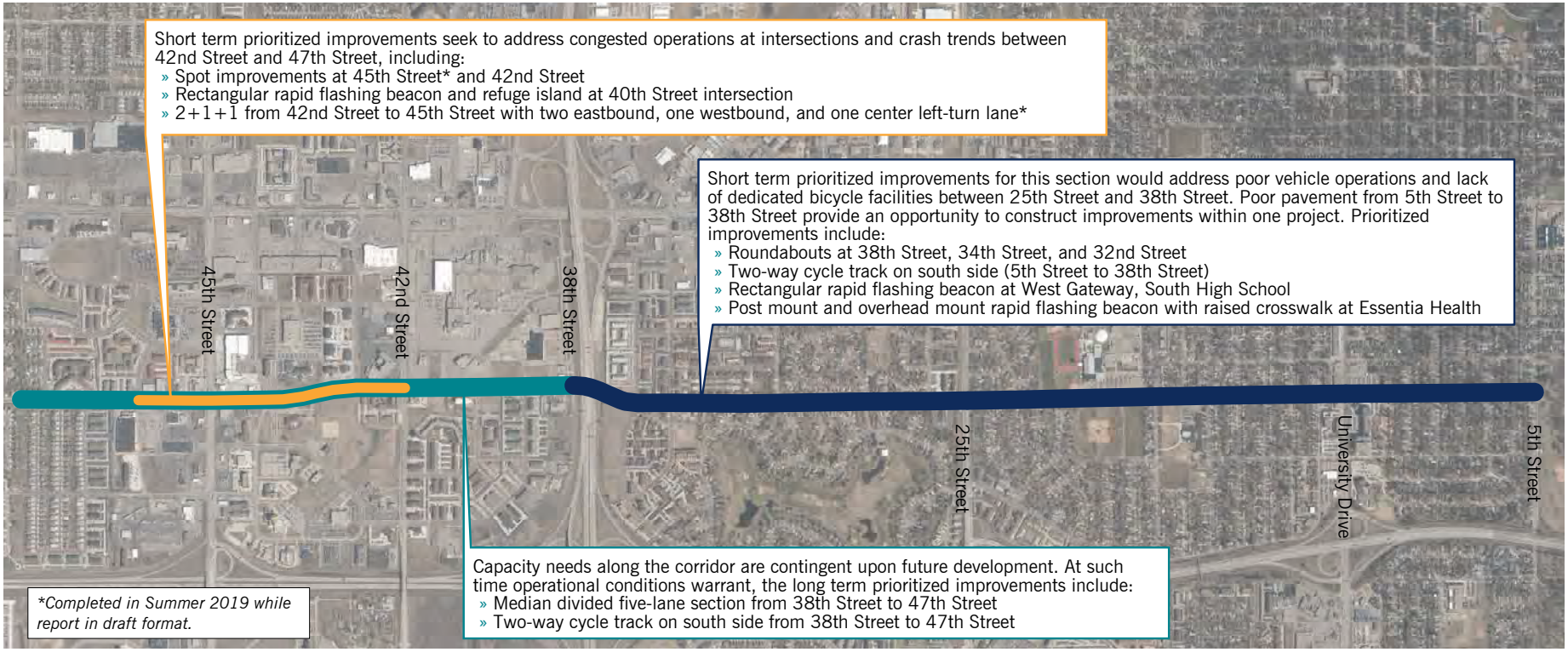
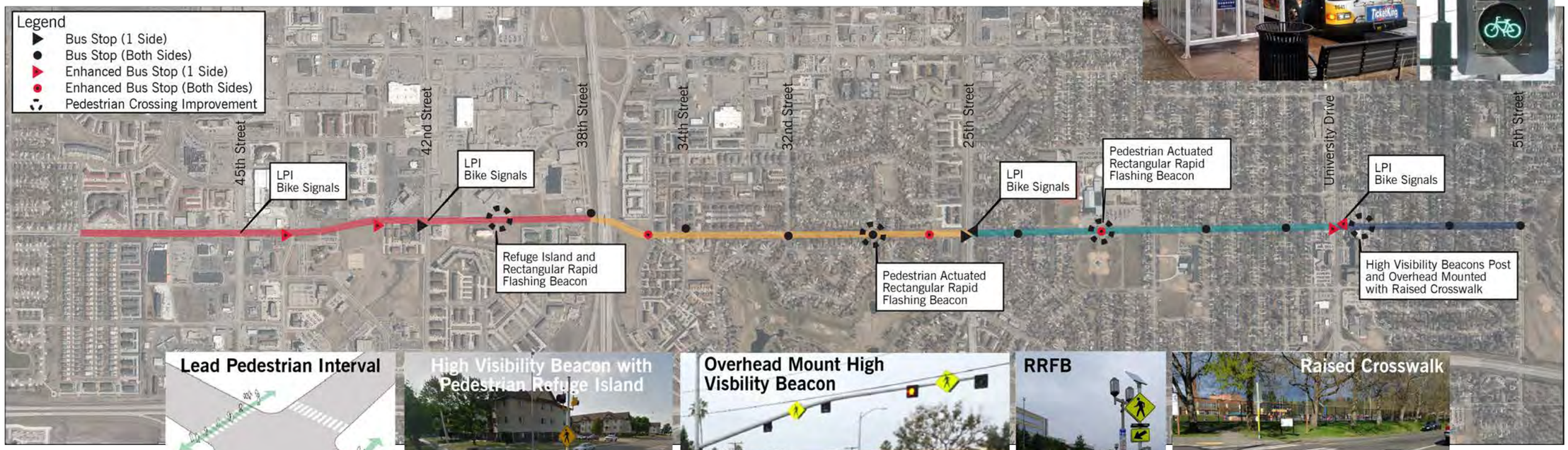


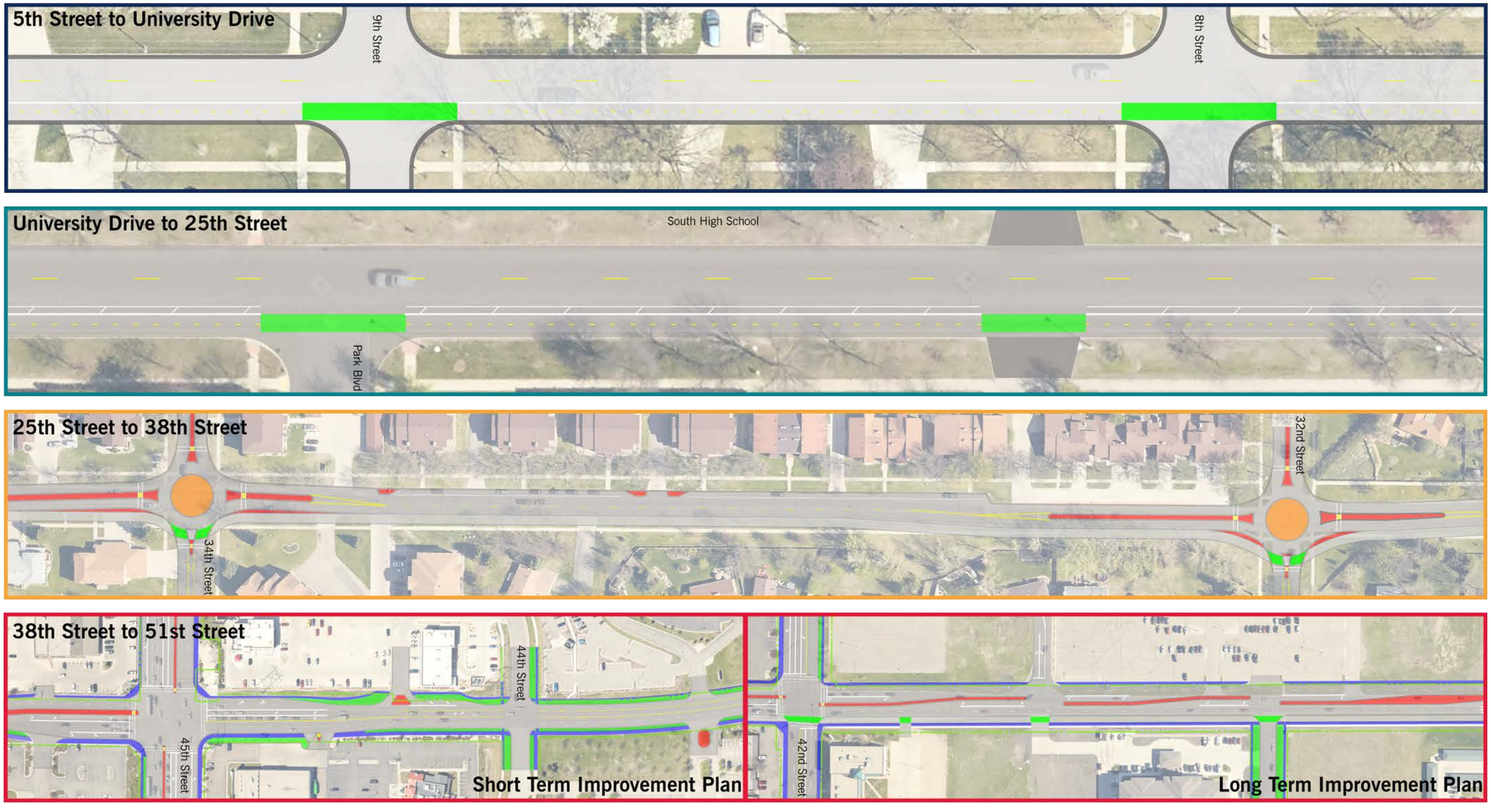
Figure 1.26: Multimodal Summary of Highest Ranked Alternatives

Summary of Highest Ranked Alternatives



Mode Category	Technical Score	Notes	Overall Score
Vehicular Efficiency	●●●●●●●●●●	Widening and spot improvements in the west segment improve vehicle operations and safety. Roundabouts at 38th Street, 34th Street, and 32nd Street intersections improve vehicular operations and safety and act to calm traffic, preserving the residential nature of the corridor.	●●●●●●●○○○
Bicycle and Pedestrian Mobility	●●●●●●●●●●	A continuous, dedicated, and separated bicycle facility improves bicycle mobility and safety. Pedestrian crossing improvements improve pedestrian safety and mobility.	
Cost and Impacts	●○○○○○○○○○	Large construction impacts, particularly on the west side to accommodate all improvements. Roundabouts on the east side may require ROW. Limited cost and impacts east of 25th Street.	

Summary of Highest Ranked Alternatives



EXISTING CONDITIONS

INTRODUCTION

Fargo's 17th Avenue is a heavily used corridor that stretches the entire length of the city. While it is primarily residential, the corridor supports some of the most intense retail and commercial development in the metro, including West Acres. It also serves two Fargo Schools (South High School and Lewis and Clark Elementary) and several of the largest parks in the metro, including Elmwood Park in West Fargo, Rabanus Park and Lindenwood Park in Fargo and connects to Gooseberry Mound Park in Moorhead. This corridor is an important roadway for all modes of transportation.

The purpose of this study is to understand the current and long-term vision of 17th Avenue to identify and analyze the impacts of potential improvements which will address declining operations and the identified need for a cross-town bicycle route. The first part of this process is an existing conditions assessment.

STUDY AREA AND BACKGROUND

The study area is broken into two segments:

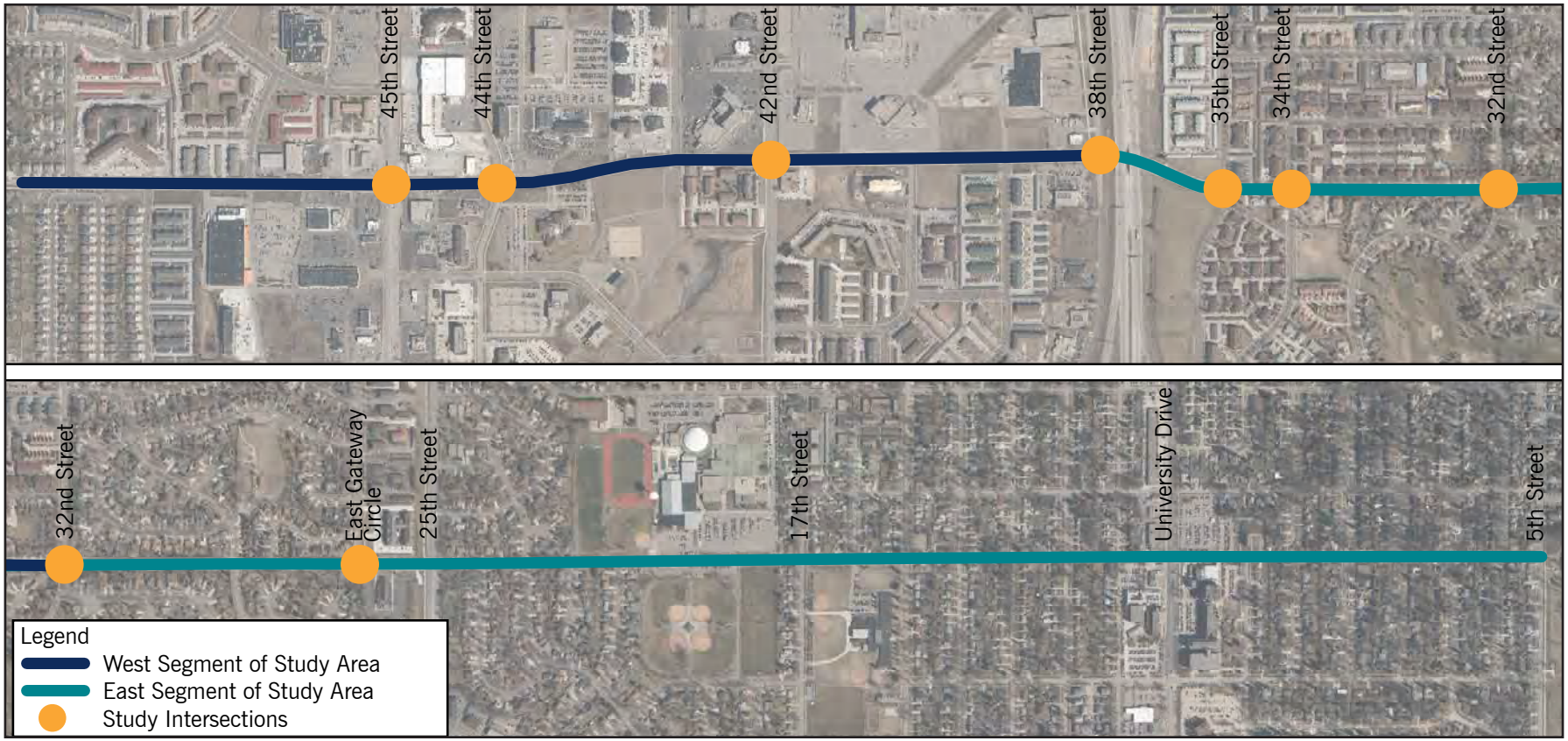
- The west segment from the western City of Fargo limits at 51st Street to 38th Street, which includes residential, commercial, and retail land uses. This segment is primarily three- and four-lane sections.
- The east segment from 38th Street to 5th Street, which includes primarily residential land uses. This segment is primarily a two-lane section.

Key intersections along the corridor were identified for analysis based on existing and future traffic volumes:

- 17th Avenue S & 32nd Street
- 17th Avenue S & East Gateway Circle
- 17th Avenue S & 34th Street
- 17th Avenue S & 35th Street
- 17th Avenue S & 38th Street
- 17th Avenue S & 42nd Street
- 17th Avenue S & 44th Street
- 17th Avenue S & 45th Street

Corridor extents and study intersections can be seen in Figure 2.1.

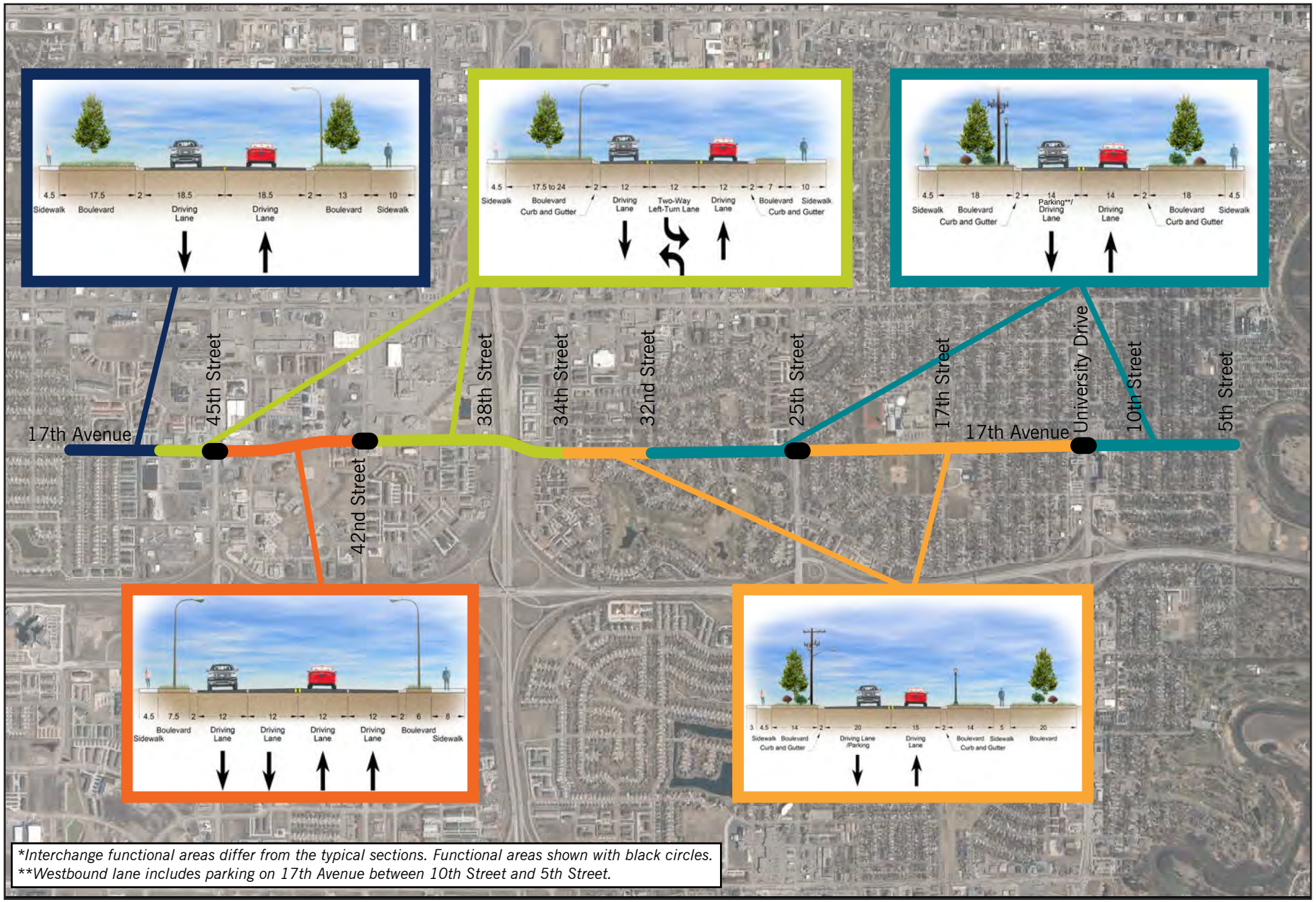
Figure 2.1: Study Area



Typical Sections

There are a variety of typical sections throughout the study area, as shown in Figure 2.2. As illustrated, there are varying degrees of pedestrian, vehicle and parking accommodations.

Figure 2.2: Typical Sections



*Interchange functional areas differ from the typical sections. Functional areas shown with black circles.
**Westbound lane includes parking on 17th Avenue between 10th Street and 5th Street.

Functional Classification

Roadways must balance access and mobility. The function of the roadway is dependent on classification; an interstate prioritizes mobility and has very strict access controls, permitting high speeds while a local road prioritizes access over mobility. Roadways that also have a functional classification are directly tied to the Federal-Aid Highway System and are eligible for federal transportation funding.

17th Avenue is functionally classified as a collector roadway for its extent from 51st Street to the Red River/5th Street boundary. The City of Fargo classifies the typical volume for a collector roadway between 5,000-9,999 ADT which 17th Avenue has surpassed along the west segment.

Typically, a collector roadway like 17th Avenue would primarily serve local traffic. While east of I-29, 17th Avenue is a primarily locally traveled corridor, 17th Avenue between 45th Street and 38th Street, is significant to regional traffic traveling to and from major commercial centers in Fargo. 17th Avenue is a convenient parallel roadway that supports I-94 and 13th Avenue, both designed to carry more regional traffic. I-94 is access controlled and heavily congested during peak hours. The nearest arterial to the south is 32nd Avenue, which is more than 1.5 miles away.

Figure 2.3: Functional Class Relationship to Access and Mobility

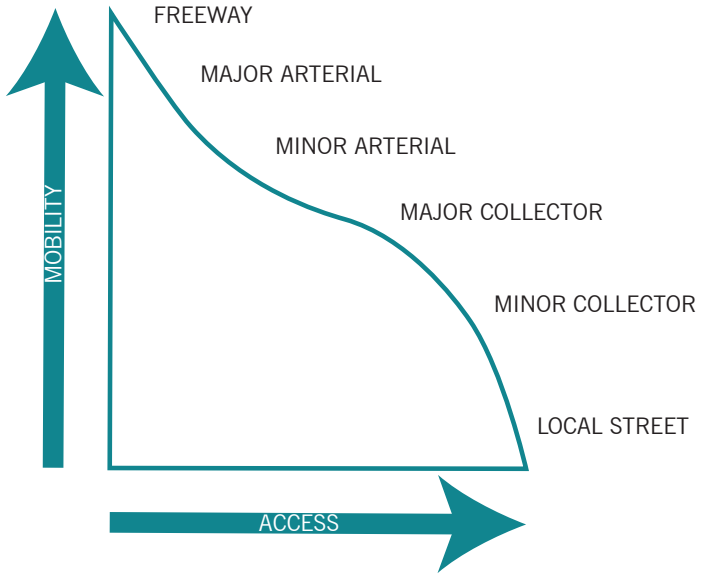
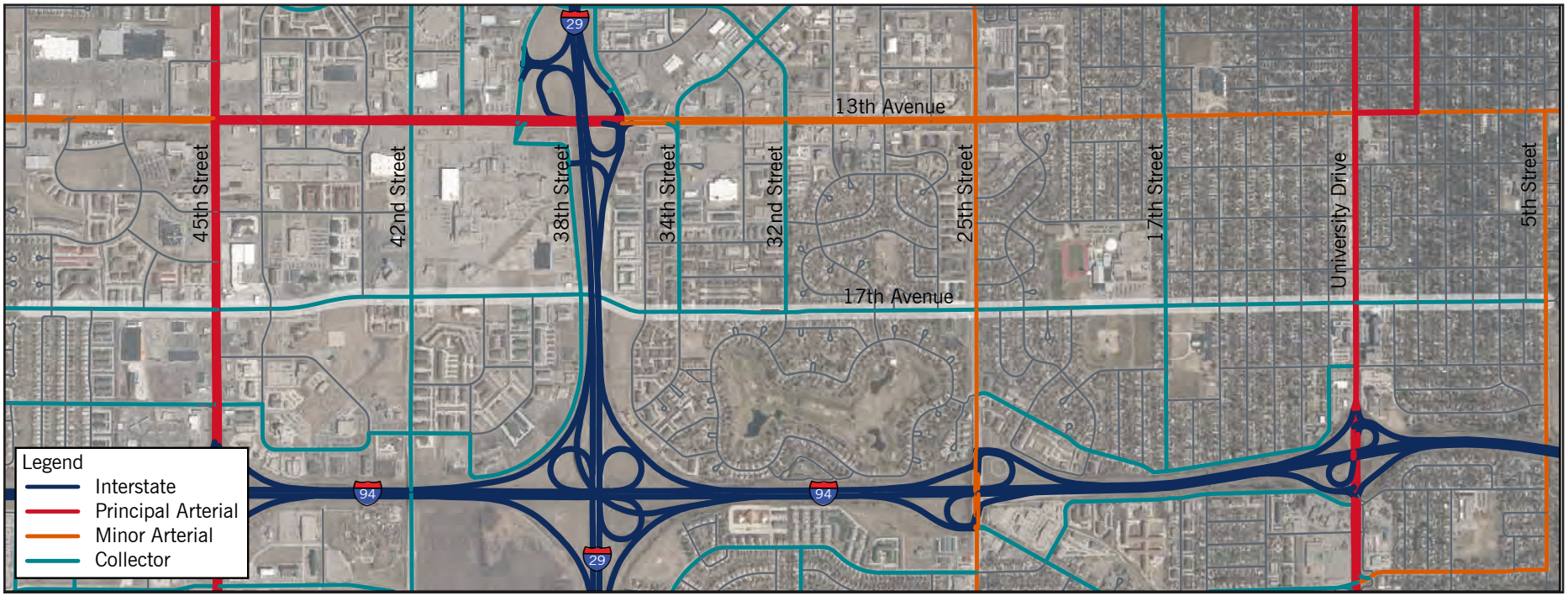


Figure 2.4: Functional Class Roadways in Study Area

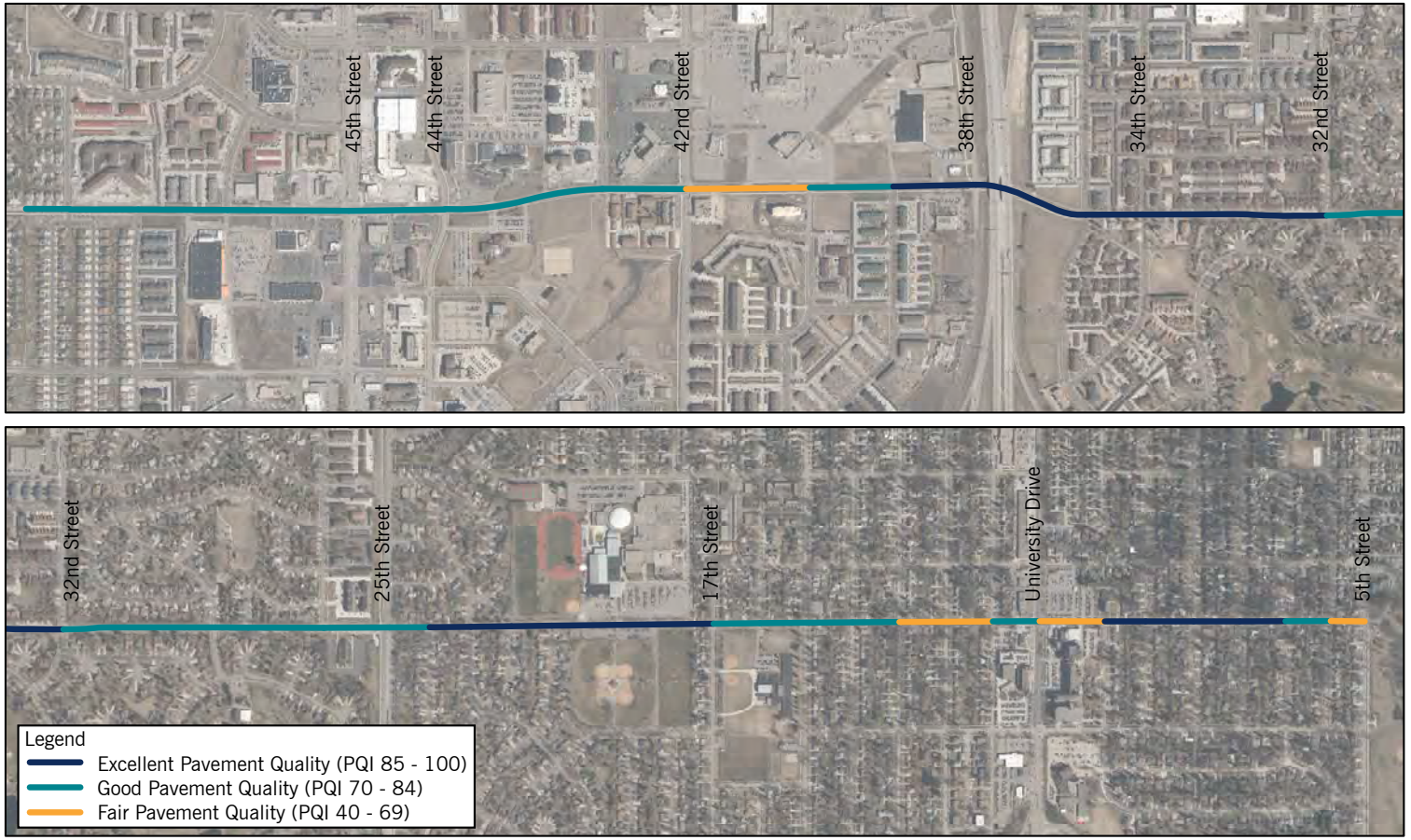


INFRASTRUCTURE
PAVEMENT CONDITIONS

Studies have found timely pavement rehabilitation has the potential to be six to 14 times more cost-effective than rebuilding a deteriorated road. Another study found that rough roads add an average of $515 to the annual cost of car ownership due to damaged tires, suspensions, reduced fuel efficiency, and accelerated vehicle depreciation.

The City of Fargo recently completed a Pavement Condition Survey. Results are shown in Figure 2.5. The Pavement Quality Index was used, with break points established in previous studies. A series of thin overlays have kept most of the pavement surface quality in "Fair" or better condition. However, there are significant areas of shifting and failing concrete east of 38th Street that will require reconstruction in the short term.

Figure 2.5: Pavement Conditions



17th Avenue was repaved in 2011 from 42nd Street to 45th Street and remains in good condition.

UTILITIES

Existing street lights are provided along the length of the corridor at an approximate spacing of 150 to 200 feet along the east segment and 200 to 250 feet along the west segment.

Overhead power lines run along the north side of 17th Avenue throughout most of the east segment. These power lines clutter the boulevard and can impact sight lines. Feasibility and cost will be analyzed if necessary later in this study.

RIGHT-OF-WAY

Existing right-of-way along the corridor is 80 feet for the east segment (30 to 36 feet curb-to-curb) and ranges from 80 to 100 feet (40 to 50 feet curb-to-curb) for the west segment. Existing right-of-way is adjacent to many houses

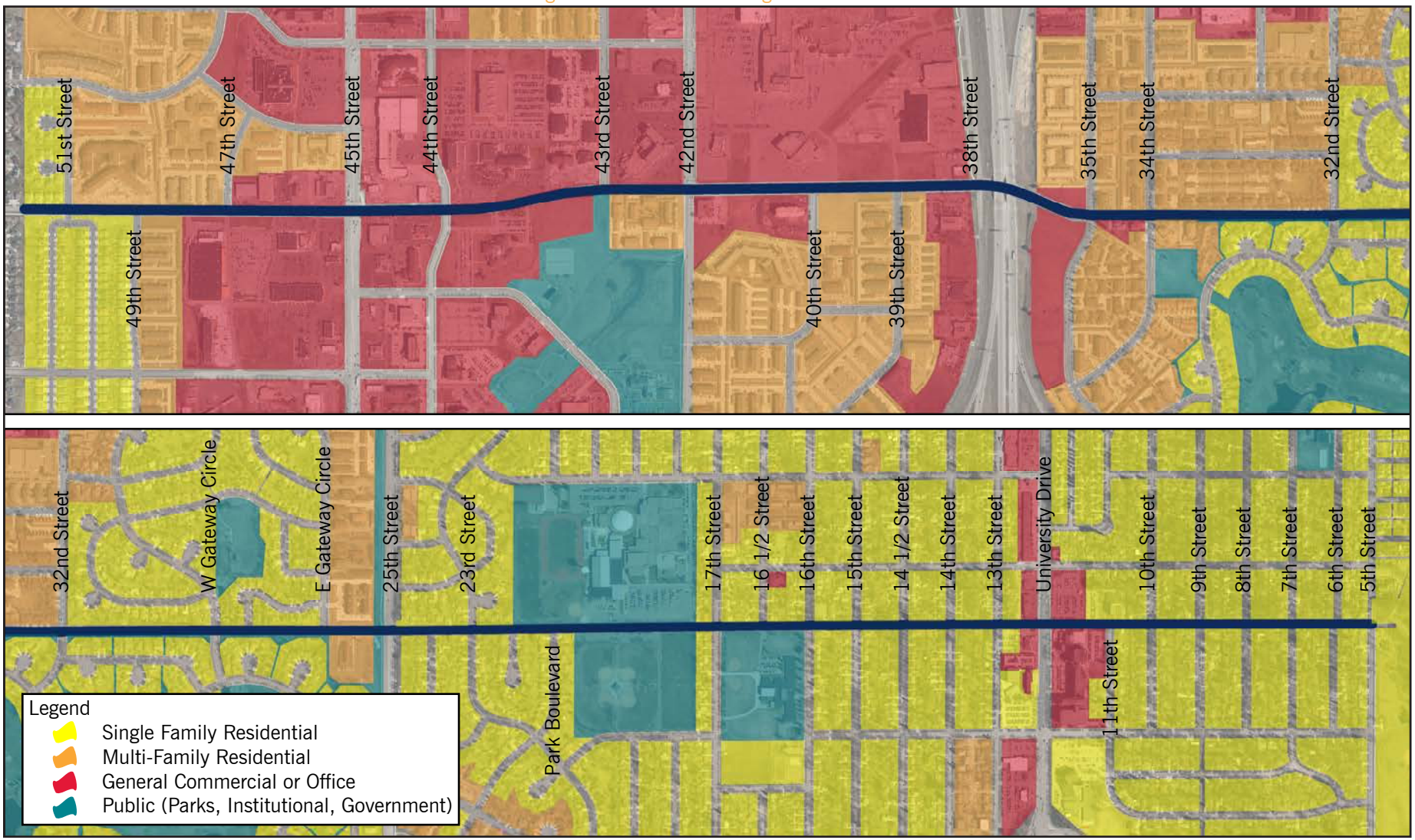
in the east segment and will present challenges utilizing the entire 80 feet of right-of-way.

Existing Land Use

Land use can have many implications on the characteristics of a neighborhood and the efficiency of its transportation network. For example, a neighborhood that is only residential requires commuting to work, results in unbalanced directional flows and strong peaking characteristics that reduces the roadway capacity. A neighborhood with only office uses means there will be few people in the neighborhood after work to support other types of businesses. However, a strong mix of residential, commercial, and office uses may support individuals working, shopping, and eating out closer to home, which minimizes the use of the transportation network and supports multimodal activity.

The 17th Avenue corridor extends through multiple multi-family, single-family and commercial and retail areas. The west segment is predominantly commercial and multi-family residential, while the east segment is primarily residential. Land uses are shown in Figure 2.6.

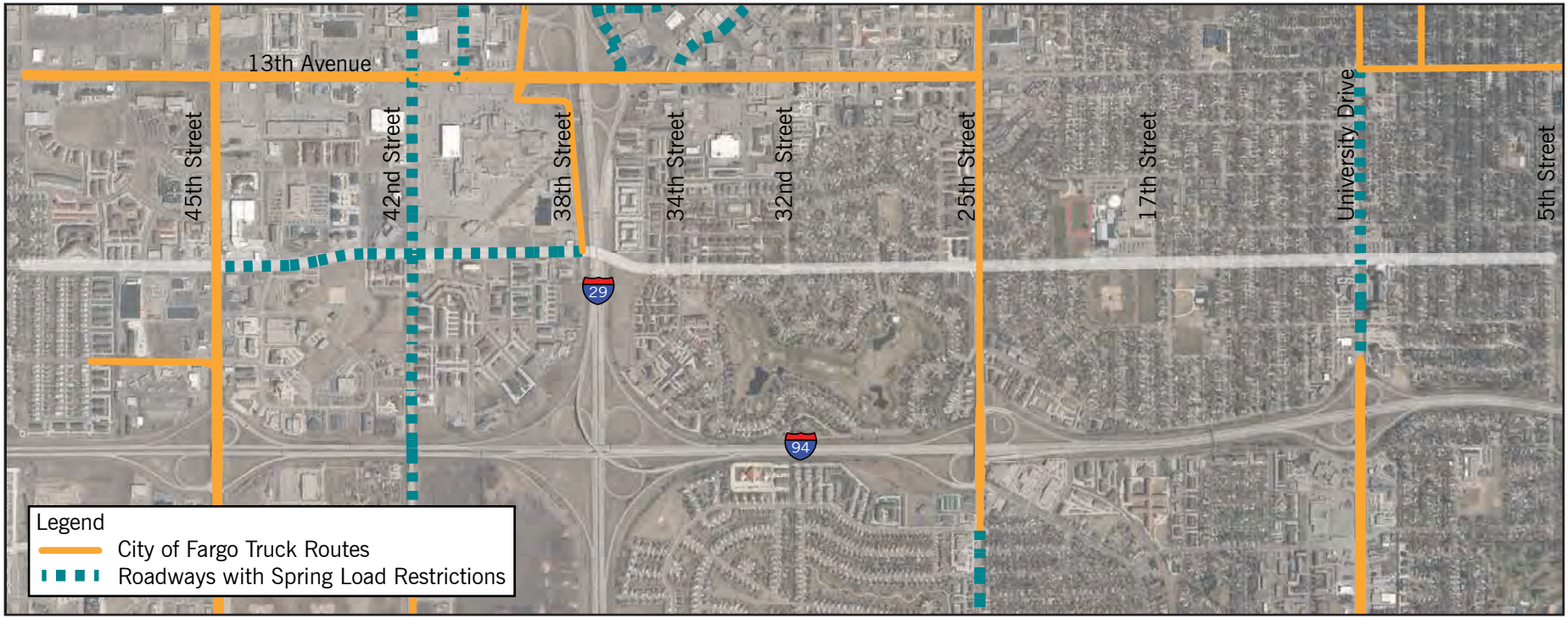
Figure 2.6: Land Use Along the Corridor



Truck Traffic

Approximately one to three percent of total traffic on 17th Avenue is heavy vehicle/truck traffic. The east section is closer to one percent, while the west segment is closer to the three percent. These truck percentages are typical of urban corridors, which on average experience two percent truck traffic. 17th Avenue is not a designated truck route, however the segment between 45th Street and 38th Street does have spring load restrictions.

Figure 2.7: City of Fargo Truck Routes



VEHICULAR ENVIRONMENT

Existing Traffic Conditions

TURNING MOVEMENT COUNTS

Turning movement counts were collected on 17th Avenue for the AM and PM peak hours at study intersections in June, 2017:

- 17th Avenue S & E Gateway Circle
- 17th Avenue S & 32nd Street
- 17th Avenue S & 34th Street
- 17th Avenue S & 35th Street
- 17th Avenue S & 38th Street
- 17th Avenue S & 42nd Street
- 17th Avenue S & 44th Street
- 17th Avenue S & 45th Street

Additional weekend counts on 17th Avenue were collected at

- 17th Avenue S & 38th Street
- 17th Avenue S & 42nd Street
- 17th Avenue S & 45th Street

The results of the traffic counts are reported in Figure 2.8 and Figure 2.9.

Figure 2.8: Weekday AM and PM Peak Hour Turning Movements

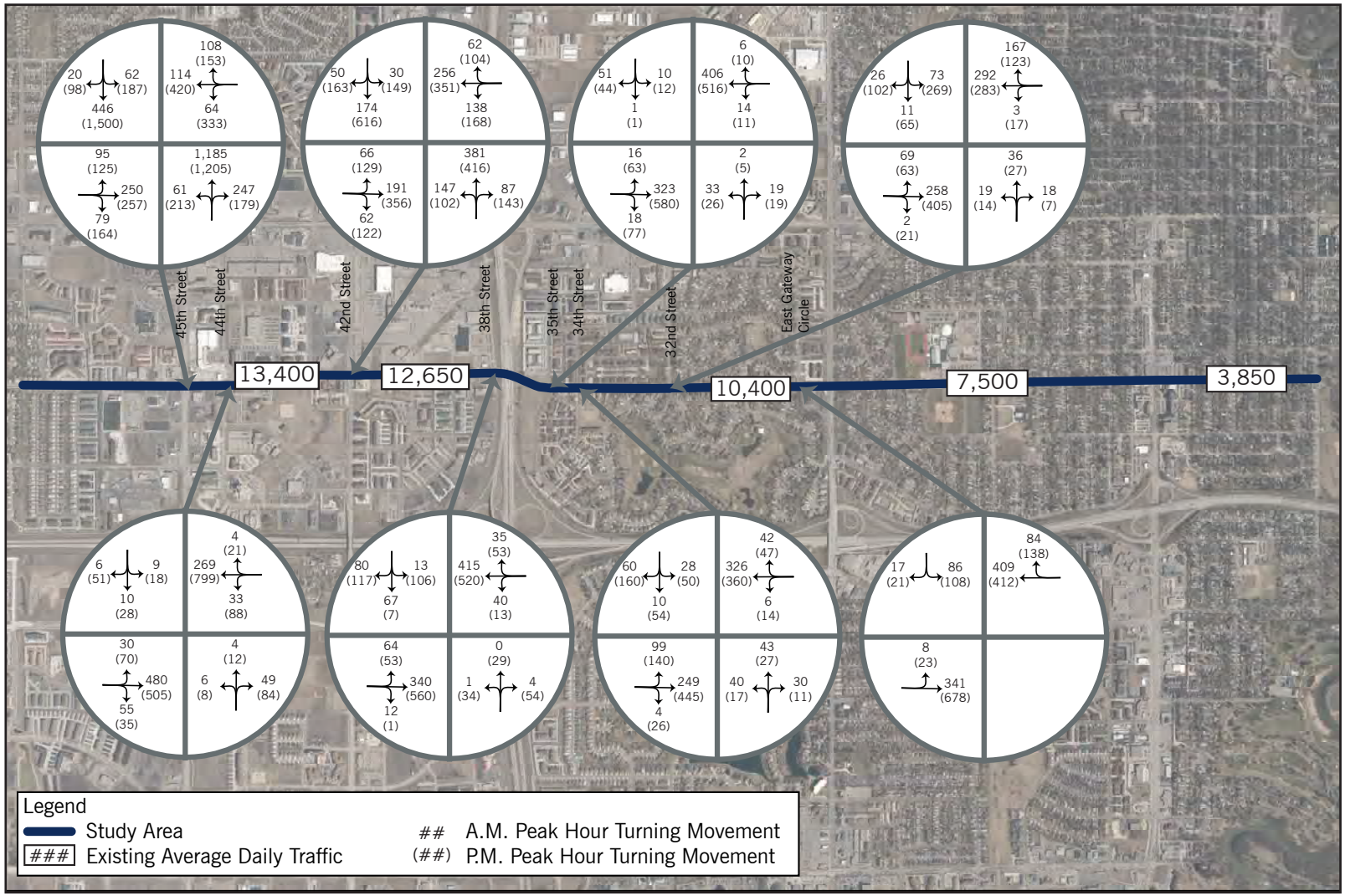
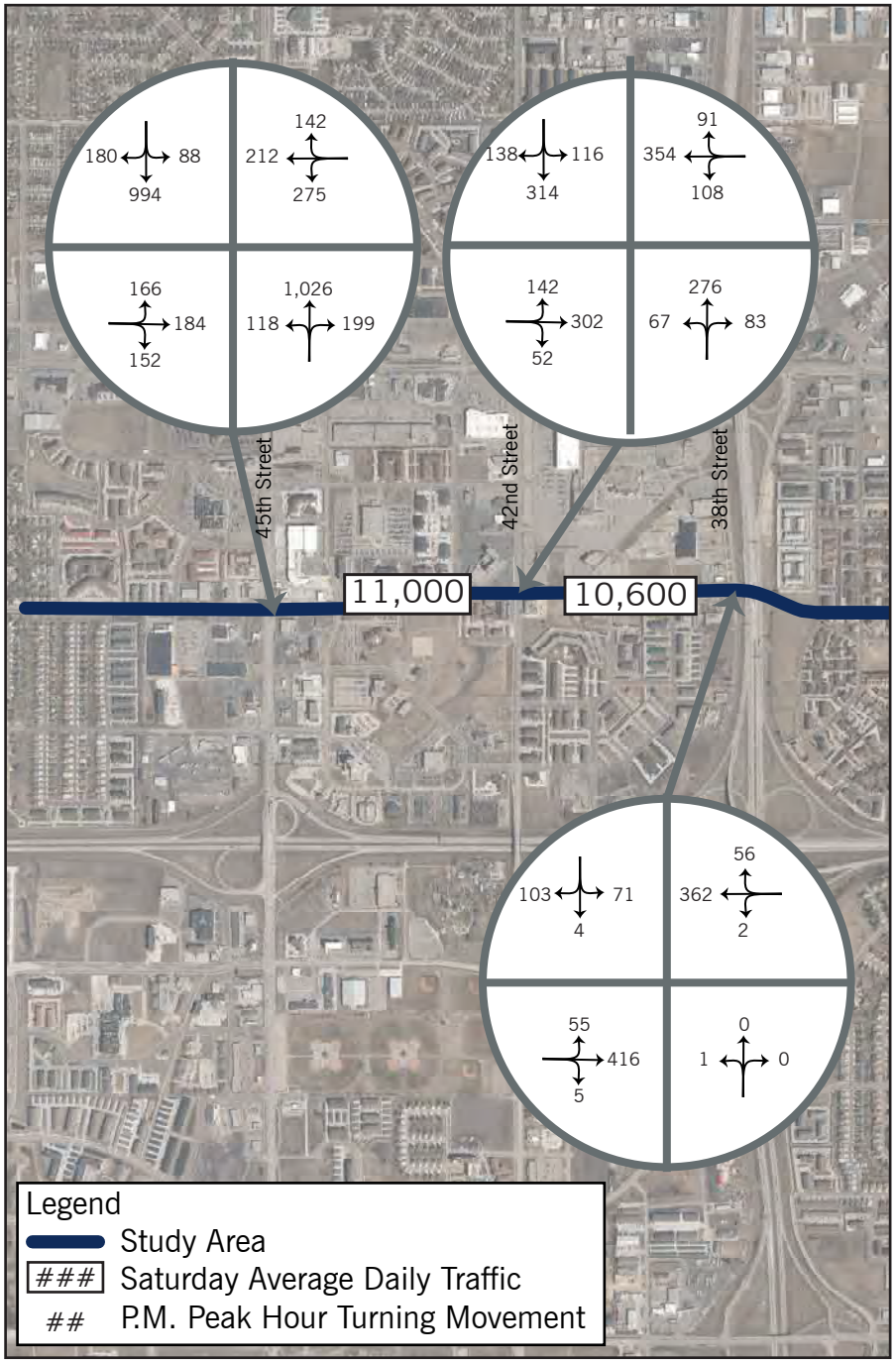


Figure 2.9: Saturday Afternoon Peak Hour Turning Movements



Traffic Distributions

In addition to turning movements, daily traffic volumes, distributions and speed data was collected using radar for the following segments of 17th Avenue:

- 45th Street to 42nd Street
- 42nd Street to 38th Street
- 34th Street to 32nd Street
- 25th Street to University Drive
- University Drive to 5th Street

Weekend daily traffic volumes and speed data was collected using radar for the following segments:

- 45th Street to 42nd Street
- 42nd Street to 38th Street

WEEKDAYS

Traffic distributions are shown in Figure 2.10.

- The east section of 17th Avenue is a mix of residential and public land uses with steady traffic throughout the day with pronounced AM, Midday, School, and PM peaks.
- The west section of 17th Avenue is primarily retail (West Acres Mall) and commercial with high density residential on the east side of I-29. This section has a pronounced AM peak but from 11:00 AM to 7:00 PM traffic is consistently high. Traffic is balanced between eastbound and westbound directions for both roadway segments.

WEEKENDS

Weekend traffic along west segment of 17th Avenue does not exhibit the same patterns as weekday traffic. Traffic continually increases along the corridor until a mid-afternoon peak and then decreases the rest of the night. Traffic along the east segment of 17th Avenue is expected to be lower than weekday traffic and consistent throughout the day.

TRAFFIC DISTRIBUTION TRENDS

The following distribution trends were observed:

- Between 38th Street and 42nd Street traffic volumes are mostly balanced until around 11 AM, when westbound traffic volumes are up to 34 percent higher. This is likely due to the significant amount of office space along 38th Street traveling to the commercial areas or getting onto I-94.
- Between 32nd Street and 34th Street, traffic volumes are mostly balanced until around noon, when eastbound traffic is up to 52 percent higher (4 PM). Commuters may be choosing 17th Avenue to access their homes instead of the heavily congested I-94.

Dramatic directional trends like those experienced on 17th Avenue is very unusual and will impact alternatives considered later in this study.

Figure 2.10:Weekday and Weekend Hourly and Directional Distributions

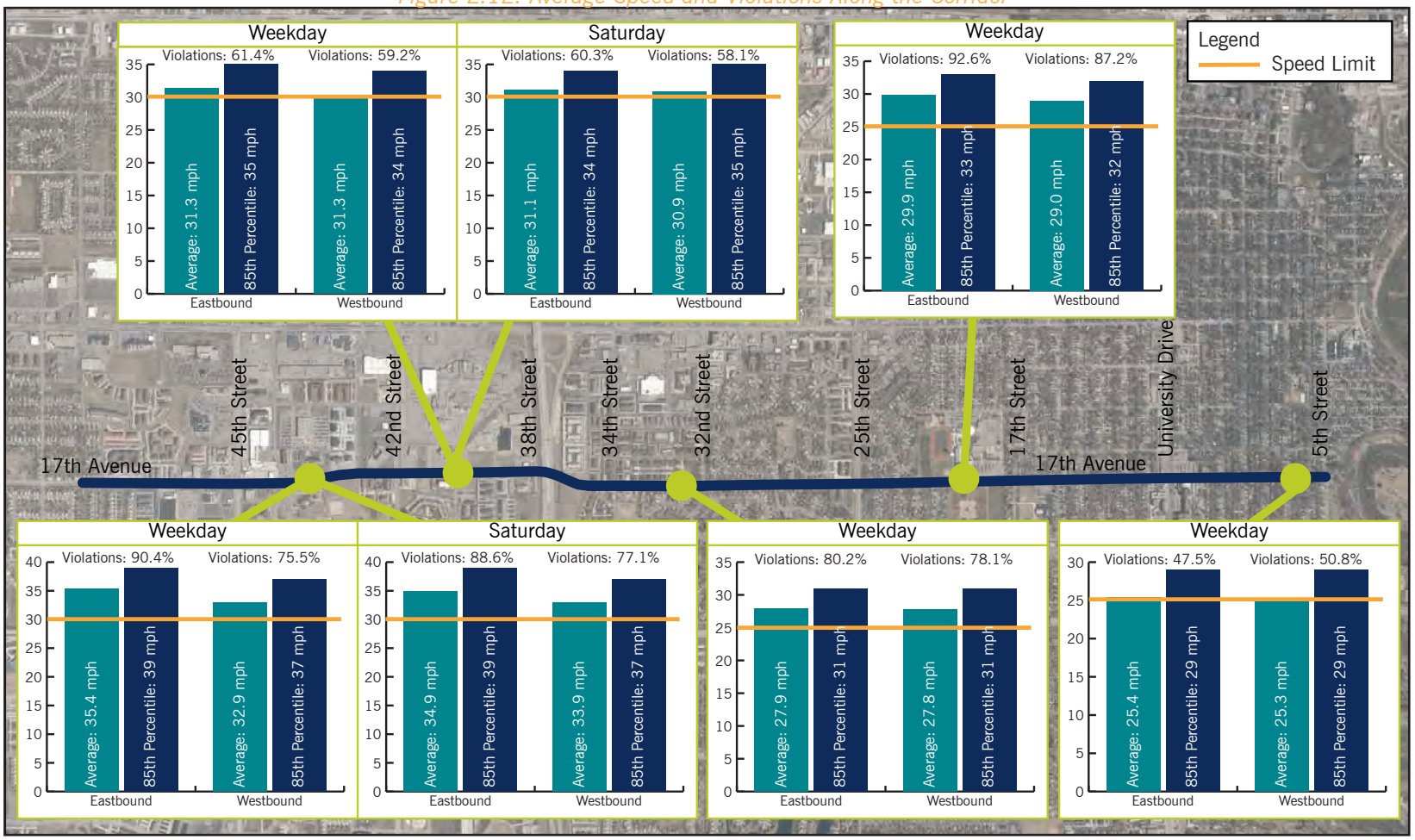
Speed

Research has shown that speeds a driver chooses to travel are a function primarily of roadway design, context, and congestion, not necessarily the posted speed limit. A summary of the speeds along the corridor is shown in Figure 2.12.

- The most significant speeding issues occurred between 45th Street and 42nd Street with 85th percentile speeds ranging from 38 to 40 miles per hour most of the day. The four-lane section in this segment, with limited congestion and development set back from the roadway likely contributes to a drivers likeliness to speed.
- The segment between 42nd Street and 38th Street has the fewest speeding violations. During peak hour, eastbound traffic speeding violations fall to 49 percent. This is likely due to congestion at the all-way stop control at the 38th Street intersection.
- The segment between 25th Street and 17th Street experiences the most speeding violations of any segment. On an average day, the eastbound direction has 14 hours and the westbound direction has seven hours of the day where 90 percent or more of drivers speed. The 85th percentile speeds for many of these hours are more than seven miles per hour over the posted speed limit (25 miles per hour).

Figure 2.11: Dynamic Speed Display

Figure 2.12: Average Speed and Violations Along the Corridor



There are two dynamic speed display signs (Figure 2.11), located west of 38th Street for westbound traffic on east of 32nd Street for eastbound traffic. These signs display a driver's actual speed and have been found to reduce average speed, 85th percentile speeds, and speeding violations.

Access Management

Access management is the process of balancing the competing needs of traffic movement and land access. Access points introduce conflict and friction into the traffic stream. Allowing dense, uncontrolled access spacing results in safety, operational, and aesthetic deficiencies:

- According to NCHRP Report 420, Impact of Access Management Techniques, every unsignalized driveway increases the corridor crash rate by approximately two percent.
- Research included in the Highway Capacity Manual found that roadway speeds were reduced an average of 2.5 miles per hours for every ten access points per mile.
- The safety and operational issues caused by dense access spacing potentially makes an area less attractive to developers and the general traveling public. Multiple national studies have shown most people have no problem making a slightly longer trip, including U-turns, to access destination businesses so long as the ride is pleasant and congestion free.

According to access management guidelines outlined in the City of Fargo Municipal Code, desired access spacing on a major collector roadway is 300 feet, with 150 feet being the minimum acceptable spacing between driveways. Within the 3.5 mile-long study area, there are more than 112 access points including private residential driveways, commercial business driveways, and local roadways.

Five of the seven segments have access points greater than the expected minimum spacing. For the east segment, many of these access exceptions are driveways offset along the block. On the west segment, there are many commercial access driveways that are not aligned with an access across from it. This provides an increase in conflicts between turning traffic to these accesses and presents a safety risk along the corridor.

Table 2.1: Access Point Spacing

Segment	Access Points[1]	Allowable Access Points Per Minimum Spacing[2]	% Over Allowable Access Points
5th Street - University Drive	35	18	94%
University Drive - 17th Street	28	17	65%
17th Street - 25th Street	15	13	15%
25th Street - 32nd Street	7	9	-
32nd Street - 38th Street	18	19	-
38th Street - 42nd Street	9	8	13%
42nd Street - 45th Street	15	9	67%

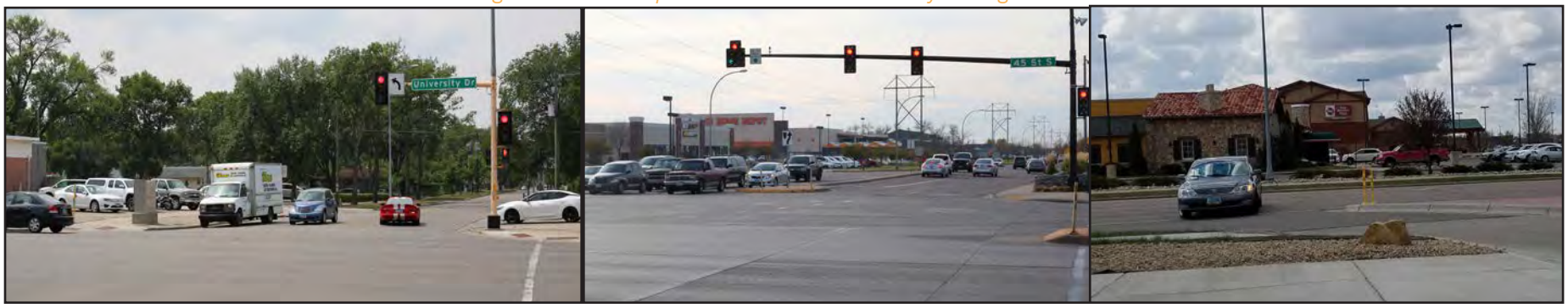
[1]Access points include starting termini. Counts aligned public access points as one access.
[2]Based on 150 foot minimum driveway spacing and 300 foot minimum access spacing In City Of Fargo access spacing guidelines.

ACCESS RISK

The traditional method of counting the number of access points along a corridor and comparing it to the maximum allowable accesses is flawed for two reasons:

- All access points are treated equally. This methodology treats a single-family driveway equal to an intersecting collector roadway carrying thousands of vehicles per day.
- All configurations are treated equally. For example, this methodology treats a right-in/right-out driveway with only three conflict points equal to a driveway with 32 conflict points.

Figure 2.13: Examples of Commercial Driveways Along Corridor



For this reason, Access Risk was used to identify areas of concern using four distinct factors to recommend locations where access modifications may be necessary:

- Activity – How many trips per day use the access point?
- Redundancy – Are there more suitable access points?
- Proximity – Is there adequate spacing between other access points?
- Accessibility – Can access be restricted to reduce conflict points?

To calculate access risk the following formula was used based on values from Table 2.2.

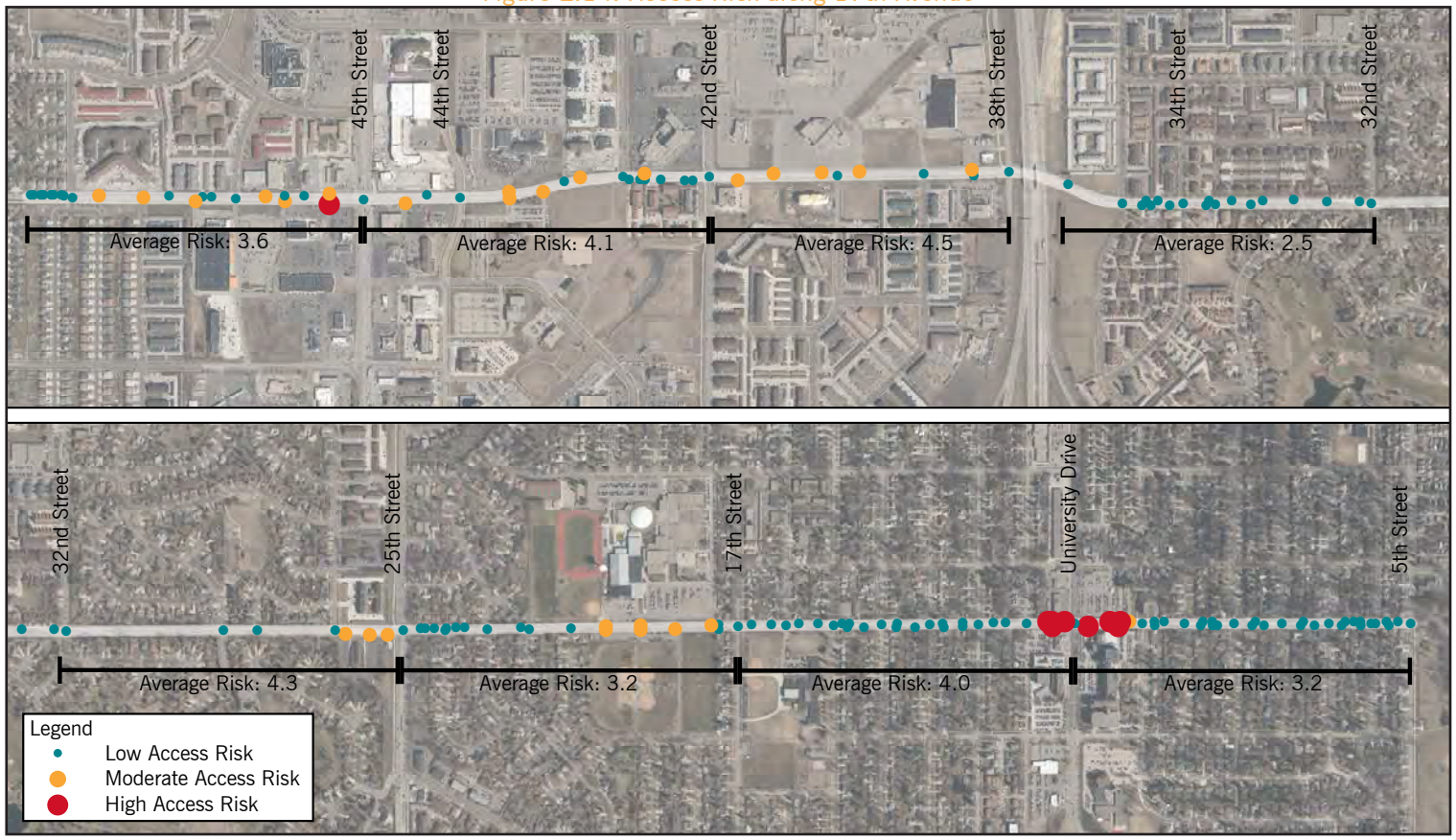
Access Risk = Activity x Redundancy x Proximity x Accessibility

The most significant areas of access risk are around the University Drive intersection and the commercial area west of 45th Street (Figure 2.14).

Table 2.2: Access Risk Scoring

Factor	Score
Activity	1 - Utility or Single Family Residential 2 - Multi-Family Residential or Local Roadways 3 - Commercial Driveway or Collector Roadway 4 - Any Other Roadway
Redundancy	1 - No Other Access 2 - Redundant Access
Proximity	1 - More than 300' from Arterial Roadway 2 - 150' to 300' from Arterial Roadway 3 - Less than 150' from Arterial Roadway
Accessibility	1 - Full Access 0.75 - for 3/4 Access 0.25 - for Right-In/Right-Out Access

Figure 2.14: Access Risk along 17th Avenue



Traffic Control

Appropriate traffic control is essential for efficient traffic operations and crash mitigation. Existing traffic control in the study area is shown in Figure 2.15.

WARRANT ANALYSIS

Selecting the appropriate traffic control device requires consideration of traffic patterns, volumes, roadway geometry, lane configurations, and multimodal aspects. The MUTCD provides guidance and standards on the installation of traffic control methods. The MUTCD considers vehicular volume, pedestrian volume, and crash frequency thresholds for multiple roadway contexts. Warrants were based on peak volumes projected to fit the daily volume distribution of the 17th Avenue Corridor created from daily counts collected for this study. Minor right-turn volumes were excluded for dedicated right-turn lanes and included for shared through/right lanes. Table 2.3 shows a summary of the traffic control analysis under existing conditions.

Table 2.3: Warrant Analysis

INTERSECTION	EXISTING TRAFFIC CONTROL	WARRANTS MET*				
		1A	1B	2	3	MWSA
East Gateway Circle	Two-Way Stop		X	X	X	
32nd Street	All Way Stop		X	X	X	X
34th Street	All Way Stop		X			X
35th Street	Two-Way Stop					
38th Street	All Way Stop					
44th Street	Two-Way Stop		X	X		

*Warrant 1a: Minimum Vehicular Volume *Warrant 1b: Interruption of Continuous Traffic
Warrant 2: Four-Hour Vehicular Volume *Warrant 3: Peak Hour *MWSA: Multi-way Stop Application

Figure 2.15: Traffic Control in the Study Area

Warrant Analysis results showed that four intersections met signal warrants at East Gateway Circle, 32nd Street, 34th Street, and 44th Street. The analysis also showed that the all-way stop at 38th Street was unwarranted due to minor approach volumes only satisfying the warrant in the PM peak period and not for eight hours of the day. Selecting the appropriate traffic control for study intersections needs to consider other factors beyond warrants including proximity to upstream traffic control, intersection spacing, and bicycle/pedestrian accommodations. Opportunities to evaluate alternative traffic control will be completed later in the study.

Traffic Operations

Corridor capacity was gauged via bottleneck analysis at the eight study intersections along the corridor. Intersection capacity analysis was evaluated in terms of delay and level of service (LOS). LOS is a term used to describe the operational performance of transportation infrastructures elements. Essentially, LOS is a grade value that corresponds to specific traffic characteristics within a given system. At intersections, LOS is a function of average vehicle delay, whereas LOS for a roadway section is defined by the average travel speed. LOS "E" or worse is considered deficient, in accordance with the *NDDOT Traffic Operations Manual* published June 2015. Capacity analysis was conducted using Synchro, which applies deterministic equations published in the *Highway Capacity Manual* (HCM). HCM capacity analysis is an industry and NDDOT standard.

Table 2.4: HCM LOS

Control Delay (Sec/Veh)		Volume < Capacity	Volume > Capacity
Unsignalized	Signalized		
≤ 10	≤ 10	A	F
> 10-15	> 10-20	B	F
> 15-25	> 20-35	C	F
> 25-35	> 35-55	D	F
> 35-50	> 55-80	E	F
> 50	> 80	F	F

Existing Levels of Service

Under existing weekday peak hour conditions, several intersections operate at unacceptable levels of service.

- 38th Street (AM and PM Peak Hour)
- 32nd Street (PM Peak Hour)

Due to heavy eastbound and westbound traffic in the PM peak hour, several of the study intersections have minor approaches operating at unacceptable levels of service. The eastbound approach at the 32nd Street intersection has a volume to capacity ratio of 1.03, making it the only study intersection to have a greater volume than capacity. Also, the minor approaches often see long queues that block driveway access and elevate crash potential. This is particularly prevalent at the 45th Street intersection, where the eastbound and westbound queues block multiple driveways even during the off-peak hours.

It is possible that the consecutive all-way stop control along the corridor at the 38th Street, 34th Street, and 32nd Street intersections meters traffic, preventing the full traffic demand from reaching adjacent high-volume intersections, like 42nd Street and 25th Street.

Existing weekend conditions operate at acceptable levels of service, but during holiday seasons and events at West Acres Mall these intersections are expected to degrade to unacceptable levels of service. Roadway corridors are not designed based on these event capacities (as event strategies are usually fit to the existing roadway), but holiday traffic is an important consideration if normal operations are nearing or over capacity.

Existing levels of service for weekday AM and PM peaks can be found in Figure 2.17. Weekend level of service can be found in Figure 2.18.

Figure 2.16: Queues on 17th Avenue at 38th Street Intersection

Figure 2.17: Weekday AM and PM Peak Hour Operations

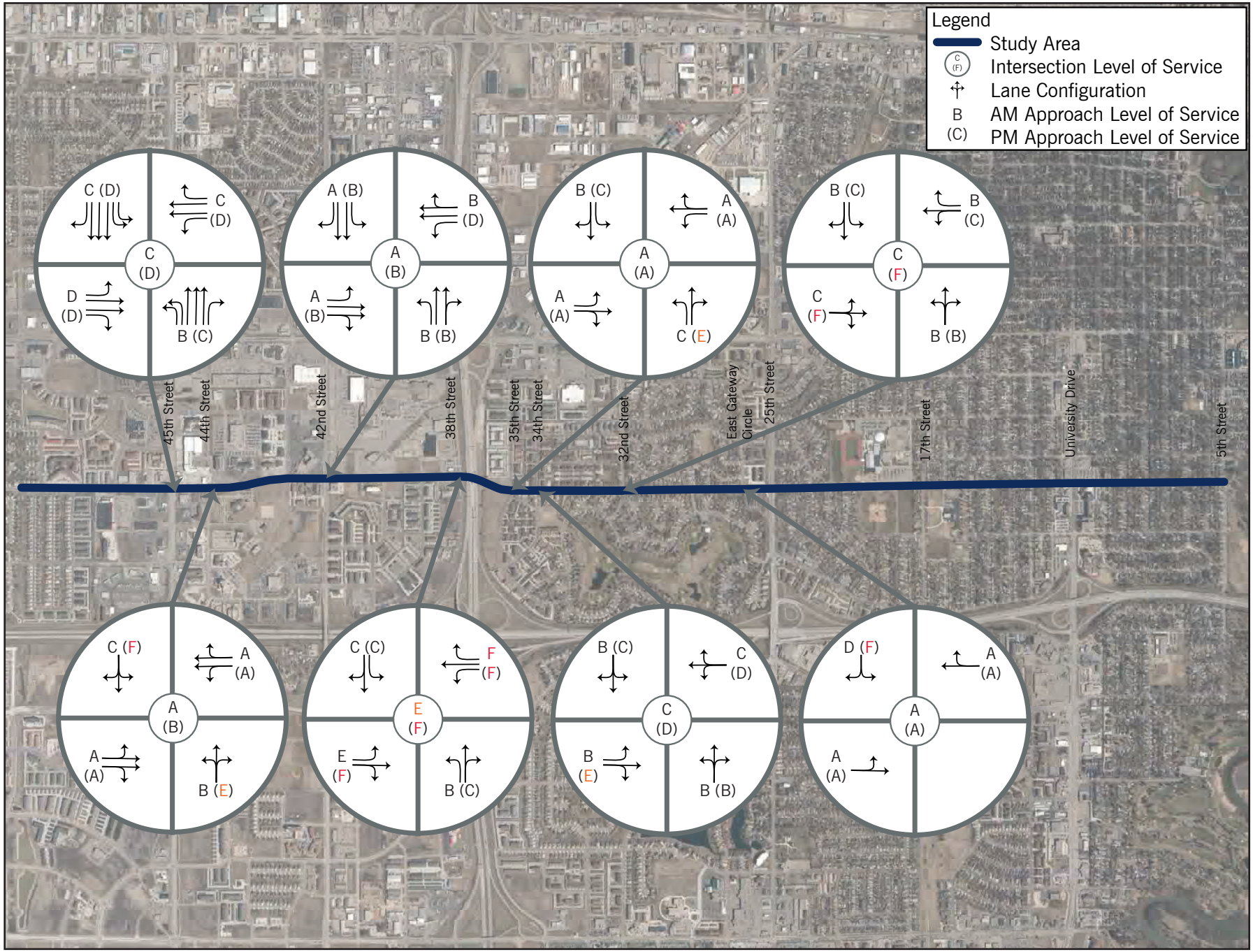
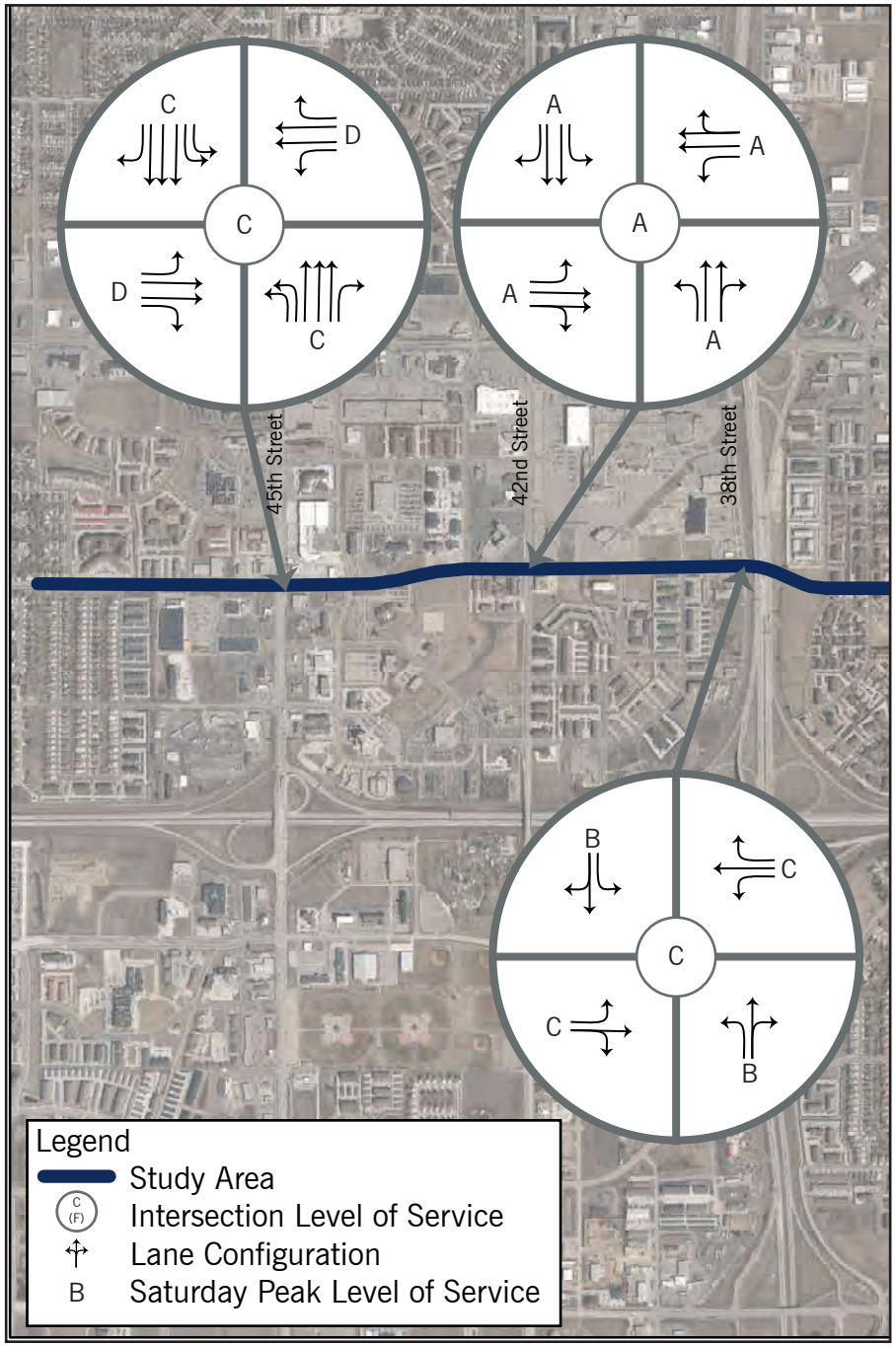


Figure 2.18: Existing Weekend Peak Hour Level of Service

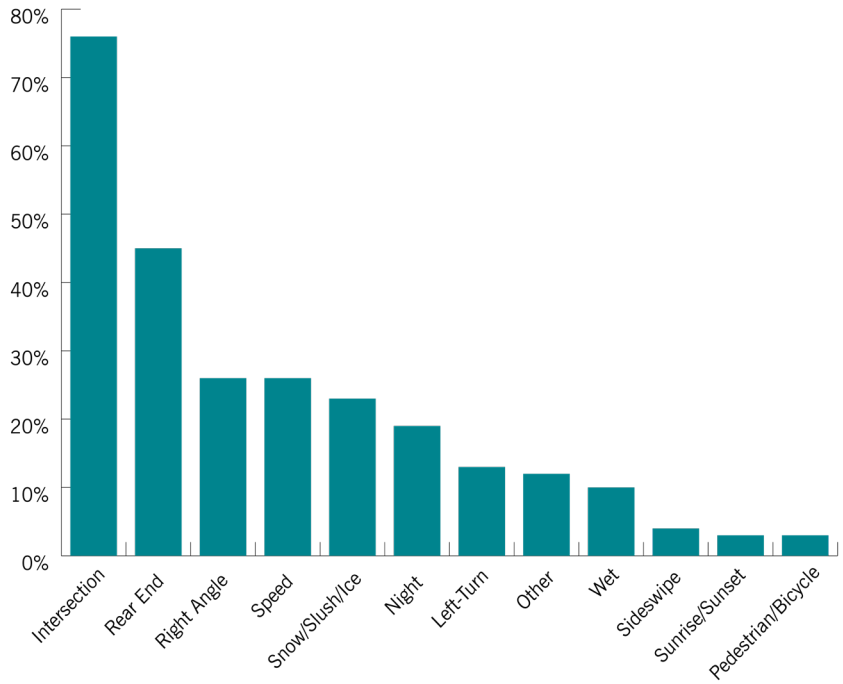


Crash History

Safety is of utmost importance when evaluating a corridor; reviewing historic crash information is vital to identifying deficiencies. Five years of crash records (January 1, 2012 to December 31, 2016) obtained from NDDOT shows 92 crashes per year in the study area. This includes 25 crashes per year resulting in an injury (includes the possible injury classification). The National Safety Council (NSC) estimates the economic impact of crashes based on wage and productivity losses, medical and administrative expenses, motor vehicle damage, and employer costs due to injuries. Based on this data, the total comprehensive costs associated with crashes in the study area was $1.17 million annually. Upon further review of the crash data, the following crash trends were identified:

- 76 percent of all crashes in the study area were intersection related crashes.
- 64 percent of all crashes in the study area happened between 1:00 PM and 7:00 PM.
- 22 percent of intersection crashes were rear-end type crashes on 17th Avenue.
- 49 percent of the 17th Avenue corridor crashes occurred at or between 42nd Street and 45th Street.

Figure 2.19: Crash Trends



CRITICAL HOT SPOTS

To identify overrepresented crash locations within the study area, a two-phase approach was adopted. First, crash frequency was studied to identify locations with the highest number of crashes. This is the most straightforward approach to determining locations susceptible to crashes. Crash frequency can be found in Figure 2.20.

Crash frequency ignores the rate at which crashes occur. Typically, intersections with a high number of crashes also carry high traffic volumes. Many times, a low volume intersection may have fewer overall crashes, but on a per car basis have a much higher susceptibility to crashes. Therefore, it is beneficial to identify which locations in the study area experience a statistically high crash rate.

To identify statistically significant crash rates, the critical crash rate method was used. This method was developed by the Minnesota Department of Transportation (MnDOT) and is included in the NDDOT Design Manual. The critical crash rate incorporates traffic volumes (million entering vehicles or MEV) and crash rates for a specific location and compares this rate against crash rates for similar facilities. Given the small study area, intersections and segments were compared against other study area intersections and segments as well as statewide rates from Minnesota. North Dakota does not provide this data.

Based on the critical crash rate analysis, six of the 11 intersections analyzed had observed crash rates greater than the critical crash rate for similar facilities, as shown in Table 2.6. This indicates that something site specific, operations, geometry, or other factor, could be contributing to the crash rates.

Based on the critical crash rate analysis, none of the study segments have observed crash rates greater than the critical crash rate for similar facilities, as shown in Table 2.5.

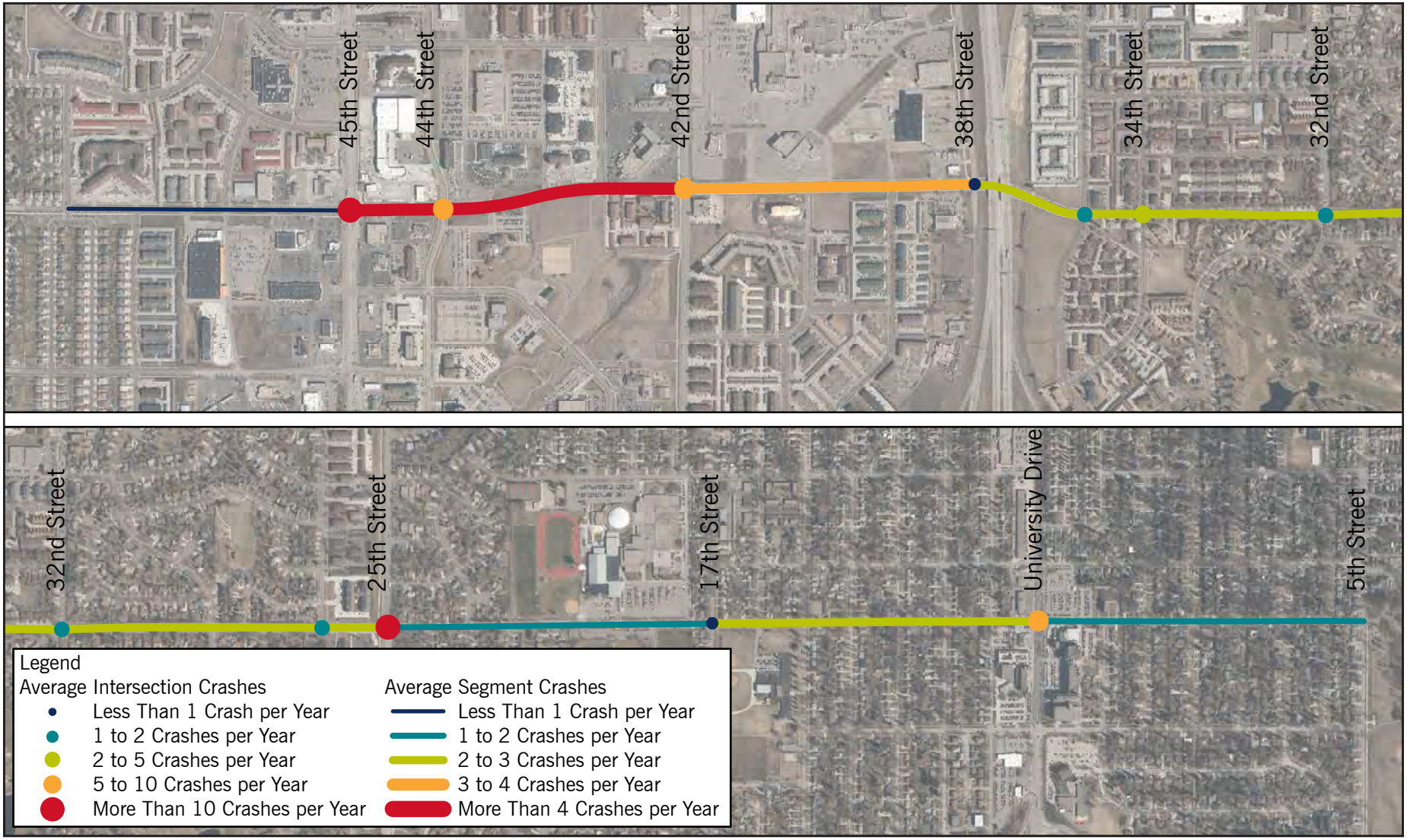
Table 2.5:Critical Crash Analysis - Intersections

Intersection	Traffic Control	MEV	Crashes	Observed CR	Critical CR
University Drive	Signal	58	38	0.66	0.77
17th Street	AWSC	12	5	0.42	0.84
25th Street	Signal	59	67	1.13	0.76
East Gateway Circle	TWSC	24	7	0.29	0.43
32nd Street	AWSC	22	10	0.45	0.70
34th Street	AWSC	23	25	1.09	0.69
35th Street	TWSC	21	10	0.47	0.45
38th Street	AWSC	24	4	0.16	0.68
42nd Street	Signal	52	43	0.82	0.78
44th Street	TWSC	34	39	1.13	0.39
45th Street	Signal	88	100	1.13	0.93

Table 2.6: Critical Crash Analysis - Roadway Segments

Segment	Roadway Type	MEV	Crashes	Observed CR	Critical CR
5th Street - University Drive	2-Lane	3	9	3.29	3.29
University Drive - 17th Street	2-Lane	5	14	3.07	3.53
17th Street to 25th Street	2-Lane	6	7	1.18	3.31
25th Street to 32nd Street	2-Lane	10	12	1.19	3.50
32nd Street to 38th Street	3-Lane	11	11	1.00	3.09
38th Street to 42nd Street	3-Lane	9	20	2.28	3.23
42nd Street to 45th Street	4-Lane	12	39	3.16	5.27

Figure 2.20: Crash Frequency



CRASH TREND ANALYSIS

Crash hotspots that were at or above the critical crash rate were identified to have a detailed review of the crash reports from January 1, 2012 to December 31, 2016 conducted. Improvement strategies will be developed and evaluated in subsequent chapters.

17th Avenue and 25th Street Intersection

67 crashes occurred at this intersection. Seventy percent of the crashes happened between 1:00 PM and 7:00 PM. Sixty percent of the total intersection crashes occurred on the northbound or southbound approaches. Forty percent of intersection crashes having wet or snow conditions as contributing factors.

The northbound to westbound left-turn was also identified as an at-risk movement with 11 left-turn type crashes at this intersection. This movement is a protected/permissive left-turn with heavy conflicting volume. The turn lane is also offset with a median which does not align with the opposite direction left-turn lane. Protected phasing for a larger part of the signal schedule or realigning the turn lane may mitigate this crash trend.

Figure 2.21: 17th Avenue and 25th Street Intersection

17th Avenue and 34th Street Intersection

25 crashes occurred at this intersection, 19 of which included a vehicle heading in the eastbound direction. This approach is currently the only multilane approach at the all-way stop controlled intersection. The eastbound and westbound approaches are not similarly aligned because of the eastbound dedicated left-turn lane which can cause confusion for eastbound and westbound drivers turning left. Eastbound volumes are 30 percent greater than westbound volumes and causes very long delays during the PM peak period causing frequent stop sign rolling.

Figure 2.22: 17th Avenue and 34th Street Intersection

Figure 2.23: Long Westbound Queues at 34th Street Intersection

17th Avenue and 35th Street Intersection

Ten crashes occurred at this intersection, with half occurring at dusk or nighttime. Sight lines, especially towards the west, are important to consider for minor approach traffic. These sight lines are also impacted from queueing caused by the all-way stops at 34th Street and 38th Street. Seven of the ten crashes were minor approach vehicles conflicting with major approach through traffic (one of which included a bicycle) and contributed to the 50 percent rate of possible injury crashes. All four approaches having dedicated left-turn lanes that may impact driver uncertainty at the intersection, especially on minor stop approaches.

Figure 2.24: 17th Avenue and 35th Street Intersection

Figure 2.25: Long Queues at Westbound 38th Street Impact Sight Lines at 35th Street

17th Avenue and 42nd Street Intersection

43 crashes occurred at this intersection, 30 percent of which happened during AM and PM peak hours. With over 40 percent of intersection crashes having wet or snow conditions, sight lines and speed are both factors to consider at this intersection. Seventy percent of the crashes were right angle or rear end type crashes. Speed and following distance was a factor in 34.9 percent of crashes. All of these trends are consistent with high speed signalized intersections, suggesting vehicles are driving too fast through the intersection. Adjusting yellow and all-red times may help mitigate this crash trend.

Figure 2.26: 17th Avenue and 42nd Street Intersection

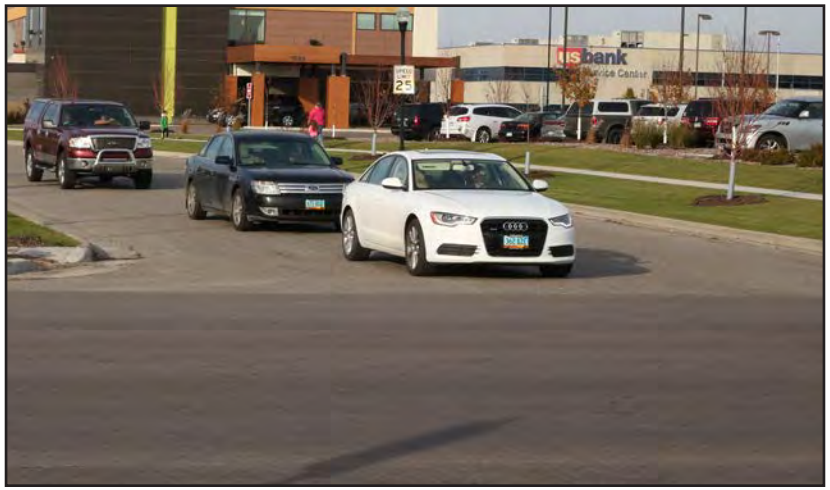
Figure 2.27: Eastbound at 17th Avenue and 42nd Street Intersection

17th Avenue and 44th Street Intersection

39 crashes occurred at this intersection. 27 of the 39 crashes were angle or left-turn type crashes, with 59 percent including southbound traffic. With existing accesses 210 feet to the west and 340 feet to the east of the intersection, speed and access are important characteristics for the cause of the elevated crash rate. Close access locations can cause driver indecision when identifying the speed and position of cross traffic especially from a two-way stop location. These issues are magnified due to queueing extending back from 45th Street which obstruct views of turning vehicles from 44th Street. This intersection is almost three times the critical crash rate further showing that improvements need to be made.

Figure 2.28: 17th Avenue and 44th Street Intersection

Figure 2.29: Southbound Queues at 44th Street



17th Avenue and 45th Street Intersection

100 crashes occurred at this intersection. 65 of these crashes rear-end type crashes with 44 of the rear-end crashes in the north-south directions. Long queues on 45th Street and poor signal progression can contribute to rear-end crashes. However, for the angle and left turn crashes, 15 of the 24 crashes (63 percent) included westbound traffic. The westbound lane drop to the east of the intersection does not appear to be an issue with only one westbound sideswipe crash. Due to the high volume of traffic using this intersection, long queues and unacceptable delay, the intersection and adjacent intersections are at a higher risk for crashes.

Figure 2.30: Long Westbound Queues at 45th Street Intersection

Figure 2.31: Long Southbound Queues at 45th Street Intersection

17th Avenue between 5th Street and University Drive

Nine crashes occurred along this segment. Six of the nine crashes were angle type crashes turning from a minor approach onto 17th Avenue. Three were possible injury crashes. Eight of the nine crashes occurred during the afternoon and evening peak hours when traffic volumes in the eastbound direction are highest along this segment of roadway. These crashes may be due to limited sight lines for minor turning traffic due to parked cars, trees and bushes, and power lines along the right-of-way.

Figure 2.32: 17th Avenue between 5th Street and University Drive

Other Trends

Other non-critical crash hotspots were identified on several other segments.

» From 32nd Street to 38th Street, there were 60 crashes. Of these crashes 23 percent (14 of 60) were rear-end type crashes on 17th Avenue. Seventeen of the 60 crashes on this segment occurred during the PM Peak Hour. Of these peak hour crashes, 53 percent (9 of 17) were rear-end crashes on 17th Avenue. Stop and go traffic and long queueing can contribute to rear-end crashes.

Figure 2.33: 17th Avenue at 32nd Street

» There were 221 crashes between 42nd Street and 45th Street, including the intersections and links. 23 percent were due to high speeds; 37 percent were left-turn or angle crashes; 28 percent were rear-ends or sideswipe crashes on 17th Avenue. These types of crash trends are common on four lane sections where high-speed through traffic conflicts with stopped left-turning traffic.

Figure 2.34: 17th Avenue between 42nd Street and 45th Street

» From 45th Street to 47th Street, there are five access points, including the Happy Harry's and Home Depot access, less than 150 feet from the 45th Street and 17th Avenue intersection. This driveway saw an average of three crashes per year for the last five years. Of these crashes, nine were angle crashes and three were left-turn crashes. These crashes occurred primarily due to queues from the 45th Street intersection which block site lines from the driveway.

Figure 2.35: Long Queues Block Driveway Access West of 45th Street

PEDESTRIAN, BICYCLE, & TRANSIT ENVIRONMENT

17th Avenue provides direct connection to several of the largest parks in all three metro communities: Lindenwood Park, Rabanus Park and South High School Parks in Fargo, Gooseberry Park in Moorhead, and Elmwood Park in West Fargo. 17th Avenue is an excellent combination of quiet roads, key infrastructure (I-29 underpass and Red River Bridge to Moorhead), connections to major generators (four regional parks, mall, etc.), and central location in the metro to serve as the backbone for the entire network (Figure 2.37).

17th Avenue has long been identified as a desirable bicycle route. Previous recommendations called for a trail section to connect existing shared-use trails to the west of 35th Street to existing shared bike lanes on 17th Avenue to the east of 7th Street. With a high number of existing pedestrian, bicycle, and transit users already utilizing the corridor (up to 14 crossings per hour at study intersections), it is important to provide future alternatives that provide a necessary multimodal focus. These alternatives will include complete streets recommendations, pedestrian walkability, bicycle infrastructure, and the ability to provide reliable transit service.

Figure 2.36: Cyclist and Pedestrian along 17th Avenue

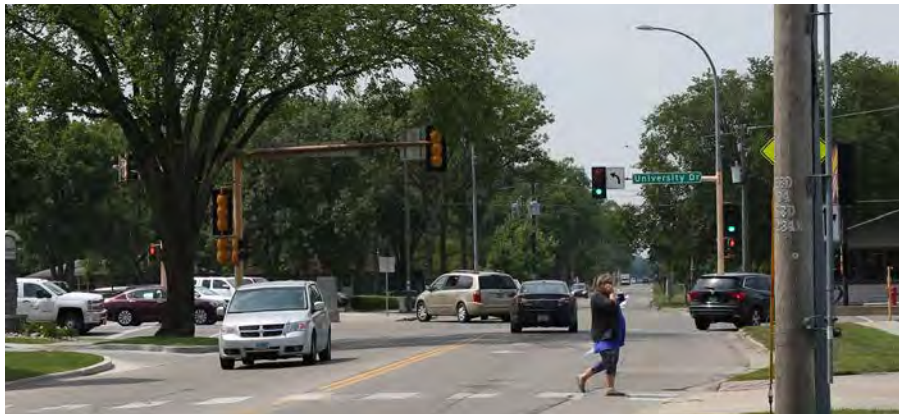
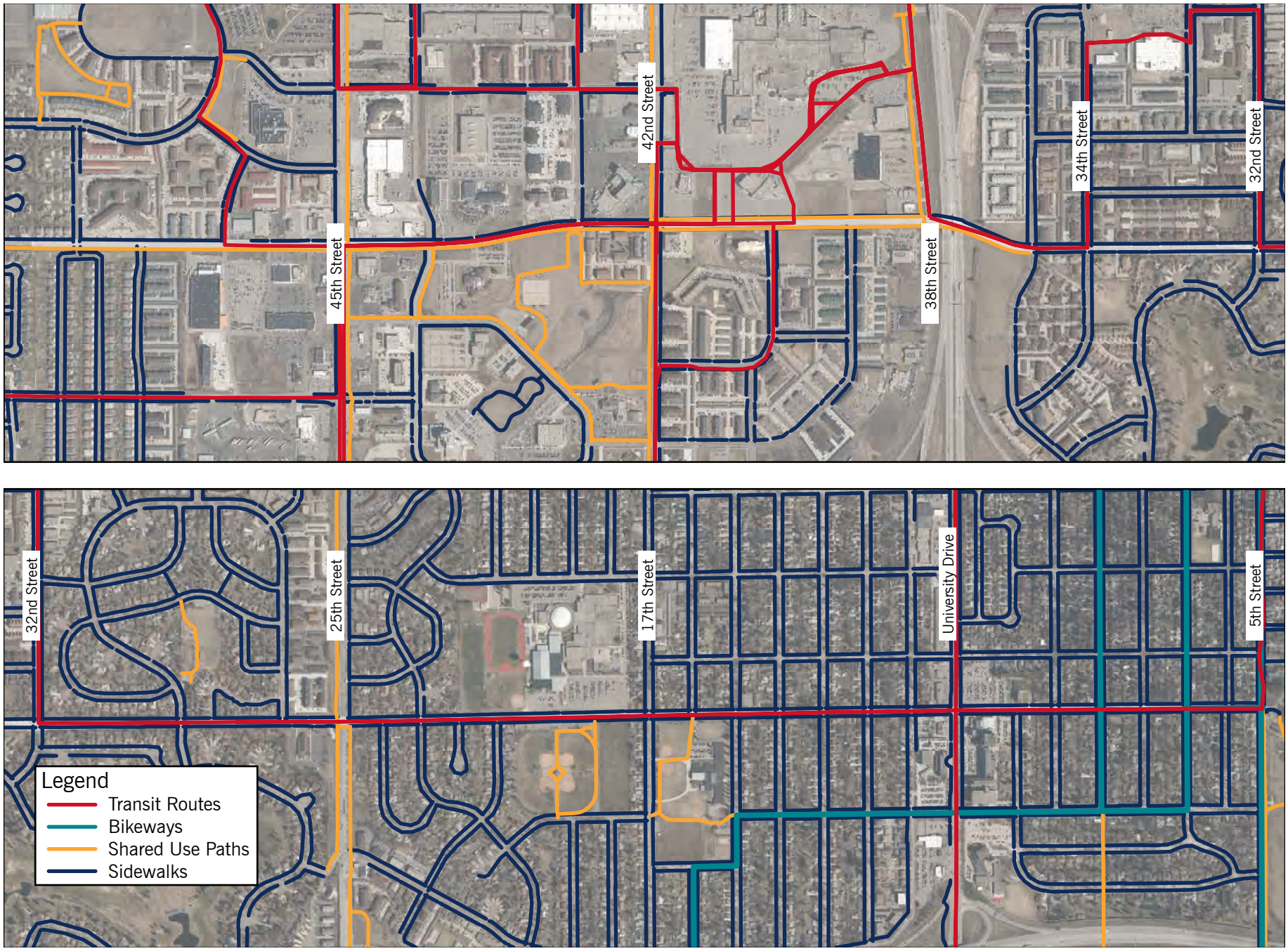


Figure 2.37: Pedestrian, Bicycle, and Transit Facilities

Figure 2.38: Pedestrian, Bicycle, and Transit Facilities



Complete Streets

In urban areas, walking and biking are important components of the transportation system. Enhancing the ability of travelers to walk or bike involves providing adequate infrastructure and linking urban design, streetscapes, and land use to encourage walking and biking. Designing roadways to accommodate all types of users is commonly termed “complete streets”. This type of roadway design offers many benefits:

- Streets designed with sidewalks, raised medians, traffic-calming measures and treatments for travelers with disabilities improves pedestrian safety. Research has shown that sidewalks alone reduce vehicle-pedestrian crashes by 88 percent.
- Multiple studies have found a direct correlation between the availability of walking and biking options and obesity rates. The Centers for Disease Control and Prevention recently named adoption of complete streets policies as a recommended strategy to prevent obesity.
- Complete streets offer inexpensive transportation alternatives to roadways. A recent study found that most families spend far more on transportation than food.
- Research has found that people who live in walkable communities are more likely to be socially engaged and trusting than residents living in less walkable communities.

Metro COG and its member local units of government approved the Fargo-Moorhead Metropolitan Area Complete Streets Policy Statement (2010). This report is designed to follow that guidance.

Pedestrian Facilities and Amenities

Current City of Fargo ordinances require sidewalks on both sides of the roadway built no less than 4.5 feet in width for residential areas. Sidewalks of varying width, from 4.5 to eight feet, are present throughout the study corridor on both sides of 17th Avenue.

CROSSING LOCATIONS

With several signalized and all-way stop controlled intersections, there are a number of protected pedestrian crossing locations along the corridor. Additionally, a beacon is provided at the midblock crosswalk location near Essentia Health, east of University Drive; an unprotected midblock crosswalk is painted near South High School; multiple uncontrolled painted crosswalk locations are provided throughout the corridor. Marked crosswalks alone do not improve pedestrian safety for certain contexts, and in certain contexts with high volumes and speeds they can negatively affect pedestrian crossing safety. They should be used with other safety strategies like pedestrian refuge islands, curb extensions and appropriate signage.

Research has shown pedestrians are unlikely to walk longer distances to use a protected crossing and will choose a more convenient crossing, even if it is less safe. As both pedestrian and vehicular traffic increase, conflict potential will also increase. Thus, it is important to include frequent controlled pedestrian crossings in highly traveled pedestrian corridors especially around South High School, Essentia Health, and West Acres Mall. These improvements are evaluated in the Alternatives Analysis chapter.

Figure 2.39: Pedestrians Crossing 45th Street

Figure 2.40: Pedestrian LOS

PEDESTRIAN LOS

NCHRP 616: Multimodal Level of Service Analysis for Urban Streets provides a formula to calculate a pedestrian level of service for an area that is reflective of the perspective of pedestrians sharing the environment with vehicles. This formula incorporates the existence of sidewalks, separation from motorized vehicles, vehicle volumes, and speeds. Elements of this methodology were incorporated into the 6th Edition of the Highway Capacity Manual (HCM). However, this methodology was found to be preferable over the HCM methodology because of its focus on the user perception. The specific pedestrian facilities' level of service is shown in Figure 2.40. Overall, the study corridor has an average level of service "A".

Bicycle Facilities and Amenities

17th Avenue between 35th Street and 5th Street was identified as a top 10 bicycle network gap in the most recent Fargo-Moorhead Metro COG Bicycle and Pedestrian Plan. The entire 17th Avenue corridor was also identified as an "Active Living Street" in the GO 2030 Plan, designed to support multiple modes of transportation.

Shared use paths support bicycling activity from 35th Street west to 51st Street and the City of Fargo Border. East of 35th Street however, many other existing gaps and barriers are apparent, and need to be overcome before this corridor achieves its vision as an active living street. Barriers include challenging uncontrolled crossings, high volume intersections, dense access spacing, limited right-of-way, school zones, poor pavement conditions, and others. Barriers are shown in Figure 2.43.

Figure 2.41: Bicyclists on East Segment of 17th Avenue

TYPES OF CYCLISTS AND THEIR BEHAVIOR

National research has found that there are generally four levels of interests/ abilities when it comes to cycling.

- Strong and Fearless riders are those that are very comfortable without bike lanes. They will ride under most roadway and traffic conditions.
- Enthused and Confident riders will ride their bikes with appropriate infrastructure.
- Interested but Concerned riders are interested in biking more but are not comfortable with the infrastructure or have other barriers to biking.
- No Way No How are unable or uninterested in bicycling and no change to the environment or infrastructure is likely to encourage them to cycle more.

Figure 2.42: Distribution of Cyclist Types in the General Population

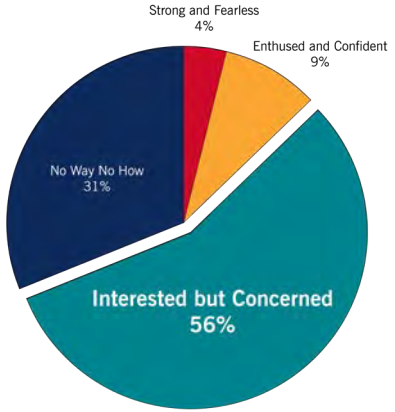


Figure 2.43: Bicycle Barriers in East Segment of 17th Avenue

Nearly three-quarters of Strong and Fearless, Enthused and Confident, and Interested but Concerned cyclists had ridden at least once in the last 30 days for transportation or recreation. Improving infrastructure and the environment can help encourage these three types of cyclists to choose bicycling more.

BICYCLE LOS

NCHRP 616: Multimodal Level of Service Analysis for Urban Streets also provides a formula to calculate the bicycle level of service for an area that is reflective of the perspective of bicyclists sharing the environment with vehicles. This formula incorporates the travel lane width, vehicle volumes, speeds, heavy truck traffic and pavement condition. Elements of his methodology were incorporated into the 6th Edition of the Highway Capacity Manual (HCM). However, this methodology was found to be preferable over the HCM methodology because of its focus on the user perception. The bicycle LOS score for the west segment is LOS A (assumed shared-use paths) while the bicycle LOS score for the east segment is LOS B (assumed on-street shared bicycle lanes) according to HCM Bicycle LOS scores (Figure 2.44).

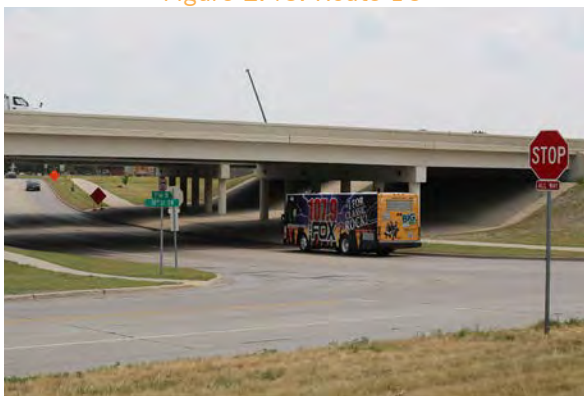
Even though bike volumes are low and existing lane and shoulder widths support in-lane biking, poor vehicular traffic operations and frustrated drivers reduce bicycle comfort to unacceptable levels. For both experienced and inexperienced bikers, off-street trails or dedicated bike lanes are preferred when there is existing roadway congestion. With congested intersection throughout the study area from 25th Street west, existing bicycle conditions are unacceptable.

Figure 2.44: Bicycle LOS

Transit

Fargo is served by Metro Area Transit (MATBUS). Currently, 23 fixed routes serve the metro area. MATBUS does not run on dedicated stops, meaning a transit rider can request a ride at any corner along a route. The 17th Avenue corridor is serviced by Route 24 between 45th Avenue and the West Acres Shopping Center (via east of 42nd Street) and by Route 16 between the West Acres Shopping Center (via 38th Street) and 5th Street. Additional routes (14, 15, 21, and 22) have transfer points at the West Acres hub. Changes to the hub location, to be analyzed in another concurrent Metro COG study, or changes to operations on 17th Avenue could have impacts to the on-time performance of these routes. Transit routes on and near 17th Avenue are shown in Figure 2.46.

Figure 2.45: Route 16



Transit Suitability

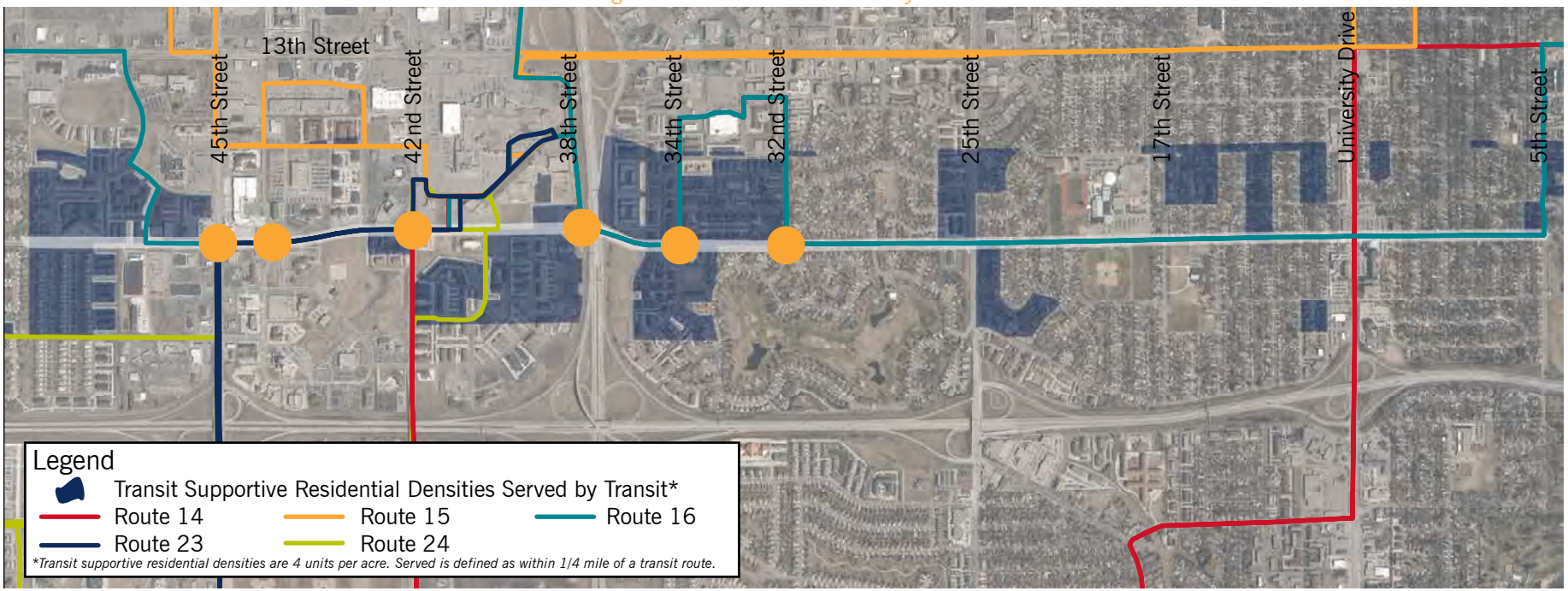
Research points to a direct correlation between transit demand and residential and employment density measured in units per acre. Specifically, a minimum of four dwelling units per acre or 25 jobs per acre is required to support a fixed-route hourly transit system. Evaluating areas that meet this threshold will be used to identify areas that may benefit from new or increased transit service. MAT does not require a passenger to be at a designated bus stop, but will stop at any corner along the route to pick up a rider. Almost all areas along the study corridor with residential densities of seven per acre or higher are within one-quarter mile of the existing Route 16.

Transit Level of Service

Transit level of service is generally determined by service hours and frequency and the directness of transit routes.

- Based on the factors discussed above, the western segment of the 17th Avenue corridor has a transit level of service "C". There are multiple 30-minute or hourly routes that run along or transfer near 17th Avenue.
- Based on the factors discussed above, the eastern segment of the 17th Avenue corridor has a transit level of service "D". It covers much of the transit supportive densities with bi-directional hourly service.

Figure 2.46: Transit in the Study Area



On-Street Parking

On-street parking can be a major challenge to in-roadway bicycling. It reduces the available roadway space available for cyclists and increases conflict as vehicles enter and leave parking spaces and open doors. To better accommodate the option of on-street bike facilities between the Red River and 25th Street, parking may need to be removed. Parking removal will likely be controversial, particularly for residential homes who front 17th Avenue without direct access to a side street. A parking study to evaluate supply and demand was completed in June, 2017. This study evaluated five different periods of a normal weekday and two time periods during a normal weekend.

PARKING SUPPLY

Parking supply on 17th Avenue includes around 155 spots for on-street parking with no day, time, or season restrictions. No on-street parking is permitted on the south side of 17th Avenue. All houses with existing on-street parking on 17th Avenue are provided with existing on-street parking on the cross streets adjacent to their properties.

PARKING DEMAND

A parking study on 17th Avenue was completed during five different periods of a normal week day to identify parking demand and to gauge feasibility of parking removal. Parking data was also completed for two time periods during the weekend. These parking results are found below in Figure 2.48, Figure 2.49, and Figure 2.50.

PARKING SUMMARY

The results of the parking occupancy analysis showed there was minimal parking on 17th Avenue:

- No weekday parking demand was observed between 25th Street and University Drive until 7 PM, when there was a baseball game at South High School.
- No weekday parking demand was greater than 25 percent east of University Drive until 7 PM, when there was an estate sale.
- Weekend morning parking demand was observed at or below 25 percent, excluding the block in front of the estate sale.
- Weekend afternoon parking demand was zero, except the block between 5th Street and 6th Street, which was 75 percent occupied.

Events at South High and other irregular events (garage/estate sales) currently utilize available on-street parking due to convenience. However, alternative options such as parking lots and other local streets are available along the corridor to satisfy this parking demand with minimal impacts to walking distances.

Figure 2.47: Vehicles Parked on 17th Avenue

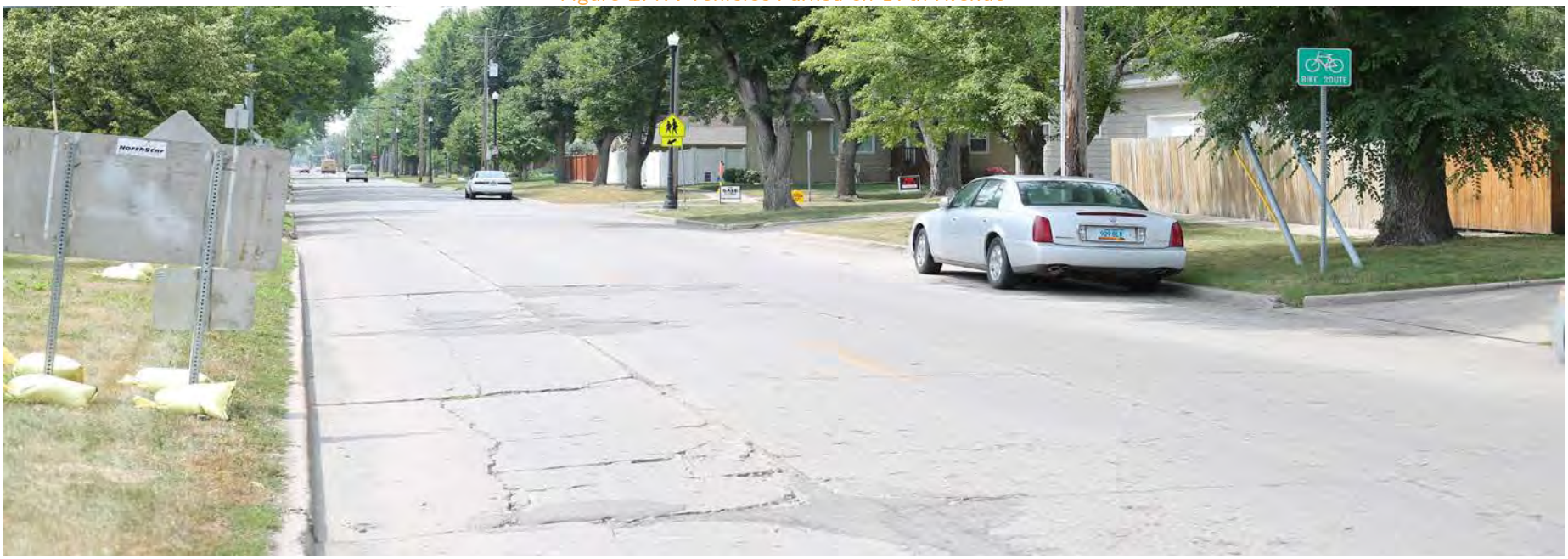
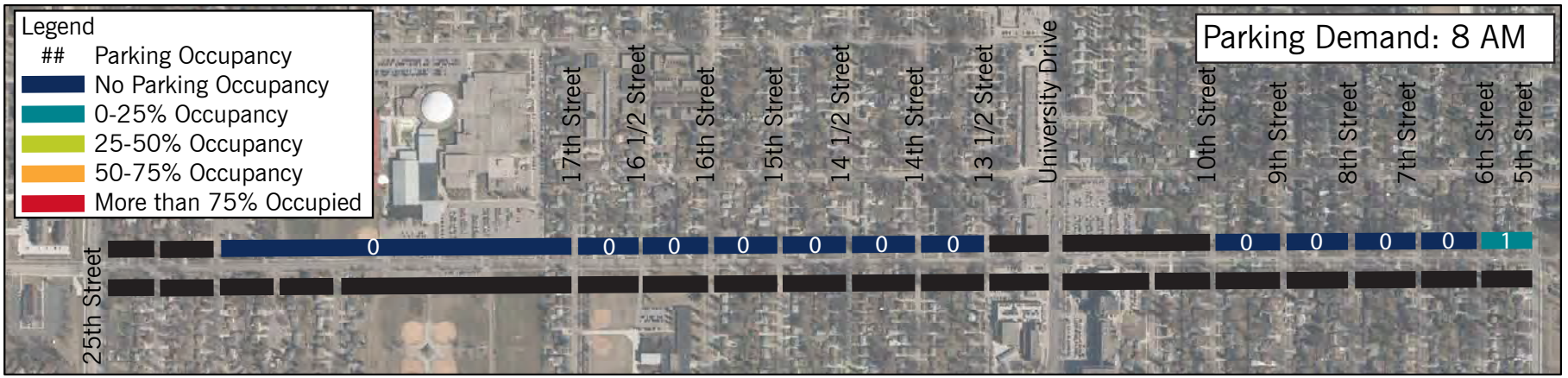


Figure 2.48: Parking Supply and Demand for 8 AM and 10 AM on a Weekday



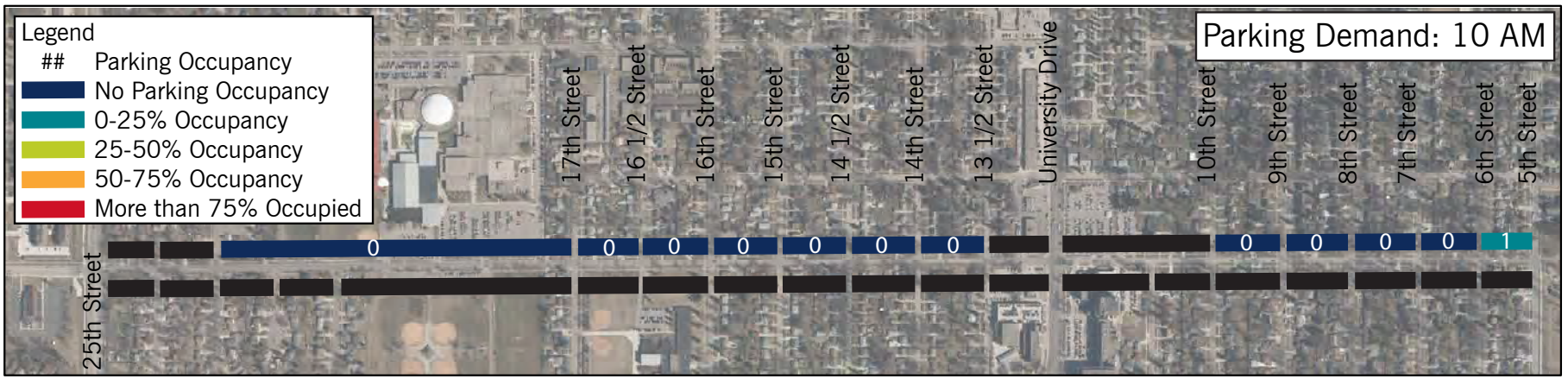
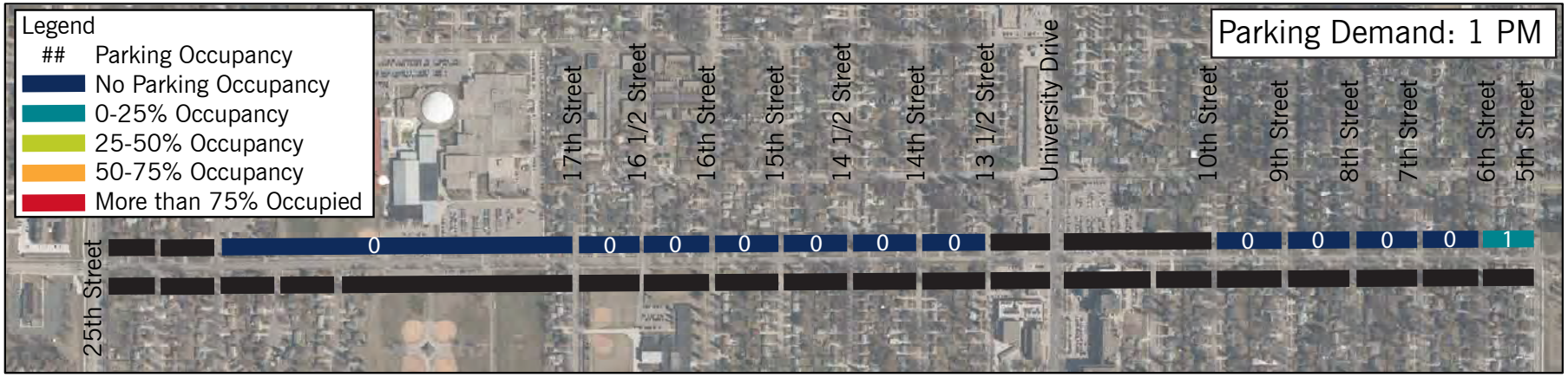
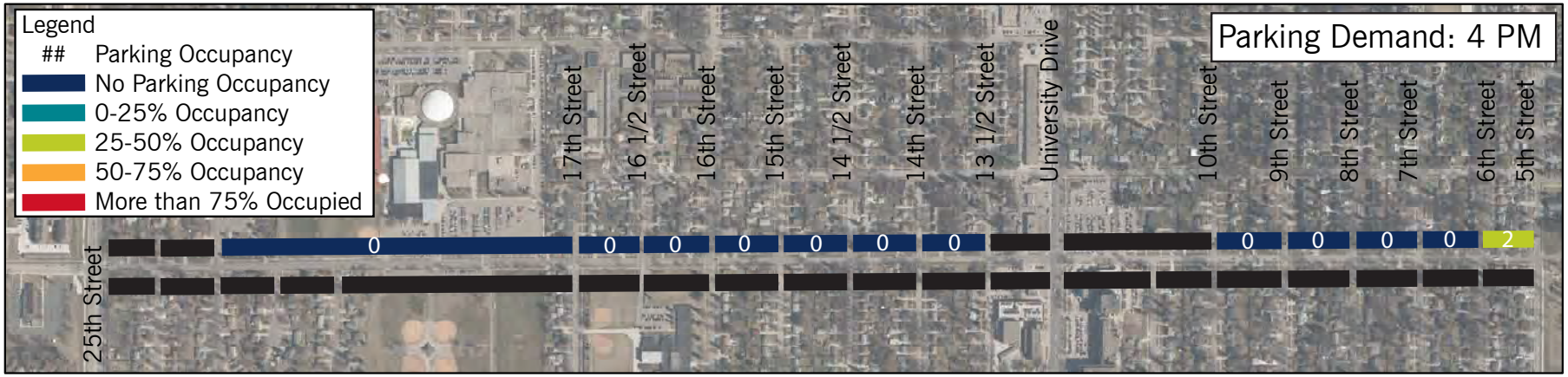


Figure 2.49: Parking Demand for 1 PM, 4 PM and 7 PM on a Weekday





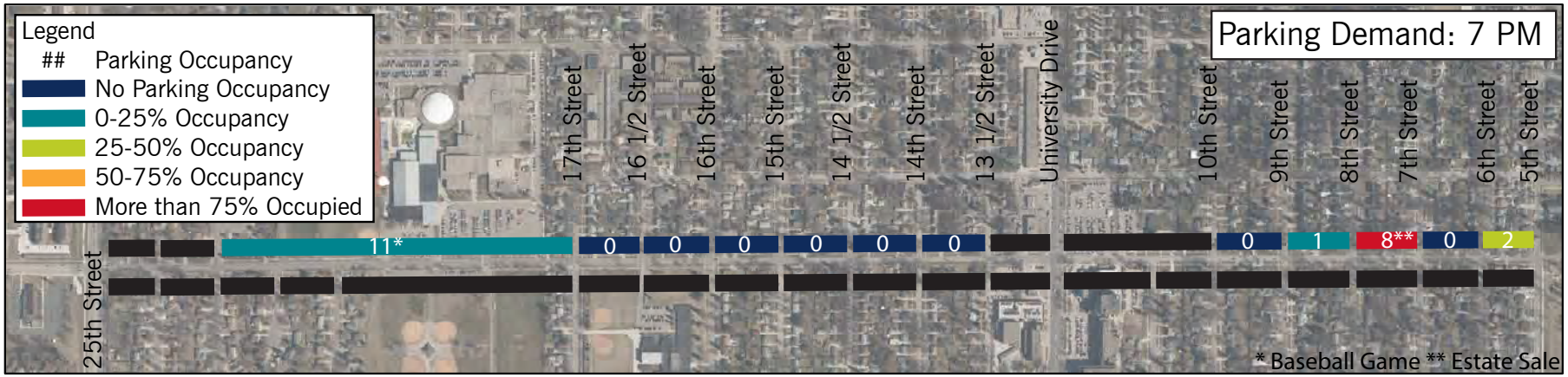


Figure 2.50: Parking Demand for 10 AM and 2 PM on a Weekend

FUTURE VEHICULAR TRAFFIC CONDITIONS

FUTURE CONDITIONS ASSESSMENT

Evaluating future conditions always involves a great degree of uncertainty, because so many factors can impact future travel behavior, especially land use and development patterns. This study analyzed four scenarios to understand how changes to the surrounding land uses and development would impact projected traffic demand along 17th Avenue. Operations and traffic control were then analyzed based on the growth scenario the Study Review Committee identified as most likely to occur

Future Growth Scenarios

The future growth scenarios discussed below incorporate approved zoning and planning documents, discussions with property owners, and consideration of national trends. Additionally, two larger issues were considered when developing these scenarios: Fargo's desire to construct a new convention center and the current brick-and-mortar retail decline.

For the last few years, Fargo (The City of Fargo, Fargodome Authority, and the Convention and Visitors Bureau) has studied the feasibility and preferred site of a Fargo Convention Center. The study evaluated one site south of West Acres at the corner of 17th Avenue and 38th Street. However, based on their analysis, this location would likely be very expensive to construct and operate and thus was not recommended. However, no final decisions have been made. A convention center at this location was considered, but given it would have limited regular impacts to peak hour traffic operations, it was not incorporated into any of the growth scenarios.

Since the recession, the nation-wide retail climate has been challenging. In the first half of 2017, there were nine retail bankruptcies, with even more retail chains liquidating stock and closing stores. This has made securing anchor tenants in major retail development challenging as retailers focus more on on-line shopping and supporting existing stores. While in the past the corner of 17th Avenue and 38th Street might have been the ideal location for an expanded retail center, the changing landscape of brick-and-mortar retail suggests smaller scale mixed-use developments may be more appropriate.

Each of the growth scenarios discussed below include specific areas of growth (Figure 3.1), expected land uses, and the related change in jobs and households.

NO GROWTH (2040 LRTP)

The 2040 Long Range Transportation Plan's travel demand model (TDM) did not include any growth for jobs or households in Traffic Analysis Zones (TAZs) along 17th Avenue. However, since the development of the 2040 LRTP TDM, multiple new developments have already occurred or been platted to occur. Figure 3.2 shows the jobs and household growth between 2010 and 2040 for the No Growth Scenario.

Figure 3.1: Areas Subject to Change

LOW GROWTH

The low growth scenario incorporated developments in progress (as of August, 2017) and updated 2045 jobs and household information from the 2017 Demographic Forecast Study. The travel demand model was updated to better accommodate major developments:

- Commercial Developments
  - Prairie Stone Development. This approximately 11-acre development is on the corner of 45th Street and 17th Avenue and is home to multiple restaurants, a fitness studio, and a furniture store, among other businesses.
  - Sanford Hospital. The new Sanford Hospital, including the Family Birth Center and Emergency Room relocated to their building at 23rd Avenue between 45th Street and Veterans Boulevard.
  - Section 22 Development. This approximately 150-acre development is at the intersection of Interstate 94 and Interstate 29. It will likely include multiple office structures, and mixed-use retail and commercial uses.
- Residential Development
  - The Nest includes two 66-unit apartment buildings south of 17th Avenue and east of I-29.
- Office Space
  - I-94 Office Building located at 42nd Street and 19th Avenue, north of I-94. This 30,000 square foot office is not fully leased, but current tenants include a general office and dental office.
  - Discovery Benefits, a benefits administrator, expanded their company headquarters along 20th Avenue between 44th Street and 42nd Street.
- General redevelopment on University Drive, 13th Avenue, and 25th Street. In the City of Fargo's most recent comprehensive plan, emphasis was put on infill and redevelopment. Expected new jobs along these corridors will likely come through redevelopment, however, no specific plans have been announced.

Figure 3.3 shows the jobs and household growth between 2010 and 2040 for the Low Growth Scenario, with an additional 6,160 new jobs and households, compared to the No Growth Scenario. This includes 4,460 new jobs and 1,700 new households.

MEDIUM GROWTH

The medium growth scenario incorporated the changes included in the low growth scenario as well as development of 31 acres of vacant land between 44th Street and 35th Street. This growth assumes:

- 14 acres of commercial
- 6 acres of retail
- 10 acres of restaurant
- 150 units of multi-family residential

These assumptions were based first on the approved zoning map, which places most of the 17th Avenue corridor under limited or general commercial uses and second on discussions with property owners and developers along the corridor, which indicated the most likely types of development in these parcels based on current development patterns in the area. Figure 3.4 shows the jobs and household growth between 2010 and 2040 for the Expected Growth Scenario, with an additional 7,350 jobs and households, compared to the No Growth Scenario. This includes 5,500 new jobs and 1,850 new households.

HIGH GROWTH

The higher growth scenario incorporated the growth included in the low growth and medium growth scenarios as well as redevelopment of 20 acres southeast of the existing West Acres and infill within the existing West Acres parcels. This growth assumes:

- 14 acres of mixed-use commercial
- 3 acres of retail
- 3 acres of restaurant

These assumptions also incorporated the approved zoning map and discussions with property owners and developers. This included the redevelopment of parcels along the mall. With input from property owners, these areas were developed as likely to change in the long term. These areas are more difficult to assemble for property development or have existing leases held that make redevelopment more challenging.

Figure 3.5 shows the jobs and household growth between 2010 and 2040 for the Higher Growth Scenario, with an additional 8,600 jobs and households, compared to the No Growth Scenario. This includes 6,600 new jobs and 2,000 new households.

SUMMARY OF FUTURE GROWTH SCENARIOS

Based on feedback from City of Fargo Staff and the Study Review Committee, the High Growth Scenario was identified as the most likely scenario to occur by 2040. This scenario was modeled and analyzed for future traffic operations.

Figure 3.2: No Growth Scenario Change in Jobs and Households

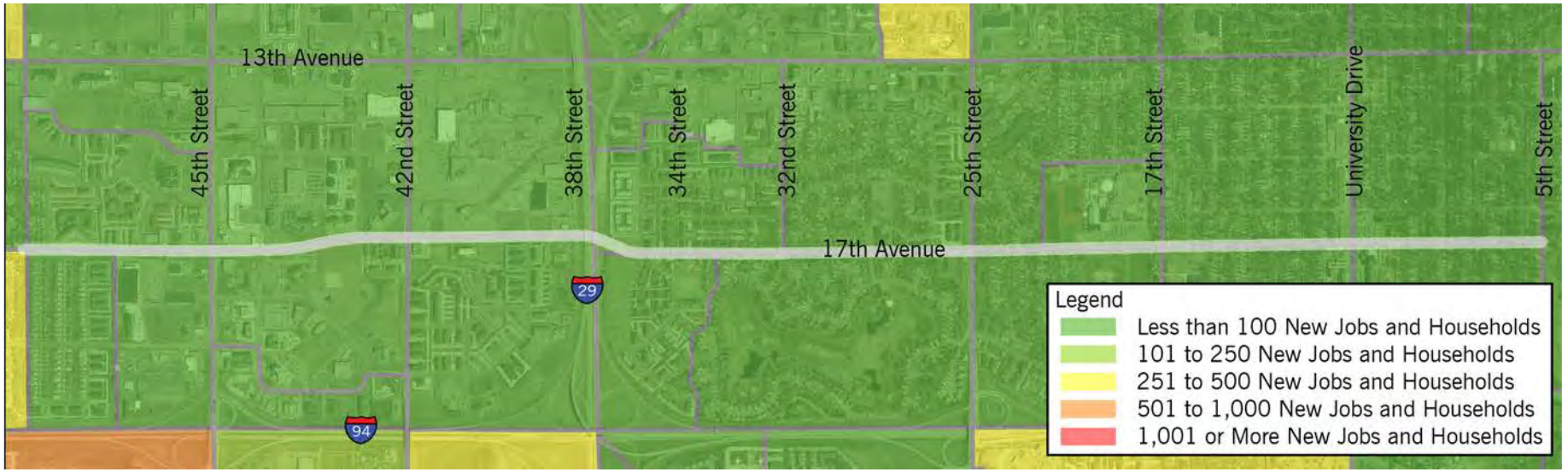


Figure 3.3: Low Growth Scenario Change in Jobs and Households

Figure 3.4: Medium Growth Scenario Change in Jobs and Households

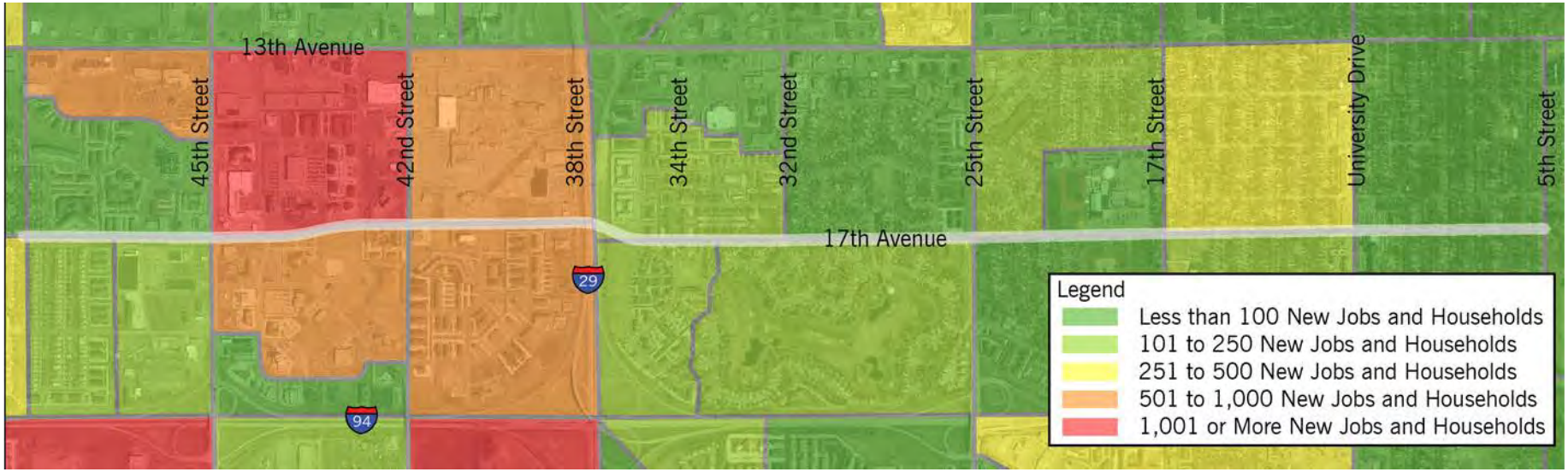
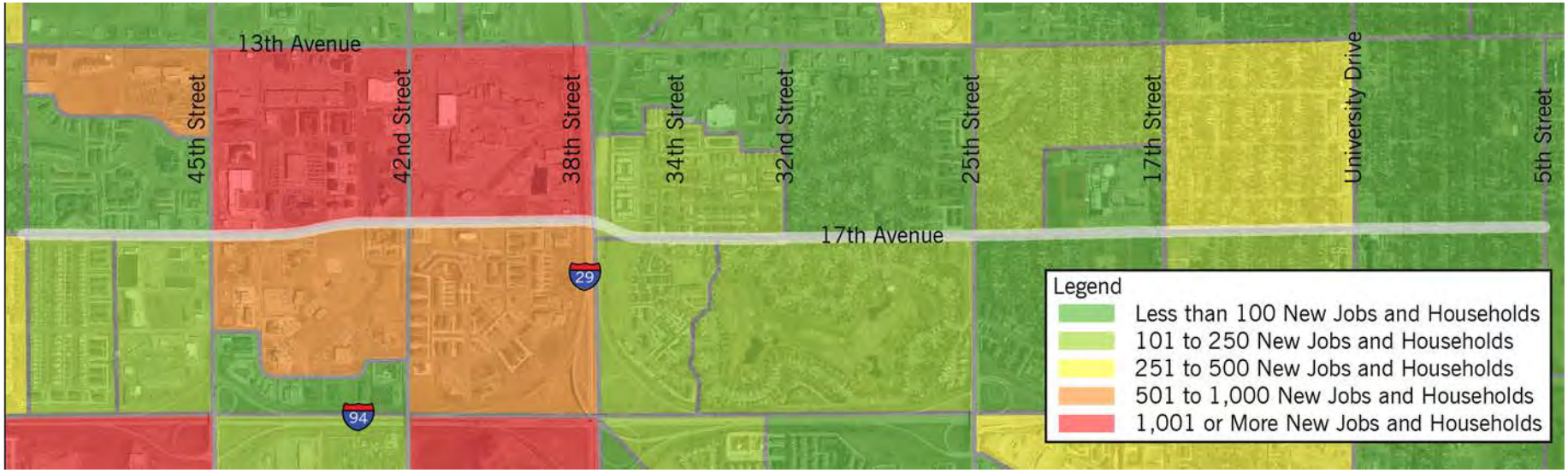


Figure 3.5: High Growth Scenario Change in Jobs and Households



Future Traffic Projections

Based on the growth scenarios discussed above, Figure 3.7 shows the projected traffic volumes along 17th Avenue. Travel demand model outputs were used with some modifications:

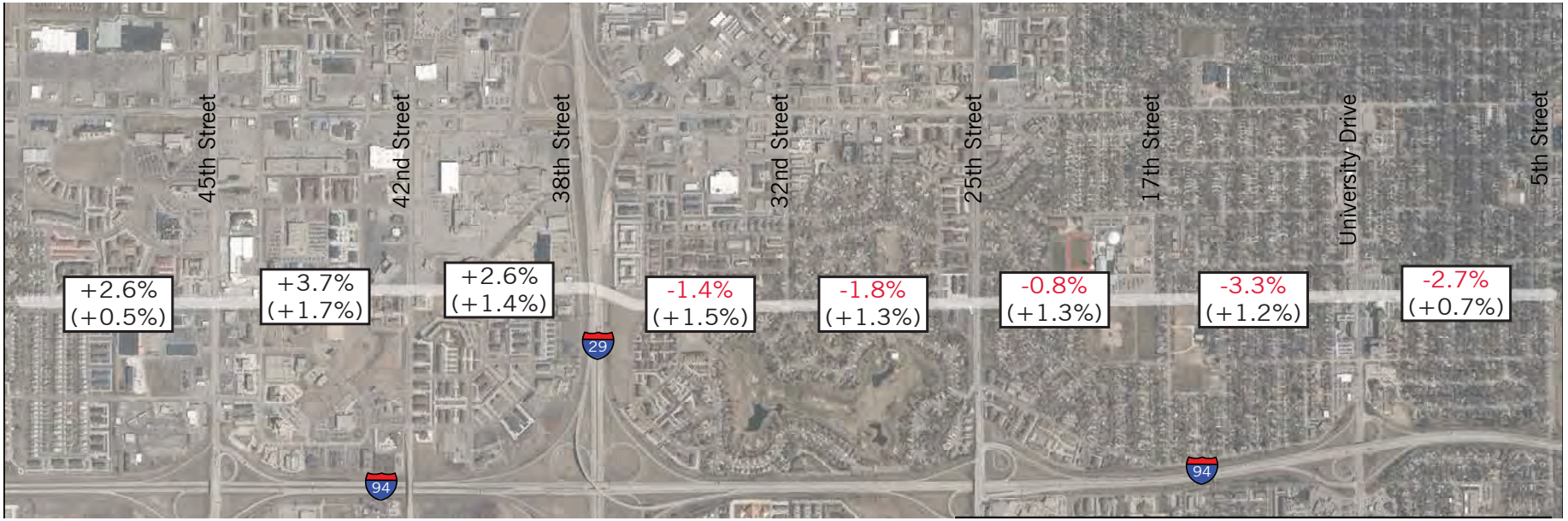
- Between 51st Street and 45th Street, model results for 2040 were 70 percent lower than the 2010 base model volumes. Manual adjustments applied modeled growth to the 2015 ADTs and adjusted the centroid connectors in TAZ 208 north of 17th Avenue and west of 45th Street.
- Between 42nd Street and 38th Street, manual adjustments incorporated additional growth from centroid connectors that pushed vehicles to 42nd Street and 38th Street instead of 17th Avenue, based on historical data at the West Acres driveways.
- Between I-29 and 35th Street, the TDM outputs were used with manual adjustments to the centroid connector, which routed all traffic to 34th Street. Since all new growth in this area will abut 35th Street, with no direct public access to 34th Street, it is unlikely all new traffic will use 34th Street.
- Between 25th Street and 23rd Street, the TDM resulted in negative growth rates from 2010 to 2040. Therefore the modeled volume was smoothed based on the surrounding growth.

Despite the significant growth, in both jobs and households, expected west of I-29, changes to future traffic patterns west of I-29 were very minimal. East of I-29, future traffic projections showed very low expected traffic growth. No development growth in this area is expected but some travel patterns may change with new jobs developments west of I-29; 17th Avenue east of I-29 is built out and stable and has shown steady or declining traffic demand since 2005, likely associated with a change in enrollment at Fargo South High School with the opening of Davies High School. It is also primarily residential which has very regular travel patterns.

These traffic projections were compared to historic traffic growth trends since 2005, the earliest year data was available. East of I-29, the 10-year growth trends have actually been negative, as discussed above. However, the 2040 traffic projections result in positive growth trends. While this seems to be counter-intuitive there are a variety of factors that make this likely, including a full Fargo South High School, increasing congestion on I-94, changes in travel patterns to new employment centers, and improved traffic operations on 17th Avenue itself. Many of the traffic forecasts on 17th Avenue east of I-29 are close to the historic ranges of traffic seen in this segment.

West of I-29, the 10-year traffic trends show high average annual growth rates, while the 2040 traffic projections result in more moderated growth rates. This is due to the area being mostly built-out with just small tracts of land available for major redevelopment, which has been incorporated into the models and traffic projections.

Figure 3.6: Historic and Projected Growth Trends



2040 Traffic Operations

2040 Weekday Turning Movements

Using an approach that follows *NCHRP 765: Analytical Travel Forecasting Approaches for Project Level Planning and Design*, future peak hour turning movements were estimated for study intersections using projected ADT and collected turning movements. This involves using directional and hourly distributions and iteratively adjusting until volumes are balanced. This was manually adjusted where appropriate, based on engineering judgment. Figure 3.7 shows the future projected average daily traffic (ADT) and turning movements.

2040 Level of Service

Future corridor capacity was gauged via bottleneck analysis at the eight study intersections along the corridor. Intersection capacity analysis was evaluated in terms of delay and level of service (LOS). LOS is a term used to describe the operational performance of transportation infrastructure elements. Thresholds are shown in Table 3.1. Essentially, LOS is a grade value that corresponds to specific traffic characteristics within a given system. At intersections, LOS is a function of average vehicle delay, whereas LOS for a roadway section is defined by the average travel speed. LOS "E" or worse is considered deficient, in accordance with the *NDDOT Traffic Operations Manual* published June 2015. Capacity analysis was conducted using Synchro, which applies deterministic equations published in the *Highway Capacity Manual* (HCM). HCM capacity analysis is an industry and NDDOT standard.

Table 3.1: HCM LOS

Control Delay (Sec/Veh)		Volume < Capacity	Volume > Capacity
Unsignalized	Signalized		
≤ 10	≤ 10	A	F
> 10-15	> 10-20	B	F
> 15-25	> 20-35	C	F
> 25-35	> 35-55	D	F
> 35-50	> 55-80	E	F
> 50	> 80	F	F

Under projected weekday peak hour conditions, several intersections operate at unacceptable levels of service:

- 45th Street falls from LOS "D" in the 2015 PM peak hour to LOS "E" in the 2040 PM peak hour.
- 38th Street operates deficiently at LOS "F" in the 2040 AM and PM peak hours. This intersection is currently deficient. Queues are expected to approach 1,000 feet during the PM peak, which would block driveways and turn lanes.
- 34th Street falls from LOS "D" in the 2015 PM peak hour to LOS "F" in the 2040 PM peak hour. Eastbound queues during the PM peak hour would approach 700 feet, which would block turn lanes and 35th Street. Westbound queues are expected around 500 feet, which would block turn lanes and driveways.
- 32nd Street operates at LOS "F" in the 2040 PM peak hour. This intersection is currently deficient during the PM peak hour.

Due to heavy eastbound and westbound traffic in the PM peak hour, several of the study intersections have minor approaches that will operate at unacceptable levels of service. This is common at stop-controlled intersections.

- Northbound and southbound approaches at 44th Street operate at LOS "F" during the 2040 PM peak hour.
- Northbound and southbound approaches at 35th Street operate at LOS "F" and "E", respectively, during the PM peak hour. The northbound approach operates at LOS "E" during the AM peak hour also.

Figure 3.8 shows the future projected levels of service at the study intersections.

Weekend Level of Service

Future weekend traffic operations were not projected. The travel demand model is not designed for weekend operations because it is based on jobs and households and the relationship between the two, most directly applicable to a traditional workday, Monday through Friday. Furthermore, existing weekend operations pointed to fewer delays compared to the weekday AM and PM peak hours, which are typically used for design purposes.

Figure 3.7: Future Traffic Projections

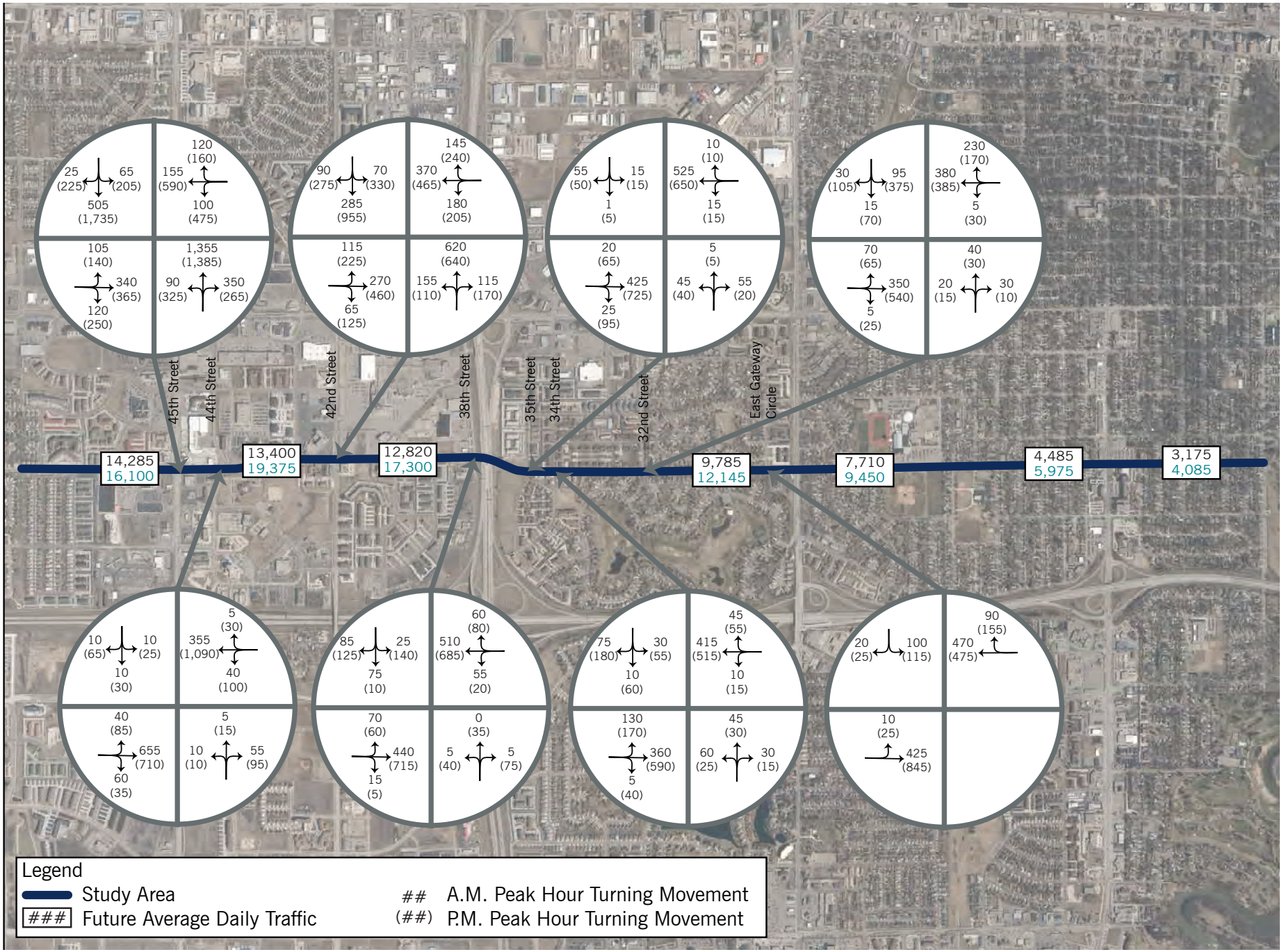
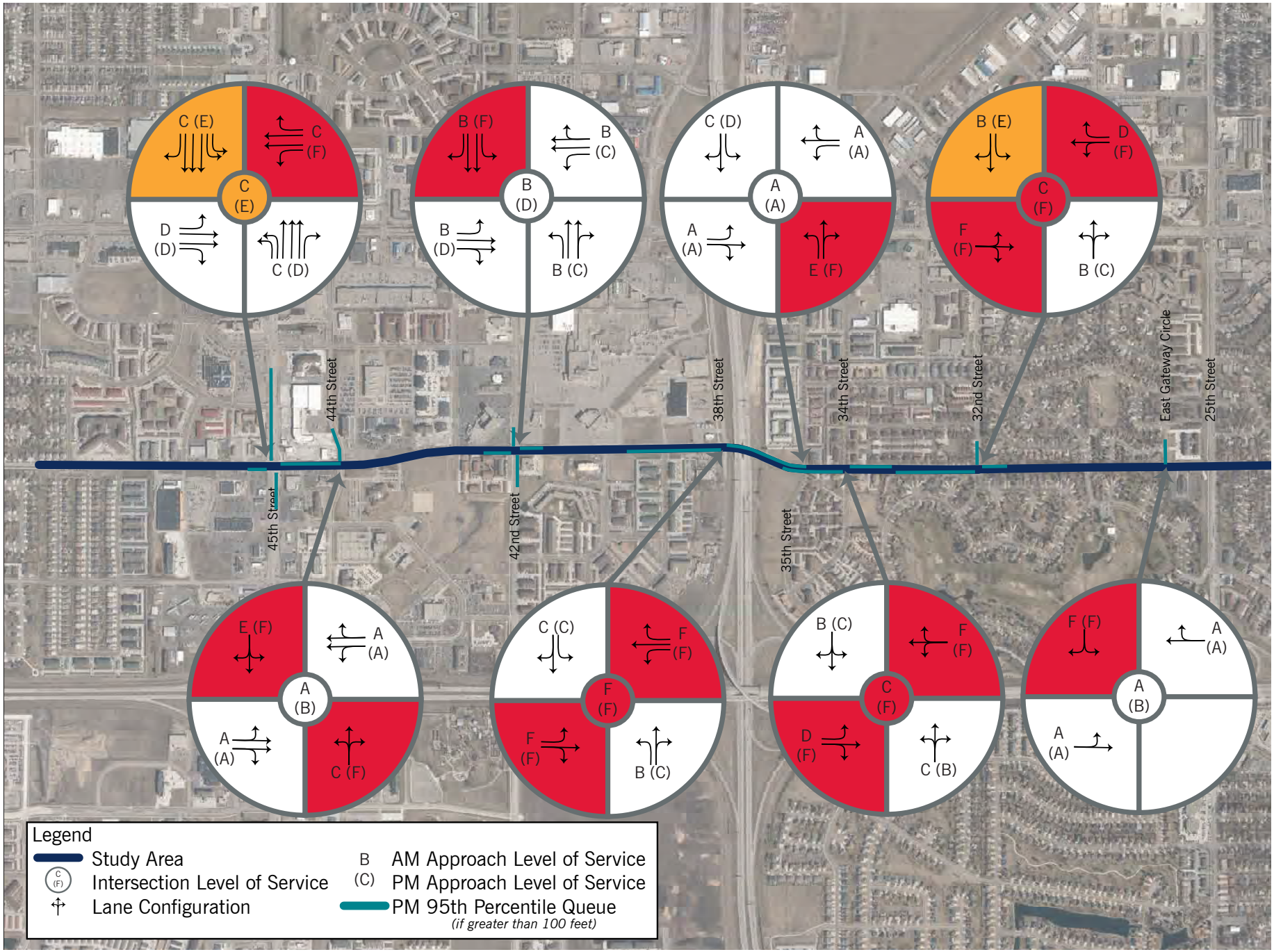


Figure 3.8: Future Projected Levels of Service



Future Traffic Control

Appropriate traffic control is essential for efficient traffic operations and crash mitigation. Future traffic control warrants were considered for the study intersections to be considered in the alternative analysis.

WARRANT ANALYSIS

Selecting the appropriate traffic control device requires consideration of traffic patterns, volumes, roadway geometry, lane configurations, and multimodal aspects. The MUTCD provides guidance and standards on the installation of traffic control methods. The MUTCD considers vehicular volume, pedestrian volume, and crash frequency thresholds for multiple roadway contexts. Future warrants for year 2040 were analyzed using the traffic projections established in the high growth scenario. Minor right-turn volumes were excluded for dedicated right-turn lanes and included for shared through/right lanes. Table 3.2 shows a summary of the traffic control analysis under 2040 future conditions.

Table 3.2: Warrant Analysis

Intersection	Existing Traffic Control	Warrants Met by 2040				
		1A	1B	2	3	MWSA
East Gateway Circle	Two-Way Stop		X	X	X	
32nd Street	All-Way Stop	X	X	X	X	X
34th Street	All-Way Stop		X	X	X	X
35th Street	Two-Way Stop					
38th Street	All-Way Stop		X	X	X	
44th Street	Two-Way Stop		X	X	X	
**Red X indicates warrants met under 2015 conditions*						

Based on the 2040 expected volumes, all study intersections except 35th Street will meet traffic control signal warrants. East Gateway Circle, 32nd Street, 34th Street, and 44th Street meet warrants under 2015 volumes.

Summary of Future Conditions

The Higher Growth Scenario will make the 17th Avenue corridor a fully built out corridor with many areas west of I-29 experiencing high density activity of all land use types. There is minimal traffic growth east of I-29, but even minimal traffic growth, mostly caused from shifting travel patterns, exacerbates operational deficiencies. This activity pushes some intersections to deficient levels, especially at 45th Street, 38th Street, 34th Street, and 32nd Street. The results of the Existing Conditions, Future Conditions, and Environmental Conditions reports were used to develop alternatives discussed later in this report.

ENVIRONMENTAL CONDITIONS

INTRODUCTION

The existing environmental conditions, or affected environment, are the baseline conditions that may be affected by any recommendations for build alternatives. Contained below are the environmental features that are evaluated to help mitigate undue environmental impacts with proposed improvements.

Development of the General Travel Corridor

For the purposes of the environmental conditions report for the 17th Avenue Corridor Study, the general travel corridor was defined to assist with the screening of project alternatives. The development of the general travel corridor defines the general corridor within which smaller scale project alternatives would be developed at the planning level and potentially transitioned into an environmental document per National Environmental Policy Act (NEPA) (42 U.S.C. §4321 et seq. [1969]) regulations. The 17th Avenue Corridor Study considers both the 17th Avenue main roadway corridor (sidewalk to sidewalk) as well as 100 feet of each existing and future intersecting arterials (e.g. 45th Street, 44th Street, 42nd Street, 32nd Street, and 25th Street, East Gateway Circle, etc.), as shown in Figure 4.1.

Figure 4.1: General Travel Corridor

PROJECT PURPOSE AND NEED

Project Purpose

The purpose of this study is to understand the current and long-term vision of 17th Avenue to identify and analyze the impacts of potential improvements which will address declining operations and the identified need for a cross-town bicycle route.

Project Need

Fargo's 17th Avenue is a heavily used corridor that stretches the entire length of the City and into West Fargo. While it is primarily residential, the corridor supports some of the most intense retail and commercial development in the metro, including West Acres. It serves many major bicycle and pedestrian generators including schools and parks in West Fargo, Fargo, and Moorhead. This corridor is an important roadway for all modes of transportation.

The need for the proposed project along 17th Avenue from 51st Street to 32nd Street is driven by increasing motorist delay, congestion from residential and commercial development, safety concerns due to crash susceptibility, and lack of multimodal (i.e., bicycle, pedestrian) opportunities. Multiple study intersections have high volumes that cause peak hour congestion including 45th Street, 42nd Street, 38th Street, 34th Street, and 32nd Street. Bicycle and pedestrian opportunities are lacking within the corridor. This corridor, between 35th Street and 5th Street, was identified as a Top 10 bicycle network gap in the most recent Fargo-Moorhead Metro Council of Governments (Metro COG) Bicycle and Pedestrian Plan. Deficiencies include no dedicated bicycle facilities east of 35th Street and several barriers to bicycle movement throughout the project corridor, including busy intersections through the commercial areas on the west side of the corridor; on-street congestion between 38th Street and 32nd Street; and poor pavement conditions. Current and projected needs within this corridor include capacity, social demands, economic development, and safety.

AFFECTED ENVIRONMENT

The purpose of this analysis is to identify potential environmental resource areas and impacts to those areas that may occur due to a project along 17th Avenue in Fargo, North Dakota. To properly assess potential environmental impacts of a project, a baseline of existing conditions must be identified; a desktop assessment of the project corridor was completed using a variety of federal, state, and local resources. Potential impacts are discussed as resource categories and each resource category is assessed based on the project information known to date. As project alternatives are developed and refined, this assessment of impacts will also become more refined.

Land Use

Land use can have many implications on the characteristics of a neighborhood and the efficiency of its transportation network. For example, a neighborhood that is only residential requires commuting to work, resulting in unbalanced directional flows and strong peaking characteristics that reduces the roadway capacity. A neighborhood with only office uses means there will be few people in the neighborhood after work to support other types of businesses. However, a strong mix of residential, commercial, and office uses may support individuals working, shopping, and eating out closer to home, which minimizes the use of the transportation network and supports multimodal activity.

The 17th Avenue corridor extends through a heavily urbanized city center and multiple established neighborhood and commercial areas. The surrounding land uses include multiple multi-family, single family, commercial, and retail areas. The west segment is predominantly commercial and multi-family residential, while the east segment is primarily residential. While some development and redevelopment is expected to occur along the general travel corridor, it is unlikely it would occur as a result of a project within the corridor.

Social/Economic Impacts

All transportation projects have some level of associated social and economic impacts. One of the primary needs identified at several locations throughout the project corridor is the need for additional roadway capacity to accommodate existing and future traffic volumes. Under existing conditions, this growth is expected to overburden several intersections within the corridor resulting in deficient traffic operations. This breakdown in traffic operations would have associated social and economic impacts to the traveling public as well as businesses within the general travel corridor. Improving overall traffic operations would satisfy these social demands and promote economic development within the surrounding area.

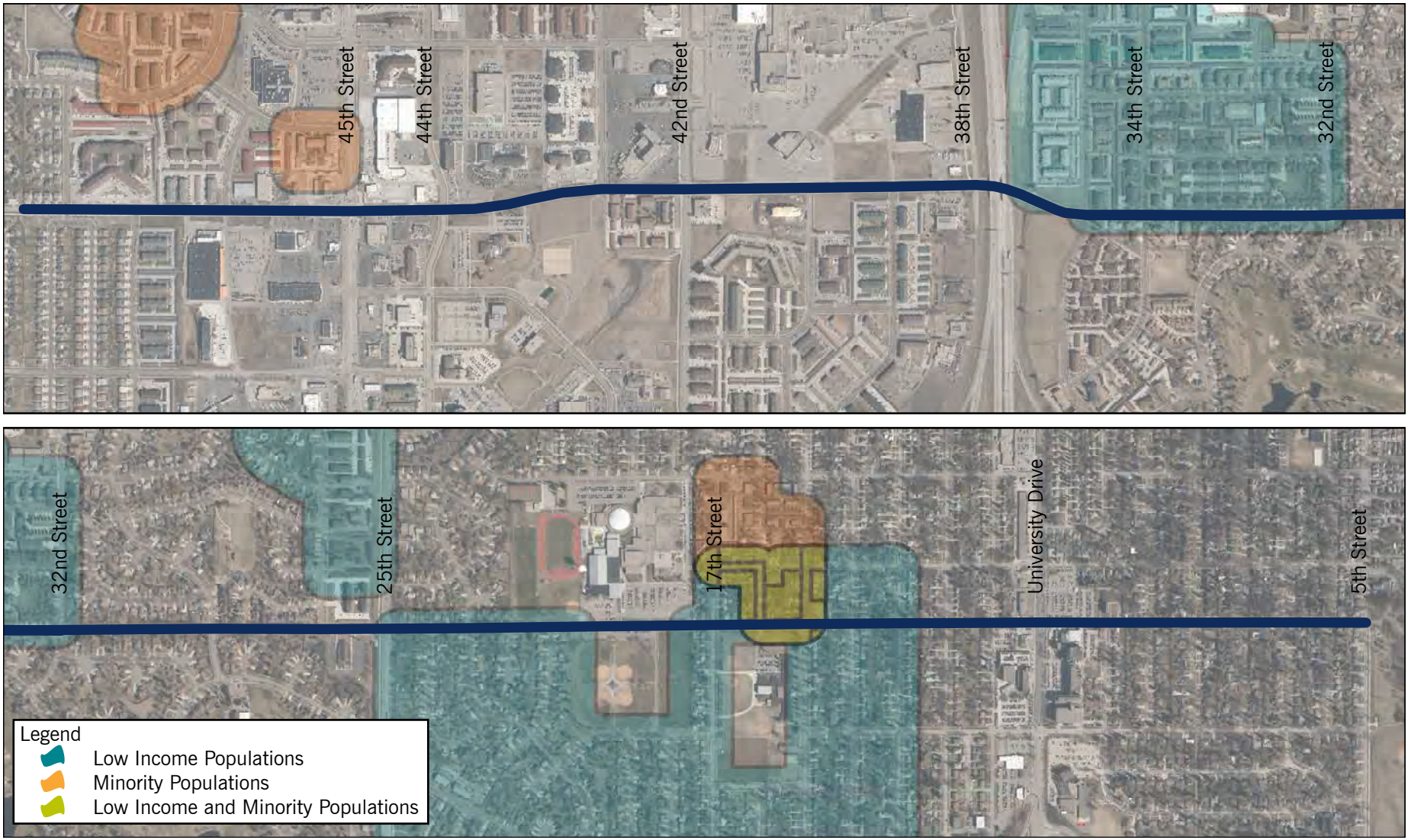
Positive social impacts may also be realized through the incorporation of additional shared use paths, pedestrian, and bicycle facilities into project alternatives. As highlighted previously, there are currently significant gaps and bicycle movement barriers in the overall network of pedestrian facilities throughout the general travel corridor, particularly at 38th Street and 32nd Street. Incorporation of additional facilities would satisfy this need and have positive social impacts to users and the surrounding community.

Environmental Justice

Consistent with Executive Order (EO) 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, measures must be taken to avoid disproportionately high adverse impacts on minority or low-income communities. Minority populations, as defined by Metro COG's Title VI Non-Discrimination Plan, include any block with minority populations (American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic) equal to or exceeding 25 percent of the total block population. Low income populations are Census defined block groups with a median household income less than 1.25 times poverty, per the 2016 U.S. Department of Health and Human Services poverty guidelines. Low-income areas are more than 33 percent of the total general travel corridor (51st Street to the Red River, 13th Avenue to I-94).

Minority populations are defined as 20 percent or more of the population using 2010 US census data at the block level. Minority populations are eight percent of total blocks in the general travel corridor. Refer to Figure 4.2 for environmental justice areas within the study area.

Figure 4.2: Environmental Justice Areas



It is not anticipated that a project within these minority or low-income areas would disproportionately affect minority or low-income populations as no relocations are expected; however, it would be the responsibility of City of Fargo to identify and address any potential disproportionately high effects of the project on minority and low-income populations once an alternative is selected.

Pedestrian and Bicyclists

The 17th Avenue corridor connects major bicycle and pedestrian generators in West Fargo, Fargo, and Moorhead including multiple parks (e.g., Elmwood, Maplewood, Rabanus, Prairiewood, Westgate, Lindenwood, and Gooseberry), schools (Cheney Middle, South High, Lewis and Clark Elementary), and commercial areas (e.g., West Acres), and numerous residential neighborhoods. Sidewalks are present on both sides of 17th Avenue throughout the study corridor. There is a shared-use path on the south side of 17th Avenue west of 35th Street. However, 17th Avenue from 35th Street to 5th Street was identified as a Top-10 bicycle network gap in the most recent Fargo-Moorhead Metro COG Bicycle and Pedestrian Plan.

There are several barriers to bicycle movement throughout the study area including busy intersections through the commercial areas on the west side of the corridor, on-street congestion between 38th Street and 32nd Street, and poor pavement conditions. On-street parking can be a major challenge to on-street bicycle travel, reducing available biking area and the creating the potential of being hit by an opening car door. There are many uncontrolled crosswalk locations (South High School and 35th Street) where pedestrian crossing volumes are higher and crosswalk safety and amenities could be improved. In addition, there are no dedicated bicycle facilities east of 35th Street.

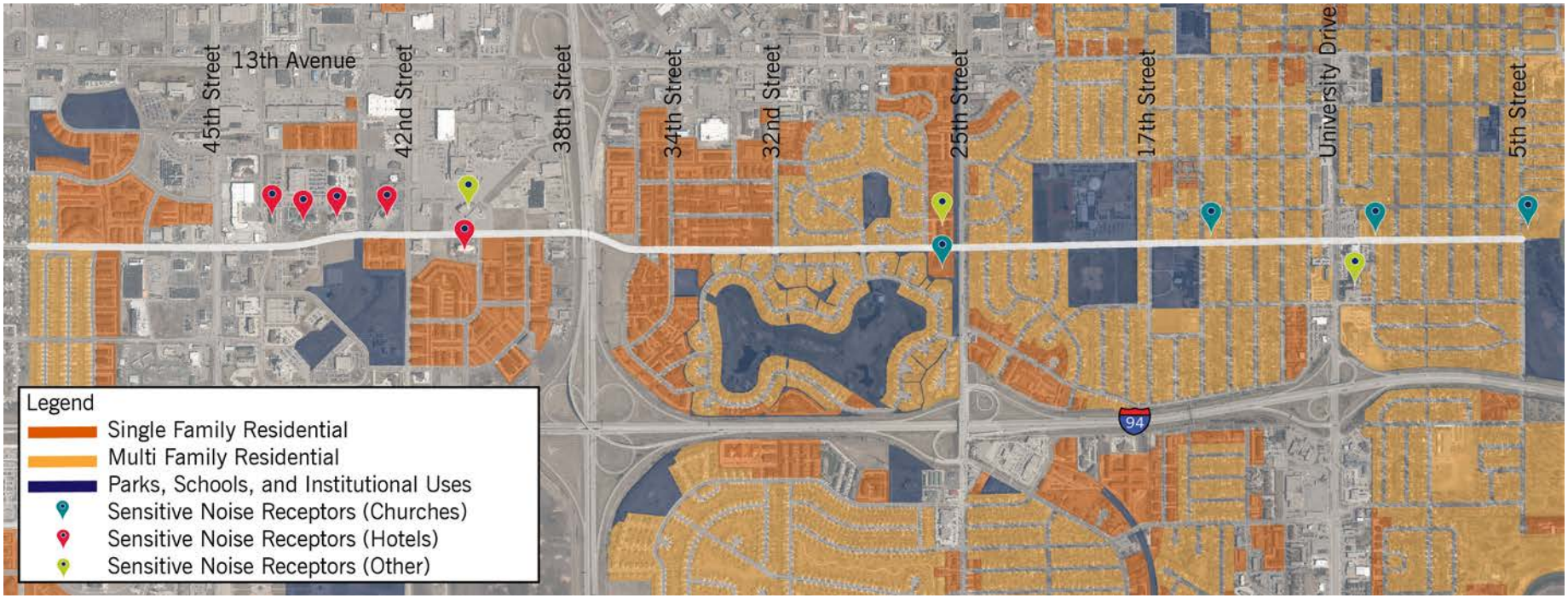
Positive social impacts may also be realized through the incorporation of additional shared use paths and bicycle and pedestrian facilities into project alternatives. As highlighted previously, there are currently significant gaps in the overall network of these facilities. Incorporation of additional facilities would satisfy this need and have positive social impacts to users and the surrounding community.

Floodplains

Floodplains constitute land situated along rivers and their tributaries that are subject to periodic flooding with a one percent chance of being flooded in any given year, on the average interval of 100 years or less. EO 11988, Floodplain Management (42 FR 26951, 3 CFR) requires federal agencies to take actions to reduce the risk of flood losses, and flood impacts on human safety, health, and welfare, whenever possible. Pursuant to EO 11988, potential effects on floodplains must be evaluated and alternatives that avoid adverse effects and incompatible development in floodplains must be evaluated. If it is found that the only practicable alternatives require siting in a floodplain, it is necessary to design or modify the project to minimize potential harm to or within the floodplain. The North Dakota Floodplain Management Act of 1981 stipulates that the 100-year base flood elevations cannot be increased because of the

Figure 4.3: Pedestrian and Bicycle Facilities

Figure 4.4: Sensitive Noise Receptors



proposed project. These flood protection measures are to be applied to new construction or rehabilitation.

According to the Federal Emergency Management Agency's (FEMA) flood hazard mapping program, the general travel corridor is located within a Zone X flood hazard area. Zone X is characterized as an area of 0.2 percent annual chance of flood hazard. From 51st Street east to I-29 is considered Zone X, but is an area with reduced risk due to a levee system. It is recommended that any proposed projects be coordinated with FEMA to ensure compliance with the National Flood Insurance Program.

Wetlands

Surface water resources generally include lakes, rivers, streams, floodplains, and wetlands. Water resources were desktop-evaluated using US Department of Agriculture (USDA) National Aerial Imagery Program (NAIP) aerial imagery, US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps, FEMA Floodplain Insurance Rate Maps, US Geological Survey (USGS) National Hydrography Dataset (NHD), and various mapping tools.

USFWS NWI and USGS NHD maps do not indicate any wetlands or water resources present within the general travel corridor

Once project alternatives have been developed and move into project development, it is recommended a field wetland delineation be completed and submitted to the US Army Corps of Engineers (USACE) for a jurisdictional determination. A permit from the USACE may be required in the event project activities result in permanent impacts to jurisdictional wetlands. Impacts to artificial wetlands do not require mitigation per Executive Order 11990; however, wetland mitigation may still be required in the event the USACE assumes jurisdiction and impacts exceed established thresholds.

Noise

Noise is generally defined as unwanted sound, and can be intermittent or continuous, steady or impulsive, stationary or transient. Noise levels discernible by humans and animals are dependent on several variables, including distance and ground cover between the source and receiver and atmospheric conditions. Perception of noise is affected by intensity, frequency, pitch and duration. Noise levels are quantified using units of decibels (dBA).

Noise-sensitive land uses are split into categories and include: Category 1, tracts of land where quiet is essential to their purpose (e.g., parks and recreation areas, outdoor amphitheaters); Category 2, residences and buildings where people normally sleep (e.g., hotels, hospitals, single family, multi-family, and mobile homes); and Category 3, including institutional land uses (e.g. churches, schools, libraries, theatres, museums, campgrounds, historical sites) .

Numerous sensitive noise receptors exist along or adjacent to the general travel corridor (Figure 4.4) including elementary and high schools, parks and recreation areas, hospitals, hotels, senior living facilities, churches, cinemas, and large swaths of residential areas. Once project alternatives have been developed and move into project development, a noise analysis may be completed during project development to assess existing and future noise levels. Should project alternatives result in noise impacts, analysis of noise abatement should be completed to determine if the implementation of noise abatement would be considered reasonable and feasible.

Historic and Archeological Preservation

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. § 306108) (Section 106) requires that federal agencies take into account the effects of their undertakings on historic properties. A historic property is any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register of Historic Places (NRHP). The Section 106 review process is defined in regulations promulgated by the Advisory Council on Historic Preservation (ACHP), "Protection of Historic Properties" (36 CFR Part 800).

A review of the State Historical Society of North Dakota's site records for Cass County and the general travel corridor was completed. Several architectural sites and a potential architectural historic district were identified along the general travel corridor. Most of the resources are associated with structures greater than 50 years old which may be eligible for listing on the National Register of Historic Places. Adverse effects to historic properties may occur when an undertaking may directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the NRHP. Examples of adverse effects include but are not limited to physical destruction, damage, or alteration; removal of a property from its historic location; neglect leading to deterioration; change in use; and introduction of visual, atmospheric, or audible elements.

It is unlikely that the project would result in an adverse impact to any of the identified cultural resources due to the lack of relocations and extensive development along the travel corridor; however, it is recommended that additional cultural field investigations be completed for any future projects decided upon.

Section 4(f) Resources

Section 4(f) of the Department of Transportation (DOT) Act of 1966 (Section 4(f)) (23 U.S.C. 138) prohibits federal transportation agencies from approving a project that uses land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites.

Several Section 4(f) resources exist along or adjacent to the general travel corridor (Figure 4.5) including public parks (e.g., Rabanus Park, Boler Park, Westgate Park, Lindenwood Park), school parks (e.g., South High School, Lewis and Clark Elementary), and recreational areas (e.g., Southwest Softball Complex, Fargo South Soccer Training Facility, Fargo South Sport Facility, American Gold Gymnastics, Prairiewood Golf Course). The potential for impacts to these properties would be determined during the alternatives development phase. In the event that project alternatives would result in impacts to Section 4(f) properties, those impacts would be coordinated with the official jurisdiction to determine the level of impact and develop potential mitigation or minimization measures. Additionally, any cultural resources identified within the general travel corridor would be protected under 4(f), but their locations are confidential.

Section 6(f) Resources

Section 6(f) of the Land and Water Conservation Act requires that the conversion of lands or facilities acquired with Land and Water Conservation Funds (LWCF) be coordinated with the Department of Interior. When such a conversion occurs, replacement in-kind is typically required.

A search of the North Dakota LWCF Project and Grant Listings (1965-2015) identified Fargo Southwest Park, Fargo South Sport Facility, and Fargo Lindenwood Camping Center, all managed by the Fargo Parks Board, as Section 6(f) resources near to the general project corridor, as shown in Figure 4.6. The potential for conversion of lands or facilities protected under Section 6(f) is unlikely, as the project corridor would not likely expand farther than sidewalk-to-sidewalk width; however, in the event that project alternatives would result in impacts to Section 6(f) properties, those impacts would be coordinated with the official jurisdiction to determine the level of impact and develop replacement alternatives.

Figure 4.5: Section 4(f) Properties

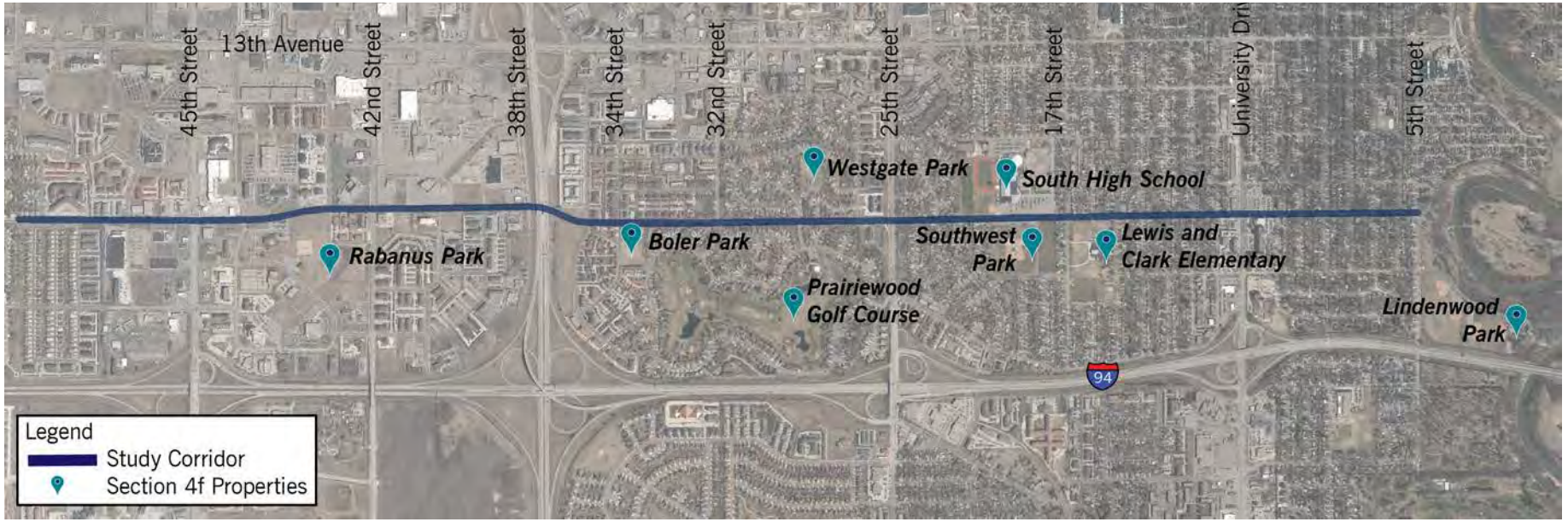
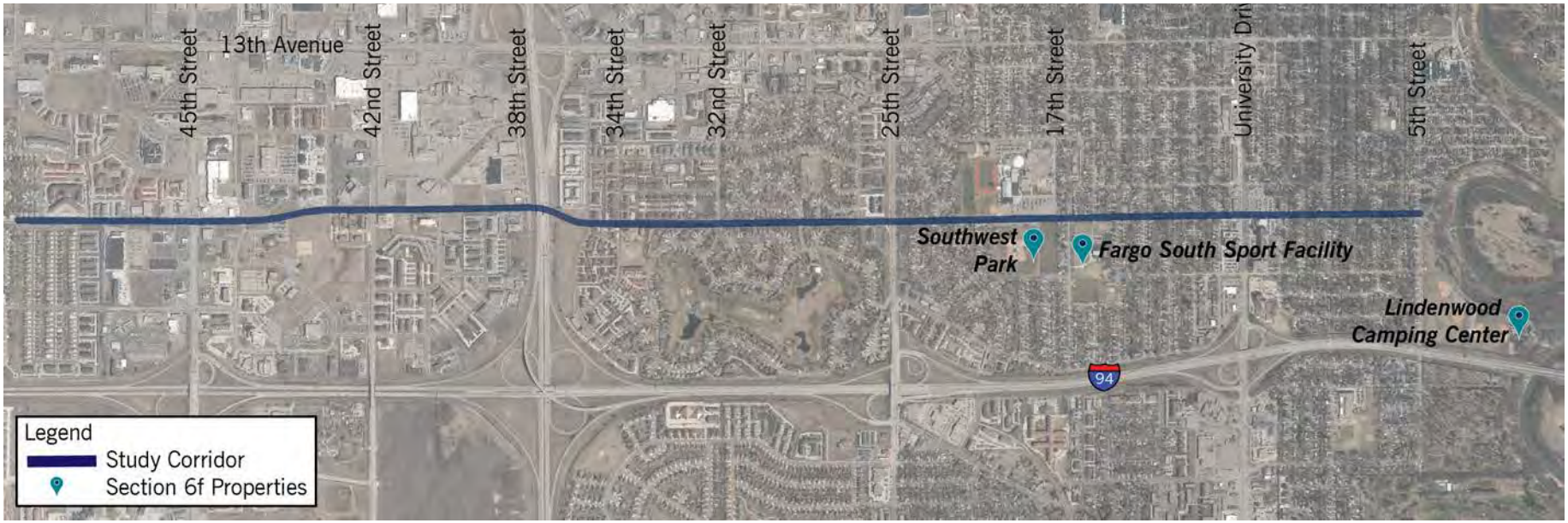


Figure 4.6: Section 6(f) Properties



WHAT WE HEARD: ISSUES AND OPPORTUNITIES

PUBLIC INPUT MEETING #1

The first round of public input meetings for the 17th Avenue Corridor Study were held on October 22nd and 24th. The first round included a bike audit and open house.

The bike audit was held on Sunday, October 22nd, beginning at the Lindenwood Softball Diamond 5/6 Parking Lot. This activity allowed the public to ride the corridor to experience first-hand the corridor's bike issues.

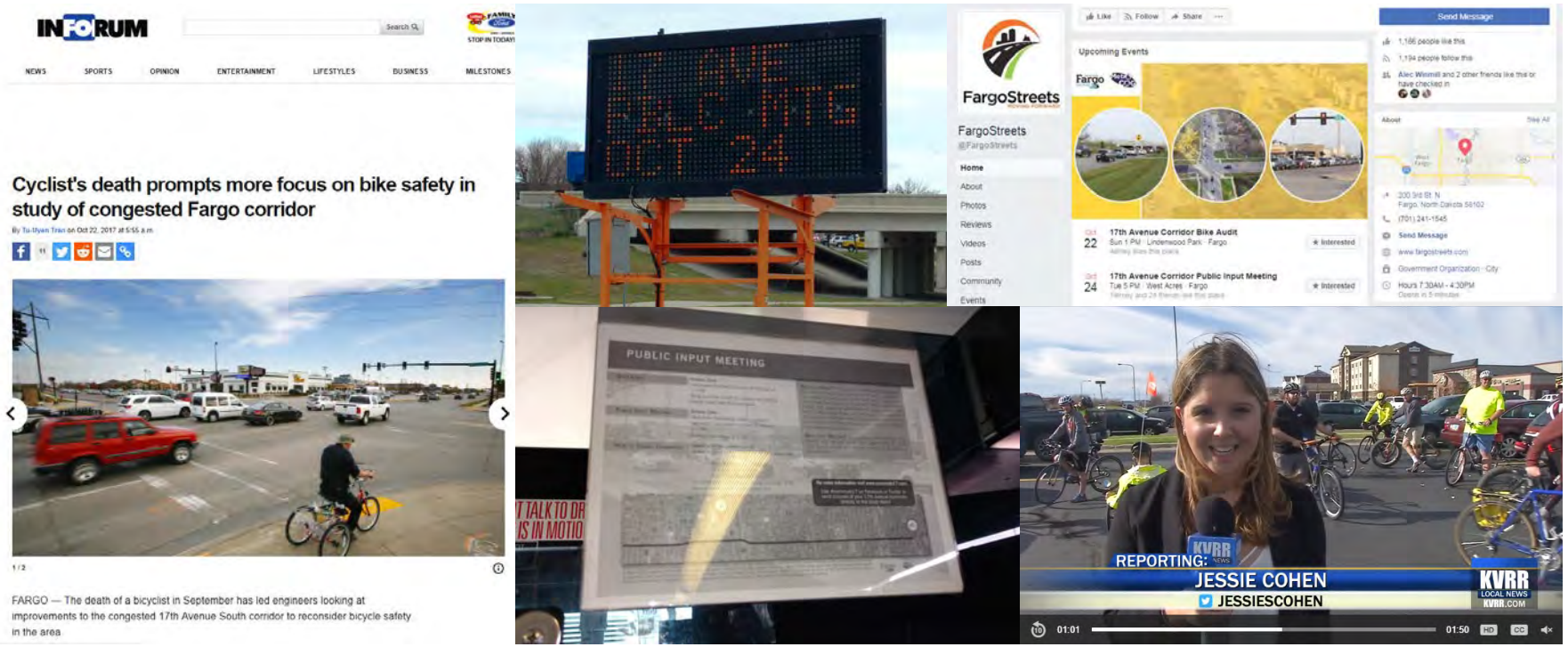
The open house was held on Tuesday, October 24th at the West Acres Community Room. This included a formal presentation and open house.

Marketing Efforts

A variety of techniques were used to inform the public about their opportunity to identify issues and opportunities on the 17th Avenue corridor and the findings from the Existing Conditions Report, Future Conditions Report, and Environmental Conditions Report.

- A press release and box ad were published in The Forum newspaper.
- Fliers were distributed to local businesses along the corridor and neighborhood associations.
- Postcards were sent to properties adjacent to the corridor.
- Social media posts on Fargo Street's Facebook and Twitter accounts and Metro COG's Facebook page.
- Multiple articles on local radio, newspaper, and television news outlets.
- Emails sent through Fargo Streets.
- Variable message signs placed on 17th Avenue.
- Flier posted in MATBUS shelters and sent out through Rider Alert system.

Figure 5.1:Summary of Marketing Efforts



Bike Audit

Around 20 people attended the bike audit. The bike audit began in Lindenwood Park and rode the corridor, stopping at multiple locations to discuss the issues and opportunities.

Comments received during and after the bicycle audit are summarized below:

- Bicyclists generally feel unsafe biking on the roadway between 38th Street and 25th Street. They cite congestion, narrow lanes and aggressive driver behavior.
- Shared use paths, particularly west of 38th Street are challenging because drivers stop in the crosswalk and do not look for bikers, especially when bikers are headed westbound.
- When vehicles pass bicyclists on 17th Avenue, they often do not provide three feet of clearance.
- The roadway context is very different from east to west, highlighted by less inviting land uses, wider roadways, increased speeds, increased volumes, and overall reduced rider comfort.
- Pavement conditions are good west of 25th Street, but generally poor between 25th Street and University Drive.
- Driveways and alleys create challenging conflict locations.

Figure 5.2: Picture from Bike Audit

Public Input Meeting

More than 50 people attended the public input meeting.

At the meetings, attendees were given multiple opportunities to provide comments.

- A written comment form that included a mailing address and e-mail address. People could elect to leave the forms with the team that evening or send them in later.
- A large aerial map of the study area. Individuals were asked to place stickers for certain areas and write specific issues directly on the map.
- Street section board. The street section board had velcro and featured pieces that allowed people to build their own road. Very few people elected to participate in this option.
- Value profile exercise. This exercise asked attendees to assign a weight to vehicular efficiency, bicycle and pedestrian efficiency, and cost and impacts. 13 value profiles were collected.

Figure 5.3: During Presentation at Public Input Meeting

VALUE PROFILE EXERCISE

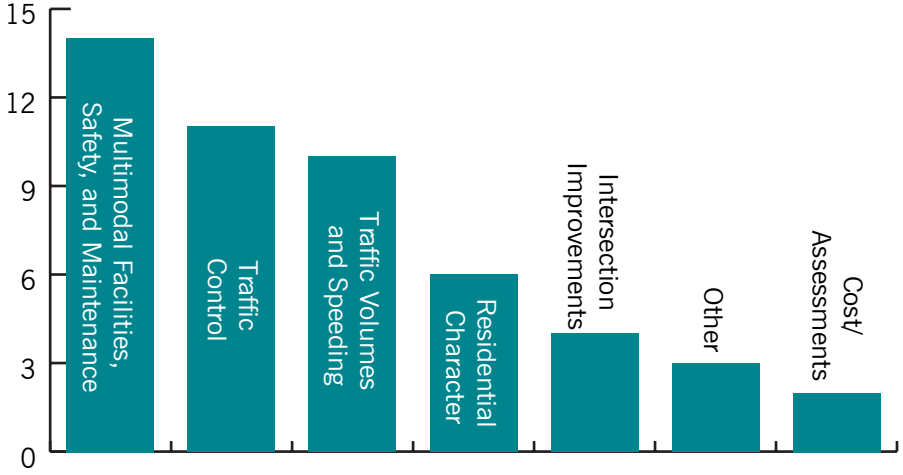
The value profile exercise asked people to assign a priority to vehicular efficiency, pedestrian and bicycle mobility, and cost and impacts. Both the public and the Study Review Committee were asked to complete this exercise. The summary of the value profile is shown in Figure 5.4. These values guided the development of alternatives and were applied to the results of the technical screening of the alternatives considered.

- For 17th Avenue between 51st Street to 38th Street, vehicular efficiency was rated 50 percent, pedestrian and bicycle mobility 28 percent, and cost and impacts 24 percent.
- For 17th Avenue between 38th Street and 25th Street, vehicular efficiency was rated 36 percent, pedestrian and bicycle mobility 37 percent, and cost and impacts 28 percent.
- For 17th Avenue between 25th Street and University Drive, vehicular efficiency was rated 28 percent, pedestrian and bicycle mobility 45 percent and cost and impacts 28 percent.
- From University Drive to 5th Street, vehicular efficiency was rated 22 percent, pedestrian and bicycle mobility 46 percent and cost and impacts 33 percent.

WRITTEN COMMENTS

Twenty written comments were received. These comments were reviewed to identify key issues, which are summarized below (Figure 5.5). Most comments related to three things: multimodal facilities (bicycle, pedestrian, and transit), safety, and maintenance, traffic control from 38th Street to 25th Street, and traffic volumes and speed. Many of these comments tie directly back to maintaining the residential character of the areas surrounding 17th Avenue east of I-29. All comments have been incorporated into the final appendix of public input.

Figure 5.4: Summary of Comments Received



ISSUES MAP

The issues map exercise was a very effective way to begin to identify the issues the public cared about the most. A majority of the issues identified were between 25th Street and 38th Street, particularly the intersections of 38th Street, 35th Street, 34th Street, and 32nd Street. These areas often have long queues and delays associated with the all-way stop control. The results of the Issues Map exercise is shown in Figure 5.6.

Figure 5.5: Value Profile Summary

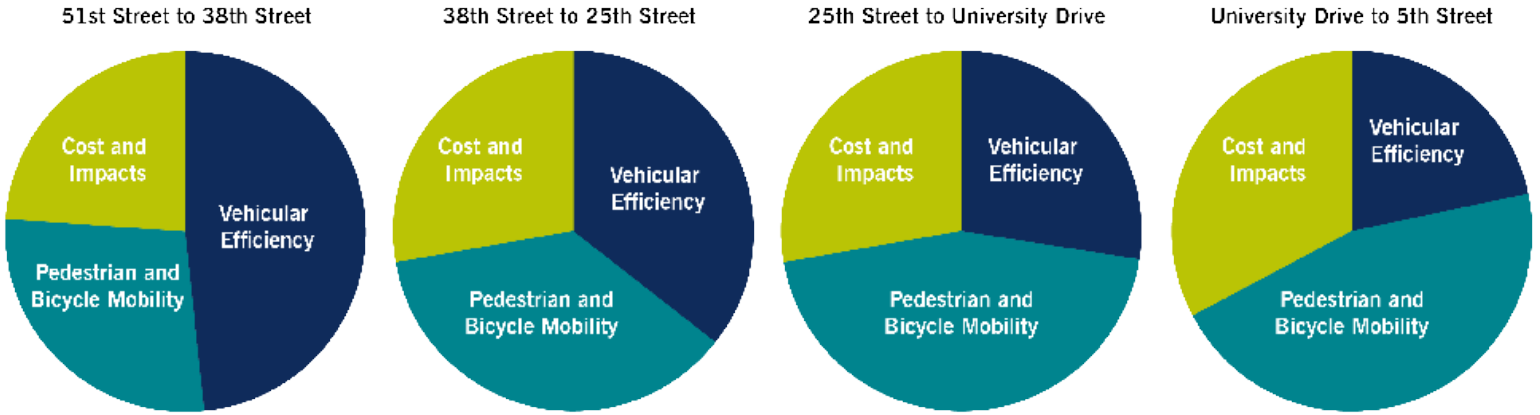
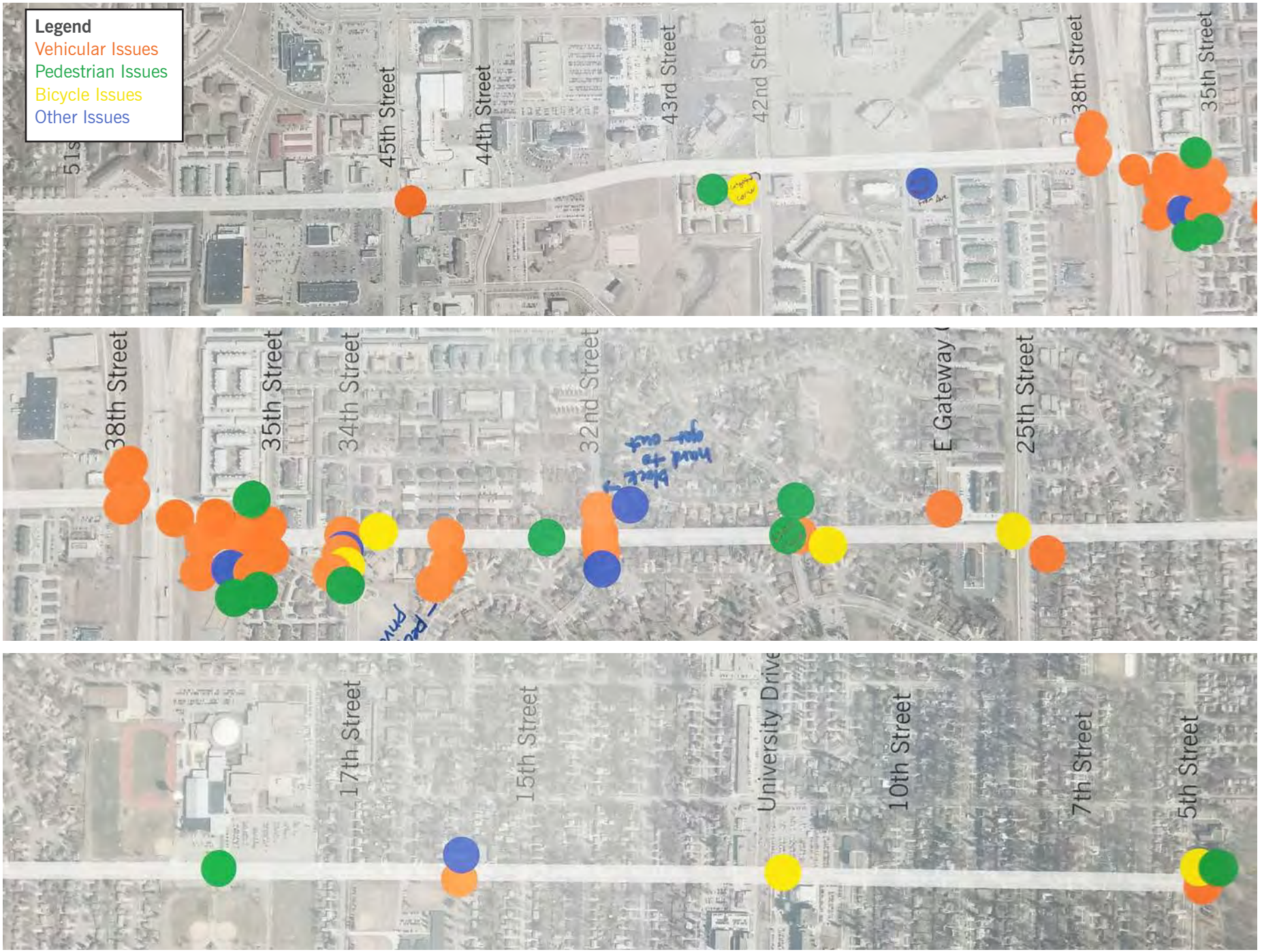


Figure 5.6: Issues Map



ALTERNATIVES ANALYSIS AND ASSESSMENT

INTRODUCTION

This chapter discusses multimodal improvements for the 17th Avenue corridor and the methods used to develop and evaluate these improvements. Improvements are intended to balance the needs of all travel modes: vehicles, bicycles, pedestrian, and transit.

Analysis in this chapter builds upon data and findings from both the Existing Conditions Report, Future Conditions Report, and Environmental Conditions Report. Key issues from these reports are summarized as necessary.

APPROACH

Multimodal transportation alternatives were developed based on the key issues, barriers, and improvement ideas uncovered during the previous technical analysis presented in the Existing Conditions, Future Conditions, and Environmental Conditions chapters, discussions with the Study Review Committee, and discussions with the public through the bike audit, public input meeting, and other comments received.

To best identify improvements appropriate for the varying characteristics and traffic patterns across the 17th Avenue corridor, it was split into four segments:

- 5th Street to University Drive
- University Drive to 25th Street
- 25th Street to 38th Street
- 38th Street to 51st Street

Improvements for each segment were first divided into vehicular, bicycle, pedestrians, and transit improvements and presented as low, medium, and high benefits for their respective modes. The improvement plans for each mode were then analyzed based on three key categories and assigned a score from one to 10.

- Vehicular efficiency and safety
- Pedestrian and bicycle mobility and safety
- Cost and impacts

Transit users start and end as pedestrians and/or bicyclists and benefit from vehicular efficiency and safety. For these reasons, transit considerations are essentially a combination of vehicular efficiency and safety, and pedestrian and bicycle mobility and safety.

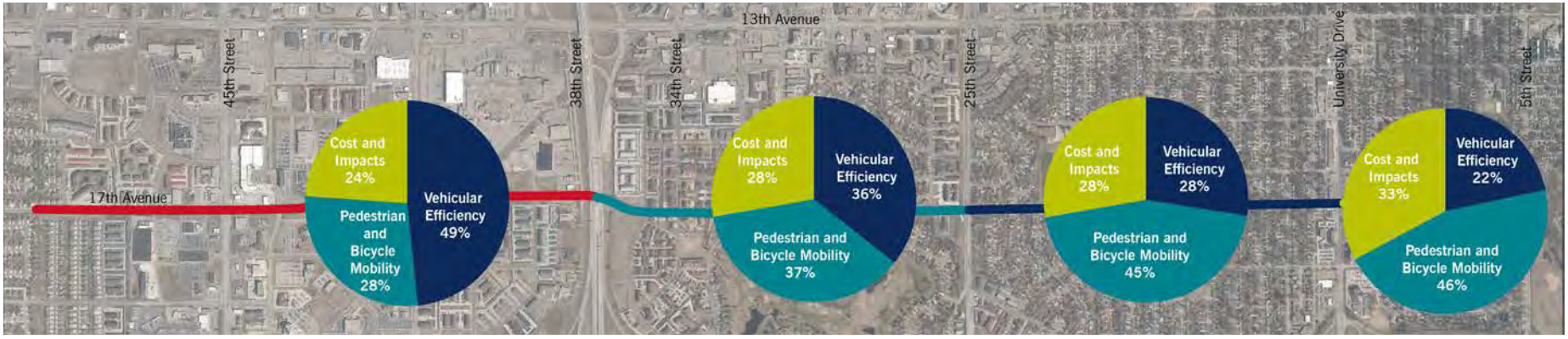
Cost and impacts scores were estimated based on the extent of construction, right-of-way, and property impacts. Detailed cost estimates will be completed once alternatives are properly vetted. Alternatives were developed to minimize cost and impacts where possible. This meant working within the existing curbline when possible to minimize impacts to property, street trees, and utilities.

After establishing a technical criteria, the value profile weights established by the Study Review Committee and the public were applied to create a weighted score by category and overall score to prioritize the alternatives. The weights are shown in Figure 6.1.

The scoring and weights were applied as follows in the example below:

- An alternative for the 51st Street to 38th Street segment has a technical vehicular efficiency score of eight (out of ten), a pedestrian and bicycle mobility of five, and a cost and impacts score of five.
- The weights would be applied to those technical scores, so the vehicular efficiency would receive a weighted score of 3.9 (eight times 0.49), the pedestrian and bicycle mobility would receive a weighted score of 1.4 (five times 0.28), and the cost and impacts would receive a weighted score of 1.2 (five times 0.24). This alternative would receive an overall score of 6.5.

Figure 6.1:Value Profile Weights



TRANSPORTATION ALTERNATIVES: VEHICLES

In this section, the alternatives focus on improvements for auto travel. Traffic control consistency was maintained for the alternatives. This means a roundabout was not recommended alongside a traffic signal. This improves traffic flow, safety, and motorist expectation. The low, medium, and high impact refers specifically to the benefit of automobiles. Operations are reported for the 2040 PM peak hour.

5th Street to University Drive

Based on the technical analysis presented in the previous chapters, and the public input, there are no vehicular improvements necessary. Operations are acceptable through 2040. There were several issues identified at the 17th Avenue and University Drive intersection, but analysis at this location was outside the scope of the study. It should continue to be monitored as part of other studies and projects.

University Drive to 25th Street

Based on the technical analysis presented in the previous chapters, and the public input, there are no vehicular improvements necessary. There were safety issues identified at the 17th Avenue and 25th Street intersection, which was reconstructed in 2014. Since that time, the number of crashes per year has increased, from 12 per year before reconstruction to 15 per year. While the reconstruction did reduce rear end crash types (likely due to improved operations), the left-turn and angle crashes increased. This includes five left-turn crashes for the north-south directions. Operating the left-turns as permitted only during the peak hours may mitigate this crash trend likely due to the introduction of a negative offset median in the recent reconstruction. Evaluation of all-red clearance times may help mitigate the south-west angle crashes, of which three occurred in 2015 and 2016. There were also two bicycle-pedestrian crashes that have occurred in the two-years after reconstruction, compared to just one in the three-years prior to reconstruction. Operational analysis here was outside the scope of the study. It should continue to be monitored as part of other studies and projects.

25th Street to 38th Street

SUMMARY OF THE VEHICULAR ISSUES

This segment of 17th Avenue is primarily residential area with multiple parks. The major vehicular issues identified in this segment are indicative of the poor operations during peak hours, and resultant driver frustration:

- Poor traffic flow and operations through the multiple all-way stop controlled intersections, especially during peak hours.
- Crash issues at the 34th Street and 35th Street intersections, often related to queueing from adjacent intersections. Rear end crashes were also prevalent in this segment, correlated with long queues and delays during peak hours.

ALTERNATIVES

No Impact

The no impact vehicular alternative for this segment would maintain the all-way stop control already in place. This alternative would not improve operations or safety. Deficient operations would remain at the 38th Street, 34th Street, 32nd Street, and East Gateway Circle intersections through 2040. Crash trends at 34th Street and 35th Street intersections, and across the segment, would remain.

Figure 6.2: Long Queues at the 34th Street Intersection

The plan view, typical section, and scoring is shown in Figure 6.6. The traffic operations presented in this table are from Synchro, which does not take into account any metering that happens at upstream intersections. The remaining alternatives for this segment of 17th Avenue have operations presented based on microsimulation analysis.

Low Impact

The low impact vehicular alternative for this segment would maintain the all-way stop control already in place. However, it would add an extra through lane on the eastbound and westbound approaches at the 32nd Street, 34th Street, and 38th Street intersections. The lanes would end around 300 feet after the intersection and require vehicles to merge back into the one lane. This improvement allows 50 percent more east-west through traffic to proceed

during each stop. 17th Avenue carries twice as much traffic than any of the sidestreets making this an appealing option. Because only two cars are present during each movement, the merge maneuver is easy to accomplish after the intersection.

This design is used very effectively on Mission Boulevard in San Diego, where it carried more than 13,000 vehicles per day in 2016. This is slightly higher than the 2040 future traffic projects for this segment of 17th Avenue. An aerial and street view is shown in Figure 6.3.

This alternative would improve overall 2040 intersection operations:

- 32nd Street, 34th Street, and 38th Street would operate at LOS "B" with acceptable approach levels of service.
- 35th Street would operate at LOS "B" with deficient northbound and southbound approach levels of service, LOS "F" and "E", respectively. This is common at minor approach controlled intersections. This alternative would not address the crash trend at this intersection as driver frustration associated with long delays leads to risk taking behavior.

By improving operations and minimizing queues, this alternative may help mitigate crash trends prevalent between 32nd Street and 38th Street, which are predominantly related to stop and go traffic and long queues. The plan view, typical section, and scoring is shown in Figure 6.7.

Medium Impact

The medium impact vehicular alternative for this segment would install traffic control signals at the 32nd Street, 34th Street, and 38th Street intersections.

The medium impact vehicular alternative includes a ¾ access at 35th Street, which would permit left-turns onto 35th Street, but would not permit left-turns from 35th Street, on either the northbound or southbound approaches. This access configuration would have positive benefits to overall intersection operations by reducing the delay expected on the northbound and southbound approaches, but it would have negative impacts on northbound and southbound traffic flows and to the 34th Street intersection, where left-turning traffic would be rerouted.

Figure 6.3: Traffic Signal at 19th Avenue and Sheyenne Street, West Fargo

A ¾ access would provide safety benefits; it would prevent left-turn crashes, which are very prevalent at this intersection currently, but would be restrictive to individuals who live in the condo development between 35th Street and 34th Street south of 17th Avenue, who have already noted vehicles use their private driveways to access 34th Street.

This alternative would improve overall intersection operations:

- LOS "A" at 38th Street and 35th Street with no deficient approach levels of service.
- LOS "B" at 32nd Street and 34th Street with no deficient approach levels of service.

This alternative would also help mitigate the crash trends currently associated with poor operations in this segment. The plan view, typical section, and scoring is shown in Figure 6.8.

Figure 6.4: Two-Lane Approach with Merge Lane on Mission Boulevard, San Diego

High Impact

The high impact vehicular alternative for this segment would install roundabouts at the 32nd Street, 34th Street, and 38th Street intersections. Roundabouts have been found to reduce total crashes by 37 percent and injury and fatality crashes more than 75 percent. Roundabouts also slow traffic while improving traffic flow because vehicles only yield, they do not need to stop. Studies have found that roundabouts contributed to an 89 percent reduction in delays and 56 percent reduction in vehicle stops. Roundabouts are becoming more common in the Fargo area. They've been installed in multiple contexts, including industrial (12th Avenue N in West Fargo), residential (30th Avenue in Fargo, shown in Figure 6.5; 9th Street W in West Fargo), and on arterial roadways (Veterans Boulevard, 25th Street).

The high impact alternative also includes a ¾ access at 35th Street, which would permit left-turns onto 35th Street, but would not permit left-turns from 35th Street, on either the northbound or southbound approaches. This access configuration would have positive benefits to overall intersection operations by reducing the delay expected on the northbound and southbound approaches, but it would have negative impacts on northbound and southbound traffic flows and to the 34th Street intersection, where left-turning traffic would be rerouted.

The 17th Avenue intersections at 38th Street, 35th Street, 34th Street, and 32nd Street operate at LOS "A" through 2040, with acceptable approach levels of service. By improving operations and minimizing queues, this alternative may help mitigate crash trends prevalent between 32nd Street and 38th Street, which are predominantly related to stop and go traffic and long queues.

The plan view, typical section, and scoring is shown in Figure 6.9.

Analyzed and Discarded

There are many concerns with the 35th Street intersection, including operations, crash trends, and impacts from the new apartments. However, the distance to the 38th Street and 34th Street intersections makes any traffic control on the east-west approaches infeasible; it would result in greater impacts to these adjacent intersections than it would fix at 35th Street. To maintain integrity at the other intersections, improved traffic control at 35th Street was discarded.

Improvements at the East Gateway Circle were also considered and discarded. While the intersection operates deficiently under all alternatives, its proximity to 25th Street means traffic control at this intersection could impact operations at 25th Street which would be unacceptable. Improvements at this intersection may also attract additional cut-through traffic, which the public has already identified as an issue. Finally, there are no additional crash issues at this intersection. For these reasons, improvements at East Gateway Circle were discarded.

Summary of Alternatives

Each of the alternatives received a technical score that was weighted using the value profile. The results of the vehicular alternatives analysis for 25th Street to 38th Street are shown in Table 6.1.

Table 6.1: Summary of Vehicular Alternatives for 25th Street to 38th Street

Alternative	Overall Score
Do Nothing	4.7
Low Impact: All-Way Stop Control with Merge Lanes	5.4
Medium Impact: Traffic Signals	7.2
High Impact: Roundabouts	7.3

Figure 6.5: Roundabout on 30th Avenue, Fargo

Figure 6.6: Summary of Do Nothing Vehicular Alternative for 25th Street to 38th Street

25th Street to 38th Street:
Vehicular Alternatives: No Impact
Do Nothing

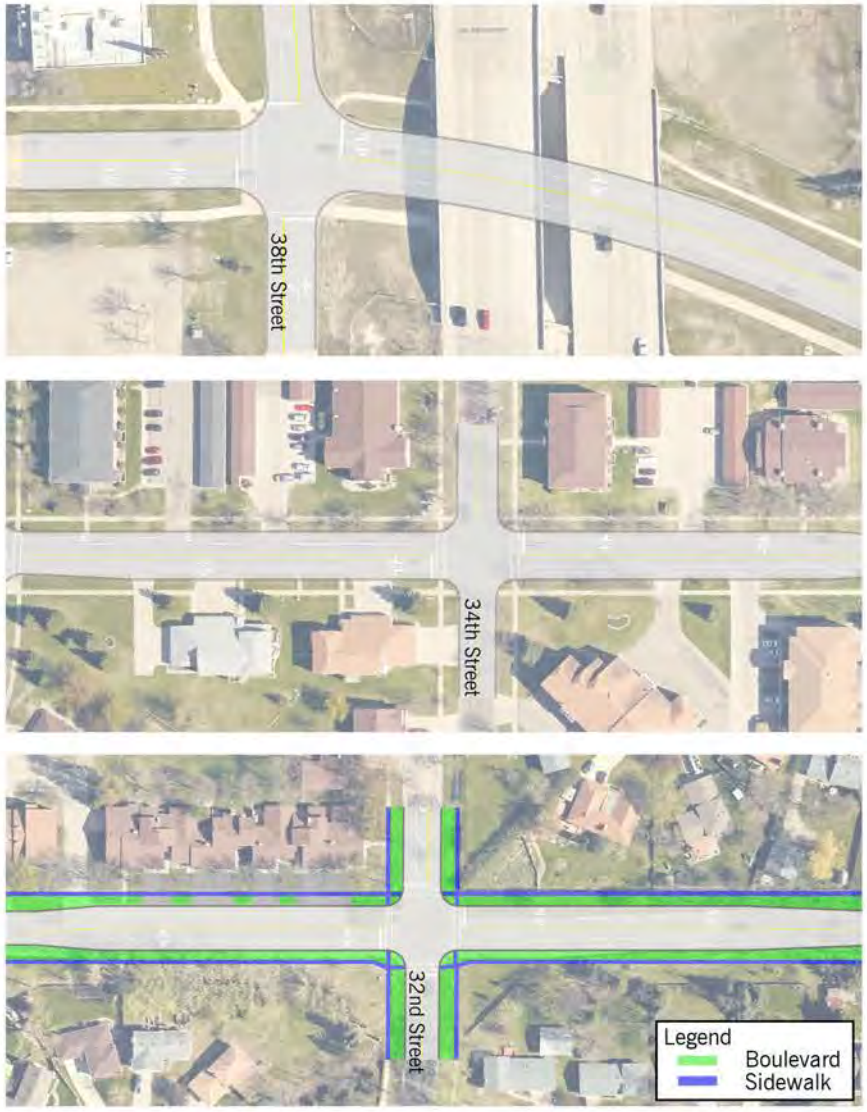
Intersection	Traffic Control	2040 PM Peak Hour Operations
38th Street	All-Way Stop	F [F]
35th Street	Two-Way Stop	A [F]
34th Street	All-Way Stop	F [F]
32nd Street	All-Way Stop	F [F]
East Gateway Circle	Two-Way Stop	B [F]

D [F] = Overall intersection level of service [worst approach level of service]

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●○○○○○○○○○	36%	Long queues result in driver frustration and elevated crash rates. Most intersections deficient.
Bicycle and Pedestrian Mobility and Safety	●●●○○○○○○○	37%	Poor vehicle operations impact bike and ped safety, operations. Frustrated drivers unwilling to wait for a bike or ped crossing.
Cost and Impacts	●●●●●●●●●●	28%	No cost.
Overall Score:	●●●●●○○○○○		**4.7**

Figure 6.7: Summary of Low Impact Vehicular Alternative for 25th Street to 38th Street

25th Street to 38th Street:
Vehicular Alternatives: Low Impact
Maintain Stop Control with Merge Lanes



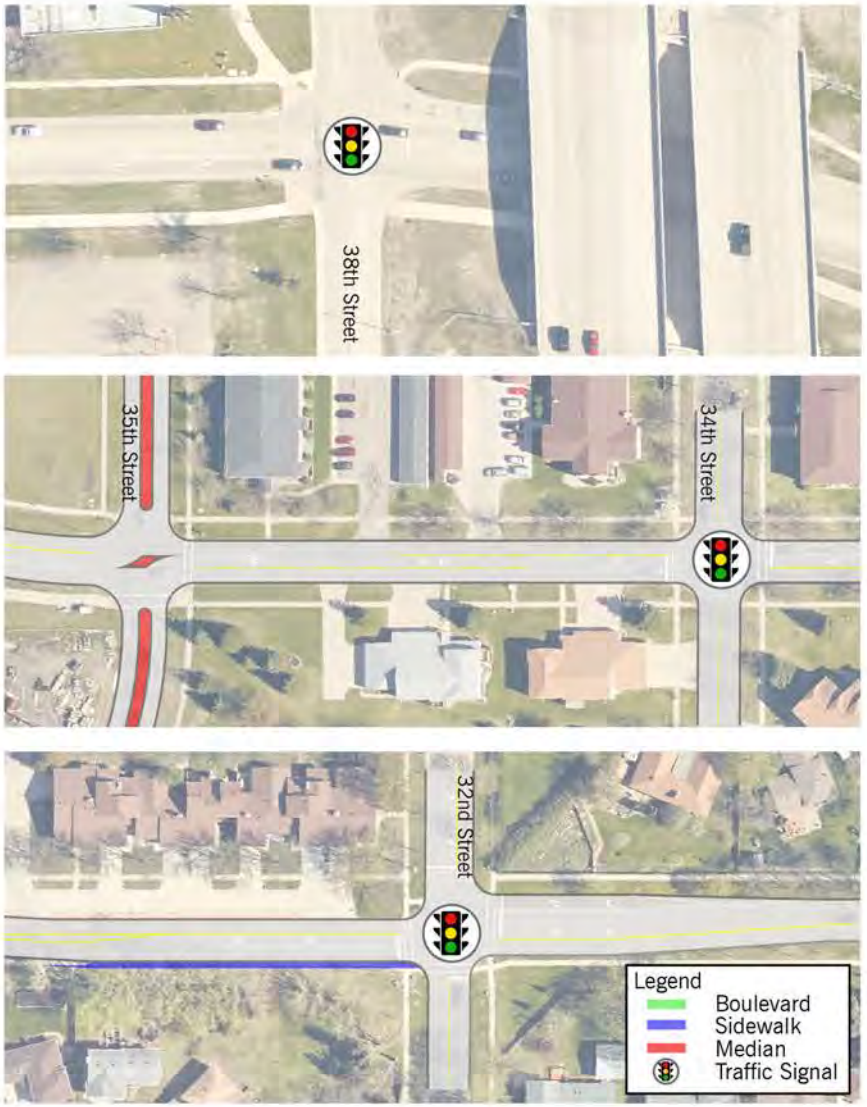
Intersection	Traffic Control	2040 PM Peak Hour Operations
38th Street	All-Way Stop	B [B]
35th Street	Two-Way Stop	B [F]
34th Street	All-Way Stop	B [C]
32nd Street	All-Way Stop	B [C]
East Gateway Circle	Two-Way Stop	E [F]

D [F] = Overall intersection level of service [worst approach level of service]

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●●●●●●●○○○	36%	Small impacts improve operations to LOS "B" at most intersections. East Gateway Circle still deficient.
Bicycle and Pedestrian Mobility and Safety	●●●●●○○○○○	37%	More efficient operations means less frustrated drivers, unpredictability at stop controlled intersections.
Cost and Impacts	●●●●○○○○○○	28%	Curb impacts expected at key intersections.
Overall Score:	●●●●●○○○○○		**5.5**

Figure 6.8: Summary of Medium Impact Vehicular Alternative for 25th Street to 38th Street

25th Street to 38th Street:
Vehicular Alternatives: Medium Impact
Traffic Signals at 38th Street, 34th Street, 32nd Street



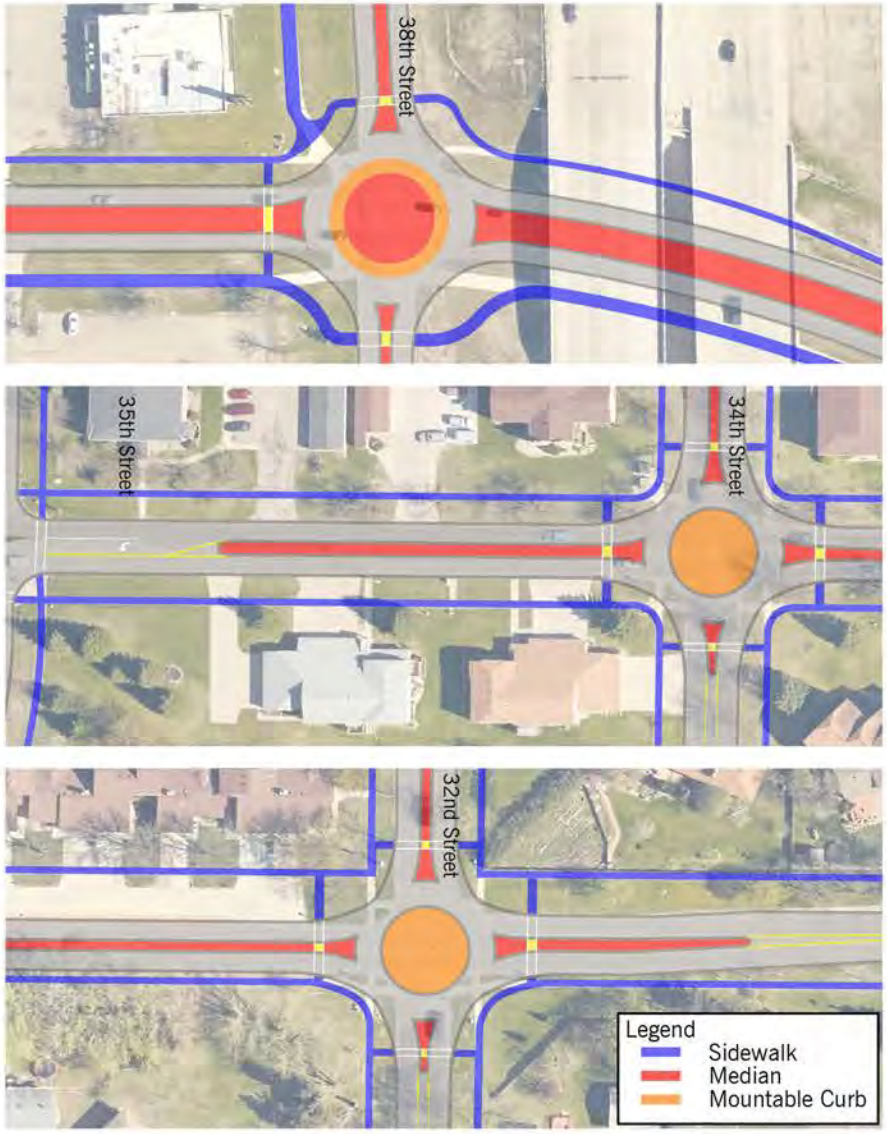
Intersection	Traffic Control	2040 PM Peak Hour Operations
38th Street	Traffic Signal	A [B]
35th Street	Two-Way Stop w/ 3/4 Access	A [B]
34th Street	Traffic Signal	B [C]
32nd Street	Traffic Signal	B [C]
East Gateway Circle	Two-Way Stop	E [F]

D [F] = Overall intersection level of service [worst approach level of service]

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●●●●●●●●○○	36%	Signals improve operations at most intersections. Improved safety at access controlled intersections.
Bicycle and Pedestrian Mobility and Safety	●●●●●●●○○○	37%	More efficient operations means less frustrated drivers, unpredictability at intersections. Signals provide protected crossing.
Cost and Impacts	●●●●●○○○○○	28%	Install traffic signals. Few impacts expected. Impacts to access controlled intersection.
Overall Score:	●●●●●●●○○○		**6.9**

Figure 6.9: Summary of High Impact Vehicular Alternative for 25th Street to 38th Street

25th Street to 38th Street:
Vehicular Alternatives: High Impact
Roundabouts at 38th Street, 34th Street, 32nd Street



Intersection	Traffic Control	2040 PM Peak Hour Operations
38th Street	Roundabout	A [B]
35th Street	Two-Way Stop w/ Right-In/Right-Out	A [B]
34th Street	Roundabout	A [A]
32nd Street	Roundabout	A [A]
East Gateway Circle	Two-Way Stop	E [F]

D [F] = Overall intersection level of service [worst approach level of service]

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●●●●●●●●●○	36%	Roundabouts improve operations at intersections. Access control improves safety.
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●○○	37%	Roundabouts slow vehicles and have been shown to reduce pedestrian-vehicle conflicts.
Cost and Impacts	●●●●○○○○○○	28%	Impacts at intersections to install roundabouts and access management.
Overall Score:	●●●●●●●○○○		7.3

38th Street to 51st Street

SUMMARY OF THE VEHICULAR ISSUES

This segment of 17th Avenue is primarily high-density commercial and residential developments.

- Multiple moderate and high access risk locations associated with redundant commercial driveways.
- Nearly half of the crashes that occur on 17th Avenue occur between 42nd Street and 45th Street. Most crashes are associated with the four-lane section resulting in rear-end crashes due to left-turning vehicles. There are also critical crash rates at three intersections (42nd Street, 44th Street, and 45th Street).

Figure 6.10: 4-Lane Section from 42nd Street to 45th Street

ALTERNATIVES

No Impact

The no impact vehicular alternative would make no changes to the existing roadway. This alternative would not improve operations or safety.

The scoring and typical section is shown in Figure 6.18.

Low Impact

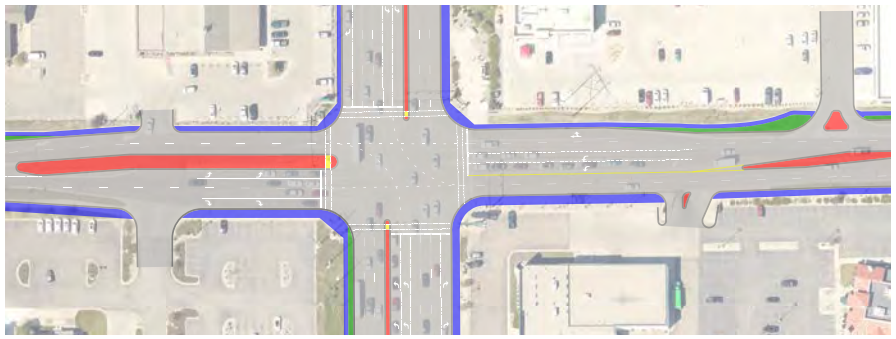
The low impact vehicular alternative for this segment focuses on access management and spot improvements along the corridor.

Reducing access points along the corridor would help mitigate some of the left-turn crashes common in this segment. Access management would close, relocate, or modify 20 accesses along the corridor reducing risk by 48 percent, as shown in Figure 6.16.

Spot improvements focused on two intersections.

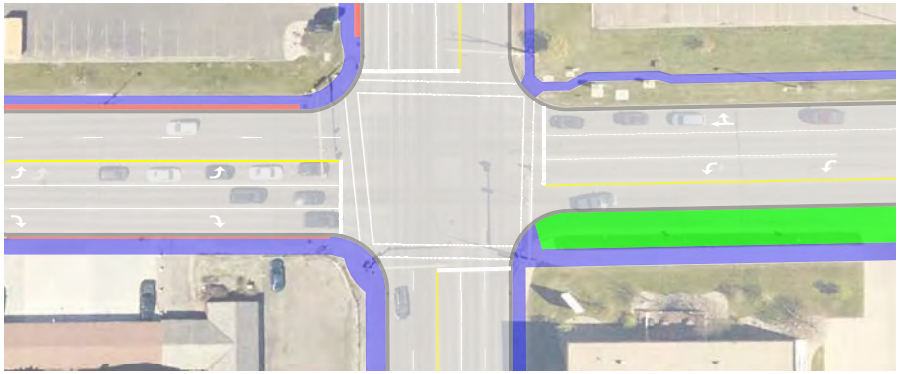
- At 45th Street, improvements would incorporate a westbound double left-turn lane, extend the turning bay on the eastbound right-turn lane, and extend the west median to convert the two development driveways into right-in/right-out only. This would improve operations at 45th Street to LOS "E" from LOS "F" through 2040. These improvements would also reduce queues on the westbound approach to a level that would not block adjacent intersections, like it often does currently, and prevent vehicles from making left turns into the right-in/right-out only driveway into the Prairie Stone development north of 17th Avenue.

Figure 6.11: Spot Improvements at 45th Street



- At 42nd Street, the lane drop a little more than 200 feet east of the intersection discourages timid drivers from using the outermost lane, because they have to merge quickly after the intersection, while blocking high-volume right turn traffic when a through vehicle is in this lane. The improvements would convert the thru/right to a dedicated right-turn lane. In the event a large, high activity development is constructed between 42nd Street and 40th Street, the through/right could be maintained with an additional through lane constructed to 40th Street. This would be a very high cost improvement, contingent on a significant development.

Figure 6.12: Spot Improvements at 42nd Street



This low impact alternative would improve safety at some of the most crash prone intersections and segments and mitigate bottlenecks.

The scoring and typical section is shown in Figure 6.19.

Medium Impact

The medium impact vehicular alternative for this segment incorporates the access management and spot improvements from the low impact vehicular alternative and improve the roadway section from 42nd Street to 45th Street to a five-lane section, with two travel lanes in each direction with a center left turn lane. This would be similar to 25th Street, south of I-94, as shown in Figure 6.13.

Figure 6.13: 5-Lane Section on 25th Street S., Fargo

Center left turn lanes have been found to reduce overall crash occurrence by about 40 percent, including a 20 percent reduction in rear end crashes. This alternative would require curb impacts.

The scoring and typical section is shown in Figure 6.20.

High Impact

The high impact vehicular alternative for this segment would widen 17th Avenue to a median divided four-lane section with turn lanes at major intersections and driveways from 47th Street to 38th Street. This design would be consistent with other major corridors recently completed or currently being designed (13th Avenue, Veterans Boulevard, 32nd Avenue, Sheyenne Street, 52nd Avenue, etc.). Installing raised medians along corridors has been found to reduce overall crash occurrence by about 40 percent. When combined with additional treatments, like marked crosswalks, raised medians have been found to reduce vehicle-pedestrian conflicts by 46 percent. It would also incorporate the spot improvements at 45th Street and 42nd Street.

Figure 6.14: 4-Lane Median Divided Section on 32nd Avenue S., Fargo

This alternative would incorporate access management, as shown in Figure 6.17. This access management plan would close, relocate, or modify 24 accesses along the corridor reducing risk by 44 percent.

The 3/4 access at 44th Street would address many of the significant crash issues at this intersection. However, this would likely divert traffic onto other challenging corridors. Vehicles from the north approach, trying to go east towards 42nd Street, would have to go north to 15th Avenue to make a right-turn. 15th Avenue likely has similar operational and safety constraints. Vehicles from the south approach, trying to go west towards 45th Street would have to go to 18th Avenue South or 19th Avenue South to access 45th Street. Only 19th Avenue South is signalized, but currently has very poor operations, with queues that regularly extend back to 44th Street.

The scoring and typical section is shown in Figure 6.21.

Figure 6.15: Street Network Surrounding 44th Street

Road Diet Alternative

A road diet alternative was evaluated for the segment between 42nd Street and 45th Street. A road diet would create more space for pedestrian and bicycle facilities by removing one travel lane and converting one other travel lane into a two-way center left-turn lane. However, this resulted in significant impacts to intersection operations, with long queues blocking driveways and delays exceeding ten minutes per vehicle by 2040. The scoring and typical section is shown in Figure 6.22.

Figure 6.16: Access Management Plan for Low and Medium Impact Alternatives

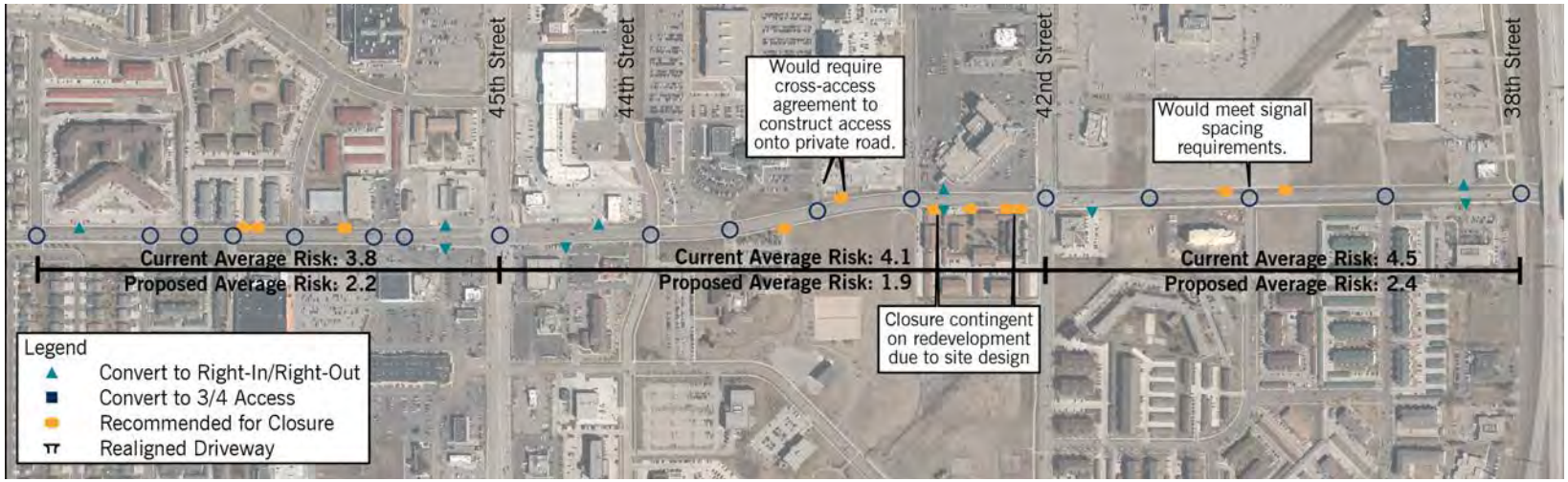
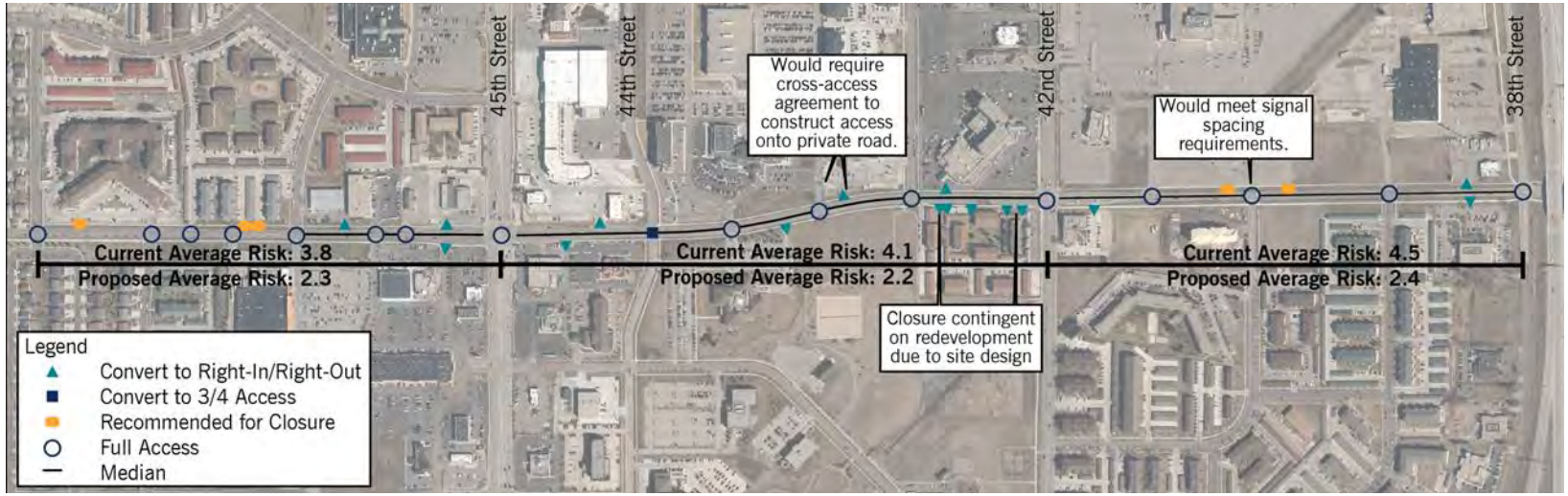


Figure 6.17: Access Management Plan for High Impact Alternative



Summary of Alternatives

Each of the alternatives received a technical score that was weighted using the value profile. The results of the vehicular alternatives analysis for 38th Street to 51st Street are shown in Table 6.2.

Table 6.2: Summary of Vehicular Alternatives for 38th Street to 51st Street

Alternative	Overall Score
Do Nothing	3.7
Low Impact: Spot Improvements	5.0
Medium Impact: 5-Lane Section from 42nd Street to 45th Street	5.0
High Impact: Median Divided 4-Lane Section from 38th Street to 51st Street	6.8
Road Diet: 3-Lane Section with Buffered Bike Lanes	3.3

Figure 6.18: Summary of Do Nothing Vehicular Alternative for 38th Street to 51st Street

38th Street to 51st Street:
Vehicular Alternatives: No Impact
Do Nothing

Intersection	Traffic Control	2040 PM Peak Hour Operations
45th Street	Traffic Signal	E [F]
44th Street	Two-Way Stop	B [F]
42nd Street	Traffic Signal	D [F]

D [F] = Overall intersection level of service (worst approach level of service)

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●○○○○○○○○○	49%	Poor operations at study intersections, many high crash locations due to access and lack of turn lanes.
Bicycle and Pedestrian Mobility and Safety	●●●○○○○○○○	28%	Poor vehicular operations impact bicycle and pedestrian safety and level of service.
Cost and Impacts	●●●●●●●●●●	24%	No changes to existing roadway.
Overall Score:	●●●●○○○○○○		**3.7**

Figure 6.19: Summary of Low Impact Vehicular Alternative for 38th Street to 51st Street

38th Street to 51st Street:
Vehicular Alternatives: Low Impact Access Management and Spot Improvements

Intersection	Traffic Control	2040 PM Peak Hour Operations
45th Street	Traffic Signal	D [E]
44th Street	Two-Way Stop	B [F]
42nd Street	Traffic Signal	D [E]

D [F] = Overall intersection level of service (worst approach level of service)

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●●●●●○○○○○	49%	Spot improvements at 45th Street and 42nd Street. Access management across the corridor.
Bicycle and Pedestrian Mobility and Safety	●●●●○○○○○○	28%	Closing accesses improves bicycle and pedestrian safety.
Cost and Impacts	●●●●●●○○○○	24%	Costs to close, realign, or modify access, and changes to three intersections.
Overall Score:	●●●●●○○○○○		**5.0**

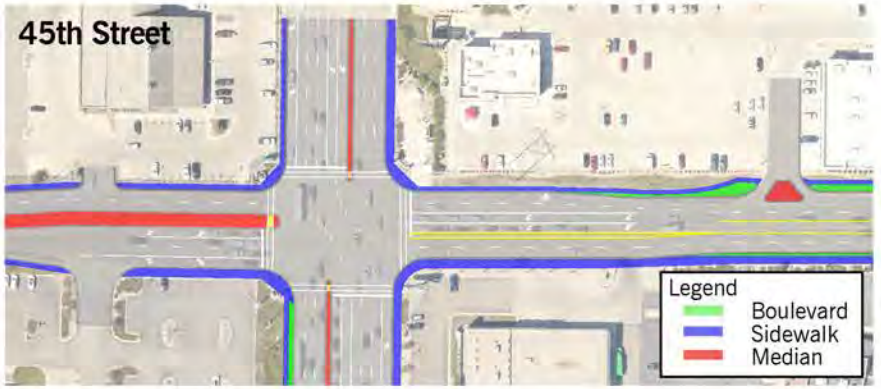
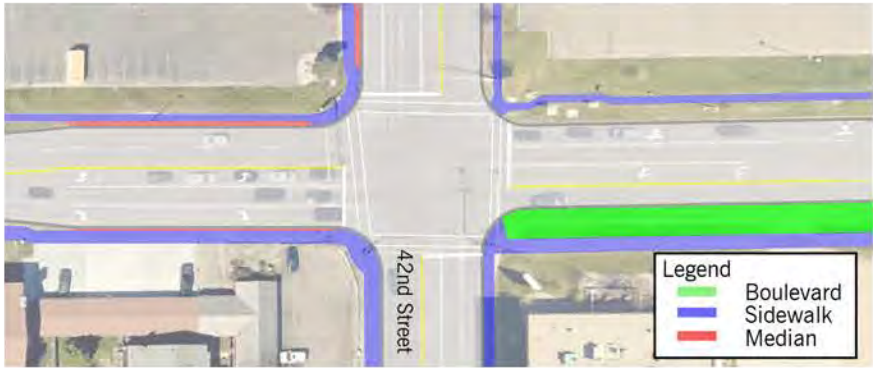


Figure 6.20: Summary of Medium Impact Vehicular Alternative for 38th Street to 51st Street

38th Street to 51st Street:
Vehicular Alternatives: Medium Impact
Spot Improvements and Widen 42nd to 45th Street



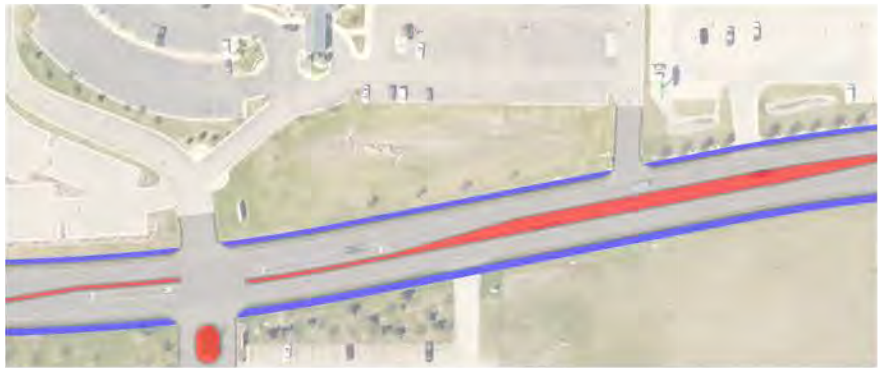
Intersection	Traffic Control	2040 PM Peak Hour Operations
45th Street	Traffic Signal	D [E]
44th Street	Two-Way Stop	B [F]
42nd Street	Traffic Signal	D [E]

D [F] = Overall intersection level of service (worst approach level of service)

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●●●●●●○○○○	49%	Spot improvements address bottlenecks. New turn lanes from 42nd Street to 45th Street and access management improves safety.
Bicycle and Pedestrian Mobility and Safety	●●●●○○○○○○	28%	Closing accesses improves bicycle and pedestrian safety.
Cost and Impacts	●●●●○○○○○○	24%	Costs associated with access management, intersection improvements, curb impacts from 42nd Street to 45th Street.
Overall Score:	●●●●●○○○○○	**5.0**	

Figure 6.21: Summary of High Impact Vehicular Alternative for 38th Street to 51st Street

38th Street to 51st Street:
Vehicular Alternatives: High Impact
Median Divided 4-Lane Section with Turn Lanes



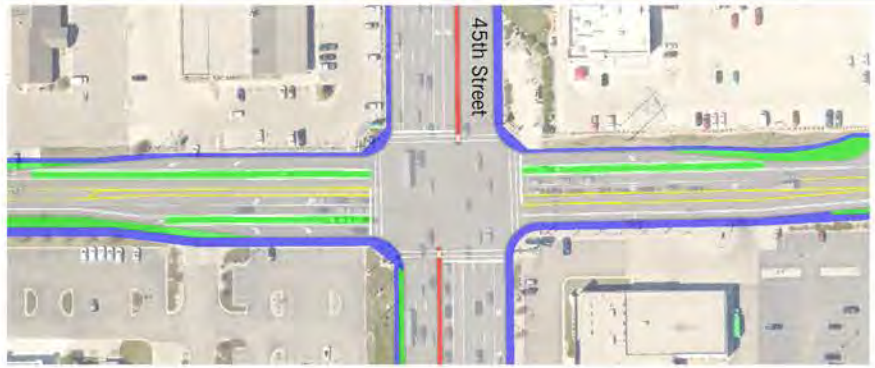
Intersection	Traffic Control	2040 PM Peak Hour Operations
45th Street	Traffic Signal	D [E]
44th Street	Two-Way Stop with 3/4 Access	A [C]
42nd Street	Traffic Signal	D [E]

D [F] = Overall intersection level of service [worst approach level of service]

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●●●●●●●●●●	49%	Access management, turn lanes, and medians improve safety and efficiency across the corridor.
Bicycle and Pedestrian Mobility and Safety	●●●●○○○○○○	28%	Closing accesses improves bicycle and pedestrian safety. Medians improve pedestrian crossing safety.
Cost and Impacts	●○○○○○○○○○	24%	Significant costs with widening, medians, turn lanes, and access management.
Overall Score:	●●●●●●○○○○	**6.3**	

Figure 6.22: Summary of Road Diet Vehicular Alternative for 38th Street to 51st Street

38th Street to 51st Street:
Vehicular Alternatives: Road Diet
3-Lane Section with Buffered Bike Lanes



Intersection	Traffic Control	2040 PM Peak Hour Operations
45th Street	Traffic Signal	E [F]
44th Street	Two-Way Stop	F [F]
42nd Street	Traffic Signal	E [E]

D [F] = Overall intersection level of service [worst approach level of service]

Mode	Technical Score	Weight	Notes
Vehicular Efficiency and Safety	●○○○○○○○○○	49%	Intersection operations are deficient resulting in long queues. At 45th Street, queues would block multiple business accesses and 44th Street.
Bicycle and Pedestrian Mobility and Safety	●●●●●○○○○○	28%	Closing accesses improves bicycle and pedestrian safety. On-street buffered bike lanes provide dedicated facilities.
Cost and Impacts	●●●●●●○○○○	24%	Costs associated with access management, intersection improvements, restriping.
Overall Score:	●●●○○○○○○○		**3.3**

TRANSPORTATION ALTERNATIVES: BICYCLES

In this section, the alternatives focus on improvements for bicycle travel. The low, medium, and high impact refers specifically to the benefit of bicycles.

5th Street to University Drive

SUMMARY OF THE BICYCLE ISSUES

While traffic volumes are low and speeding is not generally a concern (fewest violations and average speed around 25 miles per hour), there are no dedicated bicycle facilities in this segment of the corridor. Bicyclists have reported that they are not always given a three-foot passing distance.

ALTERNATIVES

No Impact

The no impact alternative would make no changes to the existing roadway. There were no major deficiencies identified in this segment as it relates to bicycles.

Low Impact

The low impact bicycle alternative for this segment would include painted sharrows. According to the National Association of City Transportation Officials (NACTO), sharrows are appropriate on roadways with a speed of 25 miles per hour and traffic volumes under 3,000 vehicles per day. Sharrows are appropriate to strengthen connections in a bikeway network, but do not attract ridership like other, dedicated bicycle infrastructure does. The City of Toronto Cycling Study completed in 2010 reported that only 54 percent of existing bicyclists reported feeling comfortable on roadways with sharrows, compared to 72.5 percent who are comfortable with dedicated bicycle lanes.

Figure 6.23: Sharrows on 5th Street S., Fargo (1 Block North of 17th Avenue)

This alternative would provide the most basic accommodation for bicycle activity in this segment of the corridor. While it would not negatively impact vehicular operations, it would maintain mixed traffic, which could slow vehicles.

The plan view is shown in Figure 6.26. The scoring and typical section is shown in Figure 6.29.

Medium Impact

The medium impact bicycle alternative for this segment would remove the parking currently provided on the north side of the roadway and stripe narrowed vehicular lanes and bike lanes. Data collected for this study found there is very little parking demand on 17th Avenue at all hours of the day, so few impacts to day-to-day parking are expected.

Bicycle lanes are the most common bicycle facility in the US and are a safe and effective bicycle facility. Bike lanes have been found to reduce injury crashes up to 50 percent, compared to roadways with no striped bicycle

Figure 6.24: Bike Lanes, Superior, WI

facility and on-street parking. Studies have also found that installing bike lanes has a positive impact on bike ridership; on average, for every one mile of bike lane installed, there was an approximately one percent increase in bicycle activity in the community.

This alternative would maintain acceptable vehicle operations and provide separate space for vehicles and bicycles.

The plan view is shown in Figure 6.27. The scoring and typical section is shown in Figure 6.29.

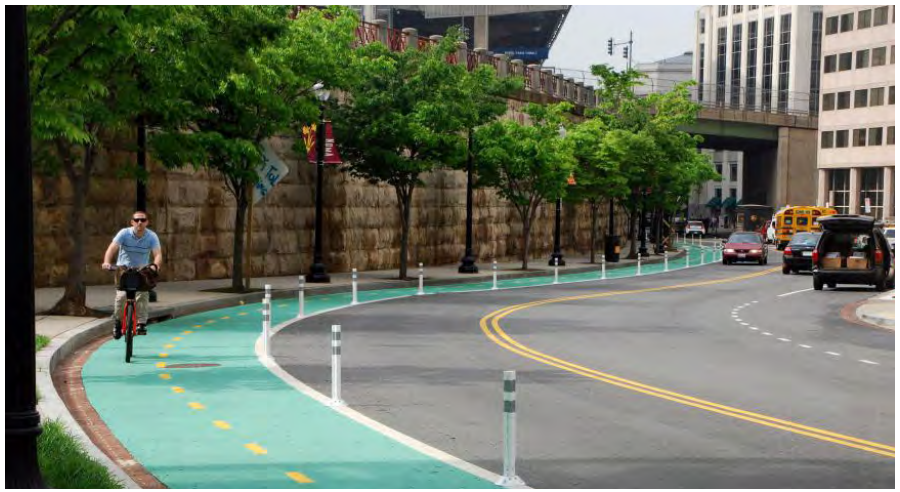
High Impact

The high impact bicycle alternative for this segment would remove the parking currently provided and stripe narrowed vehicular lanes and a two-way bike facility, or cycle track, on the south side of the roadway. Cycle tracks typically provide a much safer bicycling experience, with research finding a 30 to 40 percent reduction in all crash types. Cycle tracks also attract higher ridership. Research has found up to 171 percent increase in bicycle ridership up when no bike facilities were present prior to implementation as well as up to 126 percent increase in bicycle ridership when bike lanes were present. This ridership is not necessarily new trips taken either, about 10 percent of new riders shift from other modes.

This alternative would provide dedicated space for vehicles and bicycles, improving level of service for both.

The plan view is shown in Figure 6.28. The scoring and typical section is shown in Figure 6.29.

Figure 6.25: Cycle Track, Washington D.C.



Analyzed and Discarded

A shared-use path was considered for this segment. However, the number of fully developed trees and above-ground utilities would be costly to mitigate. The shared-use path alternative was discarded.

Summary of Alternatives

Each of the alternatives received a technical score that was weighted using the value profile. The results of the bicycle alternatives analysis for 38th Street to 51st Street are shown in Table 6.3.

Table 6.3: Summary of Bicycle Alternative Scores for 5th Street to University Drive

Alternative	Overall Score
Do Nothing	8.3
Low Impact: Sharrows	8.4
Medium Impact: Bike Lanes	9.3
High Impact: Buffered Cycle Track	9.8

Figure 6.26: Low Impact Bicycle Alternative for 5th Street from University Drive - Sharrows

Figure 6.27: Medium Impact Bicycle Alternative for 5th Street from University Drive - Bike Lanes

Figure 6.28: High Impact Bicycle Alternative for 5th Street from University Drive - Cycle Track

Figure 6.29: Summary of Bicycle Alternatives from 5th Street to University Drive

5th Street to University Drive - Bicycle Alternatives

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●●●	22%	No deficiencies.	8.3 ●●●●●●●●○○
Bicycle and Pedestrian Mobility and Safety	●●●●●○○○○○	46%	Quiet corridor conducive to on-street biking.	
Cost and Impacts	●●●●●●●●●●	33%	No cost.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●●●	22%	No deficiencies.	8.4 ●●●●●●●●○○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●○○○	46%	Quiet corridor conducive to on-street biking.	
Cost and Impacts	●●●●●●●●●○	33%	Requires new striping.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●●●	22%	No deficiencies.	9.3 ●●●●●●●●●○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●●○	46%	Dedicated space for bicycles.	
Cost and Impacts	●●●●●●●●●○	33%	Requires new striping.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●●●	22%	No deficiencies.	9.8 ●●●●●●●●●●
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●●●	46%	Dedicated space for bicycles. Opportunity for continuity across 17th Avenue.	
Cost and Impacts	●●●●●●●●●○	33%	Requires new striping.	

University Drive to 25th Street

SUMMARY OF THE BICYCLE ISSUES

Higher traffic volumes, number of speeding violations, and access density, combined with the lack of dedicated on- or off-street bicycle facilities make bicycling on this segment of 17th Avenue very challenging. Ninety percent of drivers are speeding in this segment, many of them significantly over the 25 miles per hour posted speed limit. This area also serves multiple parks, a high school, and a middle school, all which would benefit from improved multimodal facilities.

ALTERNATIVES

No Impact

The no impact alternative would make no changes to the existing roadway to improve bicycle mobility and safety.

Low Impact

The low impact bicycle alternative for this segment would remove the parking currently provided on the north side of the road and stripe bike lanes. Data collected for this study found there is very little parking demand on 17th Avenue at all hours of the day. Most of the parking demand was associated with an evening baseball game and was adjacent to the empty South High School parking lot.

Bike lanes would provide a dedicated space for cyclists, without negatively impacting the other modes of travel on 17th Avenue. They only require restriping and are a low-cost alternative.

The plan view is shown in Figure 6.33. The scoring and typical section is shown in Figure 6.36.

Medium Impact

The medium impact bicycle alternative for this segment would also remove the parking currently provided and stripe bike lanes, but would also stripe narrower vehicular lanes to incorporate a small painted buffer between the bicycle and vehicular lanes. Buffered bicycle lanes are often preferred to standard bicycle lanes because they increase space and perceived safety.

Again, buffered bike lanes would provide a dedicated space for cyclists. The narrowed lanes will induce a traffic calming effect for vehicles, which is important for safe multimodal operations, especially in this section where speed is an issue. The buffer would not be possible without curb impacts east of 17th Street.

The plan view is shown in Figure 6.34. The scoring and typical section is shown in Figure 6.36.

Figure 6.30: Buffered Bike Lanes, Minneapolis, MN

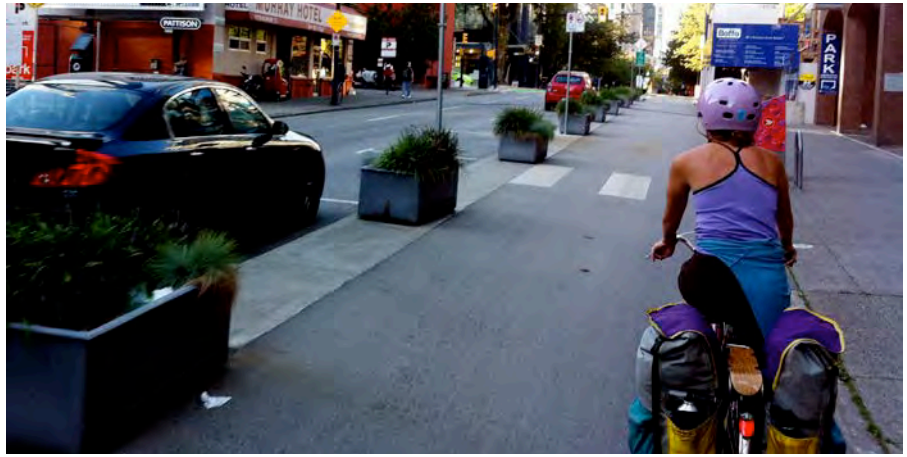
High Impact

The high impact bicycle alternative for this segment would remove the parking currently provided and stripe narrowed vehicular lanes with a two-way bike facility, or cycle track, on the south side of the roadway. Cycle tracks typically provide a much safer bicycling experience and increase bicycle ridership, as discussed previously.

This alternative provides a dedicated space for cyclists, with improved safety features, relative to the low and medium impact alternatives. It provides traffic calming through narrowed lanes. To accommodate the buffer east of 17th Street, this alternative would require curb impacts. However, a non-buffered cycle track, as discussed for 17th Avenue between 5th Street and University Drive would be acceptable here for continuity of bicycle facilities.

The plan view is shown in Figure 6.35. The scoring and typical section is shown in Figure 6.36.

Figure 6.31: Buffered Cycle Track, Seattle, WA



Analyzed and Discarded

A shared-use path was considered for this segment of 17th Avenue. However, the existing street trees and utility poles would make aligning and constructing a shared-use path extremely difficult and costly. Therefore, it was discarded from consideration.

Figure 6.32: Tree and Utilities near Sidewalk

Summary of Alternatives

Each of the alternatives received a technical score that was weighted using the value profile. The results of the bicycle alternatives analysis for University Drive to 25th Street are shown in Table 6.4.

Table 6.4: Summary of Bicycle Alternative Scores for University Drive to 25th Street

Alternative	Overall Score
Do Nothing	7.0
Low Impact: Bike Lanes	7.9
Medium Impact: Buffered Bike Lanes	8.3
High Impact: Buffered Cycle Track	8.7

Figure 6.33: Low Impact Bicycle Alternative for University Drive to 25th Street - Bike Lanes

Figure 6.34: Medium Impact Bicycle Alternative for University Drive to 25th Street - Buffered Bike Lanes

Figure 6.35: High Impact Bicycle Alternative for University Drive to 25th Street - Cycle Track

Figure 6.36: Summary of Bicycle Alternatives from University Drive to 25th Street

University Drive to 25th Street - Bicycle Alternatives

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●○○○	28%	Challenges at 25th Street and University Drive. Bicycles ride on roadway.	7.0 ●●●●●●●●○○
Bicycle and Pedestrian Mobility and Safety	●●●●●○○○○○	45%	Moderate traffic with some speeding.	
Cost and Impacts	●●●●●●●●●●	28%	No cost.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●○○	28%	Challenges at 25th Street and University Drive.	7.9 ●●●●●●●●○○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●○○○	45%	Dedicated space for bicycles.	
Cost and Impacts	●●●●●●●●●○	28%	Requires new striping.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●○○	28%	Challenges at 25th Street and University Drive.	8.3 ●●●●●●●●●○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●●○	45%	Dedicated space for bicycles with buffer.	
Cost and Impacts	●●●●●●●○○○	28%	Requires new striping. Some curb impacts expected if buffer maintained east of 17th Street.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●●●●●●○○	28%	Challenges at 25th Street and University Drive.	8.7 ●●●●●●●●●●
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●●●	45%	Dedicated space for bicycles with large buffer. Continuous facilities across 17th Avenue.	
Cost and Impacts	●●●●●●●○○○	28%	Requires new striping. Some curb impacts expected if buffer maintained east of 17th Street.	

25th Street to 38th Street

SUMMARY OF THE BICYCLE ISSUES

There are no dedicated on- or off-street bicycle facilities on this segment of 17th Avenue. This segment of 17th Avenue carries around 10,000 cars a day, with moderate growth expected by 2040, to about 12,000 cars a day. The poor vehicular operations associated with the all-way stop control currently limits drivers' patience with on-street cyclists, resulting in reported instances of drivers passing without a safe distance.

ALTERNATIVES

No Impact

The no impact alternative would make no changes to the existing roadway to improve bicycle mobility and safety.

Low Impact

The low impact bicycle alternative for this segment would widen the sidewalk on the south side of 17th Avenue to a shared-use path. This would allow bicyclists ample space to use the off-road facility without negatively impacting pedestrian or vehicular movements. While this alternative provides dedicated space, vehicles may not look right for westbound bicycles, creating crossing challenges. Furthermore, advanced and novice bicyclists (children, specifically) would share the same space, potentially increasing conflicts.

Figure 6.37: Wide Boulevards on 17th Avenue (from North Side)

The plan view is shown in Figure 6.39. The scoring and cross-section is presented in Figure 6.42.

Medium Impact

The medium impact bicycle alternative for this segment would widen the sidewalk on the south side of 17th Avenue to a shared-use path and provide on-street bike lanes. This would require striping narrowed lanes to accommodate the bike lanes. This alternative would provide both on- and off-street facilities, which would appeal to all types of riders. This alternative may result in curb impacts in narrower areas of the roadway, where there is parking or curb extensions on the north side.

The plan view is shown in Figure 6.40. The scoring and cross-section is presented in Figure 6.42.

High Impact

The high impact bicycle alternative for this segment would install a raised and buffered two-way cycle track on the south side of 17th Avenue. This would continue the cycle track alternative from the previous segments, but because traffic increases, would provide additional separation to increase safety.

This alternative would require curb impacts on the south side of the roadway, but would not require additional right-of-way.

The plan view is shown in Figure 6.41. The scoring and typical section is shown in Figure 6.42.

Figure 6.38: Raised and Buffered Cycle Track, St. Paul, MN

Summary of Alternatives

Each of the alternatives received a technical score that was weighted using the public value score. The results of the bicycle alternatives analysis for 25th Street to 38th Street is shown in Table 6.5.

Table 6.5: Summary of Bicycle Alternative Scores for 25th Street to 38th Street

Alternative	Overall Score
Do Nothing	3.5
Low Impact: Shared Use Path	4.2
Medium Impact: Shared Use Path and Bike Lanes	4.6
High Impact: Raised and Buffered Cycle Track	5.2

Figure 6.39: Low Impact Bicycle Alternative for 25th Street to 38th Street - South Side Shared Use Path

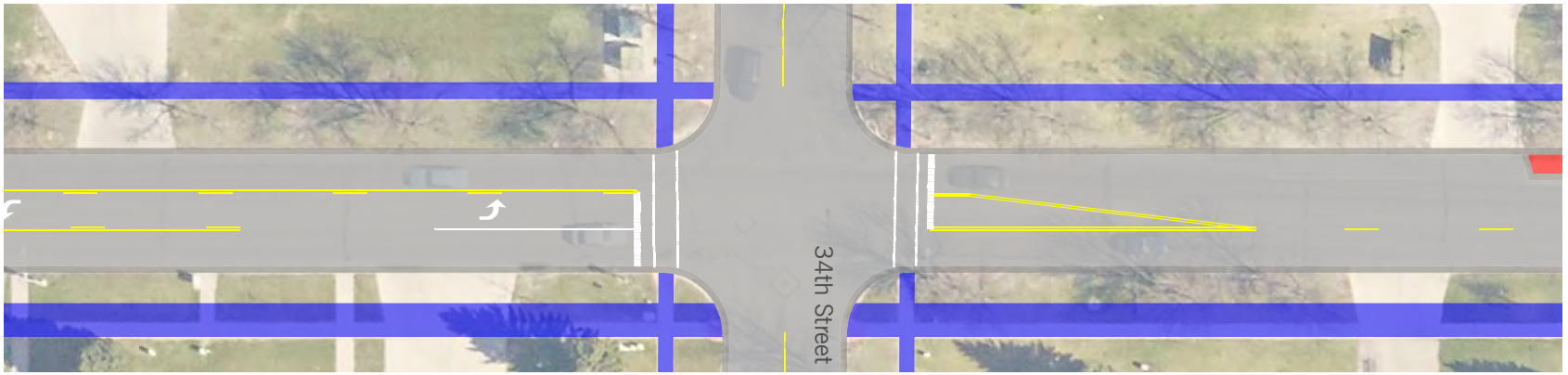


Figure 6.40: Medium Impact Bicycle Alternative for 25th Street to 38th Street - Shared Use Path and Bike Lanes

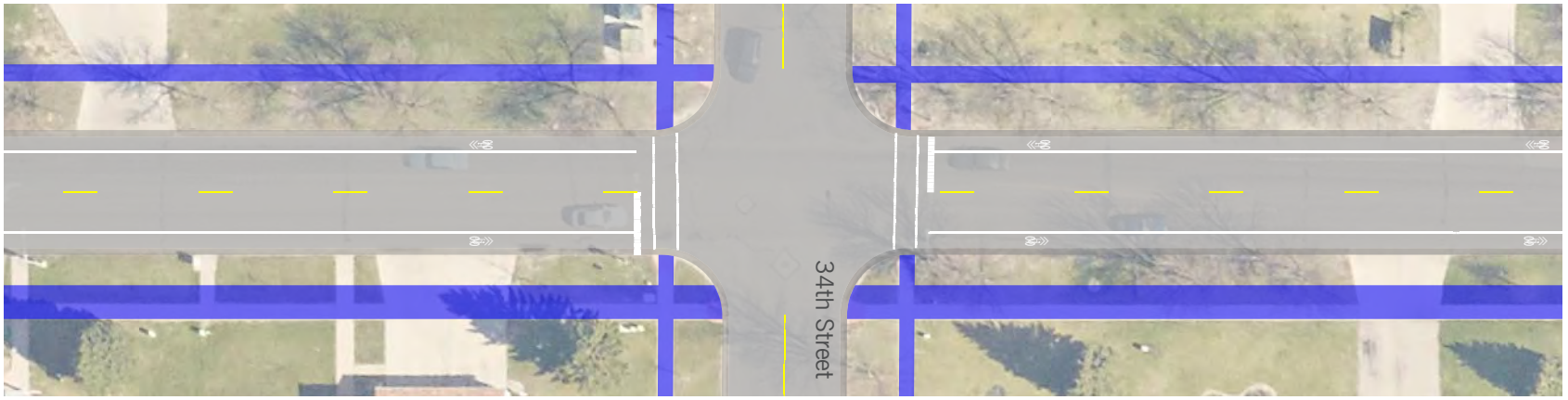


Figure 6.41: High Impact Bicycle Alternative for 25th Street to 38th Street - Cycle Track

Figure 6.42: Summary of Bicycle Alternatives from 25th Street to 38th Street

25th Street to 38th Street - Bicycle Alternatives

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●○○○○○○○○○	36%	Long queues leave drivers frustrated and unwilling to wait for cyclists.	3.5 ●●●●○○○○○○
Bicycle and Pedestrian Mobility and Safety	●○○○○○○○○○	37%	Poor vehicular operations impacts bicycle safety and level of service.	
Cost and Impacts	●●●●●●●●●●	28%	No cost.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●○○○○○○○○○	36%	Long queues leave drivers frustrated and unwilling to wait for cyclists.	4.2 ●●●●○○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●●●○○○○○	37%	Off-street space available for cyclists. Paths not always desirable for experienced cyclists.	
Cost and Impacts	●●●●●●●○○○	28%	Construction of path on south side.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●○○○○○○○○○	36%	Long queues leave drivers frustrated and unwilling to wait for cyclists.	4.6 ●●●●●○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●○○○	37%	Provides on- and off-street facilities to accommodate cyclists of all abilities.	
Cost and Impacts	●●●●●●○○○○	28%	Construction of path on south side. New striping.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●○○○○○○○○○	36%	Long queues leave drivers frustrated and unwilling to wait for cyclists.	5.2 ●●●●●○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●●●	37%	Dedicated space for bicycles with large buffer. Continuous facilities across 17th Avenue.	
Cost and Impacts	●●●●○○○○○○	28%	Curb impacts expected. Possible tree and/or utility impacts.	

38th Street to 51st Street

Summary of Bicycle Issues

A shared-use path on the south side of 17th Avenue provides basic east-west bicycle mobility. However, high volume intersections reduce bicycle crossing safety. Because there is only a shared-use path on the south side of 17th Avenue, vehicles may not look right for westbound bicycles, resulting in crossing challenges, as shown in Figure 6.43.

Figure 6.43: Shared Use Path Conflicts

Alternatives

No Impact

The no impact alternative would make no changes to the existing roadway to improve bicycle mobility and safety. The scoring and cross-section is presented in Figure 6.48.

Low Impact

The low impact alternative would improve pavement markings at all intersections and driveways. Adding high visibility crosswalks, stop bars, or green paint across intersections will help increase visibility of dedicated bicycle space. Signage, like those shown in Figure 6.44, can bring attention to bicycles.

Figure 6.44: Signage at Major Driveways

The scoring and cross-section is presented in Figure 6.48.

Medium Impact

The medium impact alternative would construct a shared-use path on the north side of 17th Avenue and improve pavement markings and signage at all intersections and major driveways. This allows cyclists to ride on the correct side of the road for their travel direction, improving motorist expectancy.

The plan view is shown in Figure 6.46. The scoring and cross-section is presented in Figure 6.48.

High Impact

The high impact bicycle alternative for this segment would install a raised and buffered two-way cycle track on the south side of 17th Avenue. This would continue the cycle track alternative from the previous segments, but because traffic increases, would provide additional separation to increase safety. This allows the bicycle context to remain safe and appealing from West Fargo to the Red River. This alternative would require curb impacts.

Figure 6.45: Raised and Buffered Cycle Track, Vancouver, BC

The plan view is shown in Figure 6.47. The scoring and cross-section is presented in Figure 6.48.

Summary of Alternatives

Each of the alternatives received a technical score that was weighted using the value profile. The results of the bicycle alternatives analysis for 38th Street to 51st Street are shown in Table 6.6.

Table 6.6: Summary of Bicycle Alternative Scores for 38th Street to 51st Street

Alternative	Overall Score
Do Nothing	4.7
Low Impact: Signage	4.8
Medium Impact: Shared Use Paths	4.4
High Impact: Raised and Buffered Cycle Track	5.0

Figure 6.46: Medium Impact Bicycle Alternative for 38th Street to 45th Street

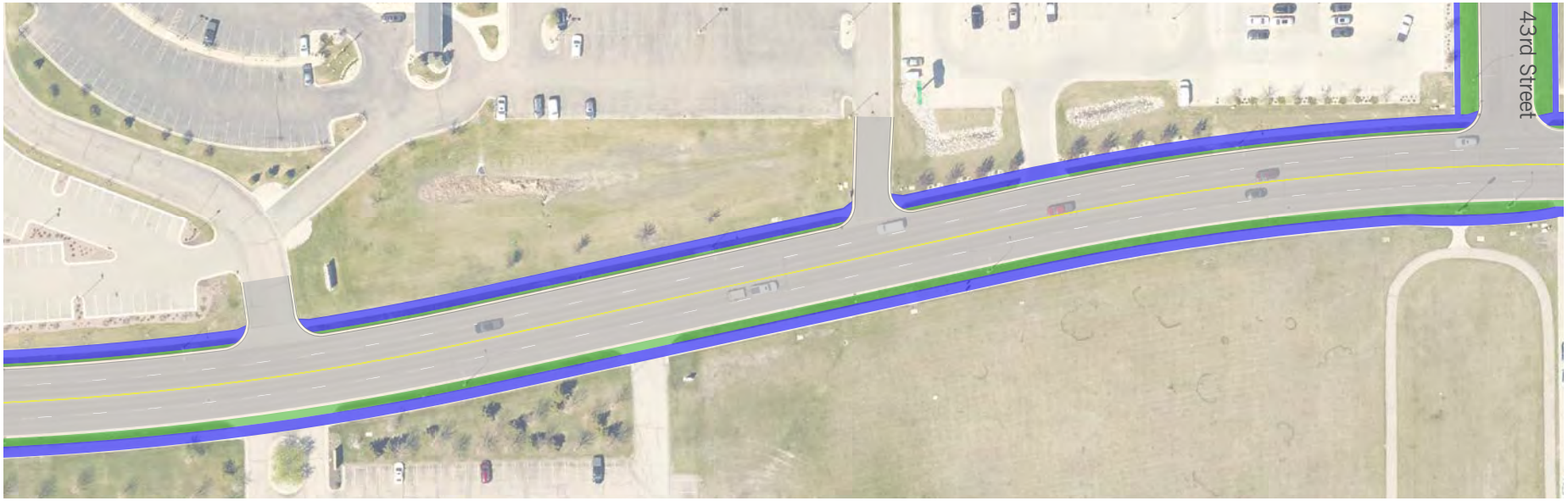


Figure 6.47: High Impact Bicycle Alternative for 38th Street to 45th Street

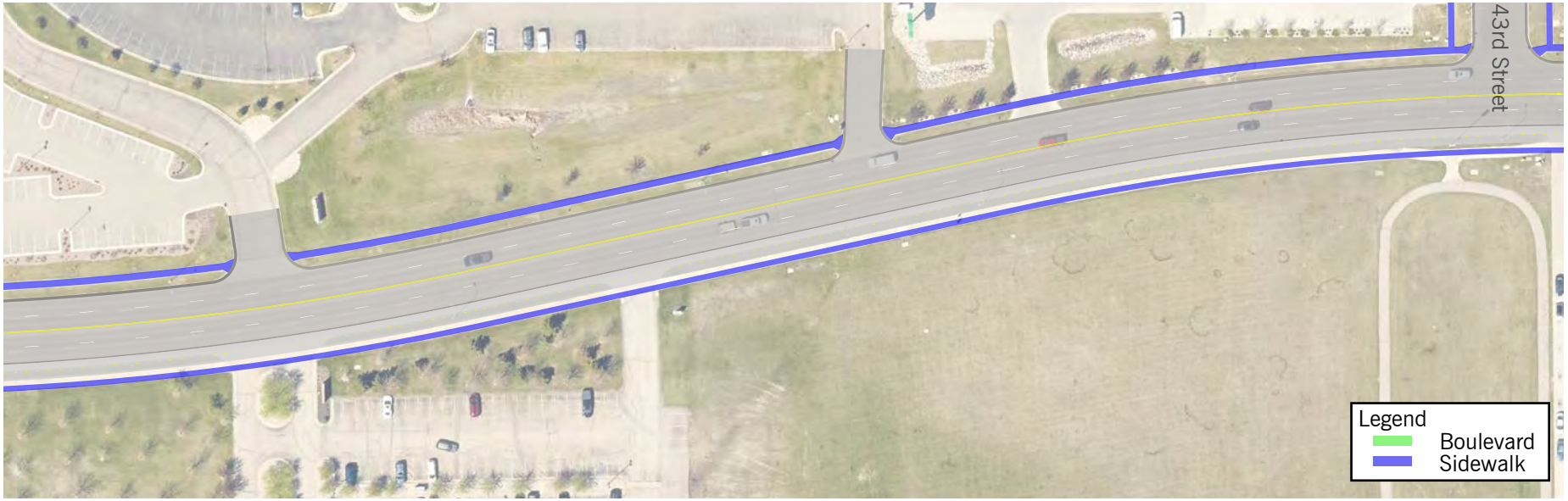


Figure 6.48: Summary of Bicycle Alternatives from 38th Street to 51st Street

38th Street to 51st Street - Bicycle Alternatives

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●○○○○○○○	49%	Long queues at major intersections. Lack of turn lanes create conflicts.	4.7 ●●●●●○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●○○○○○○○	28%	Poor vehicular operations impacts bicycle safety and level of service.	
Cost and Impacts	●●●●●●●●●●	24%	No cost.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●○○○○○○○	49%	Long queues at major intersections. Lack of turn lanes create conflicts.	4.8 ●●●●●○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●●○○○○○○	28%	Large intersections difficult for cylists to cross. Driveways introduce conflicts to bicyclists on paths.	
Cost and Impacts	●●●●●●●●●○	24%	Requires striping and new signs.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●○○○○○○○	49%	Long queues at major intersections. Lack of turn lanes create conflicts.	4.4 ●●●●○○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●●●●○○○○	28%	Allows cyclists to use appropriate side of road for travel, improves visibility.	
Cost and Impacts	●●●●●○○○○○	24%	Construction of shared use path. No ROW impacts expected.	

Mode Category	Technical Score	Weight	Notes	Overall Score
Vehicular Efficiency and Safety	●●●○○○○○○○	49%	Long queues at major intersections. Lack of turn lanes create conflicts.	5.0 ●●●●●○○○○○
Bicycle and Pedestrian Mobility and Safety	●●●●●●●●●●	28%	Dedicated space for bicycles with large buffer. Continuous facilities across 17th Avenue.	
Cost and Impacts	●●●○○○○○○○	24%	Curb impacts expected. Possible tree and/or utility impacts.	

Bicycle Transition Points

As discussed across the 17th Avenue segments, crossing the signalized intersections (45th Street, 42nd Street, 25th Street, University Drive) is challenging because they are large intersections with high traffic volumes. Low impact, medium impact, and high impact alternatives were developed for these intersections as well. These alternatives are not scored, but incorporated into the final alternatives shown later.

ALTERNATIVES

No Impact

The no impact alternative would make no changes to the existing intersections to improve bicycle mobility and safety.

Low Impact

The low impact alternative would improve pavement markings through the intersection. This would include adding stop bars, crosswalks, and stop here signs.

Medium Impact

The medium impact alternative would install bike boxes, which designate an area at the head of a traffic lane to provide cyclists with a safe and visible way to get ahead of traffic. Bike boxes have been installed in more than 20 cities since 2010. They are still considered experimental, so no safety data is available. However, preliminary surveys of cyclist perception is that they increase safety.

Figure 6.49: Bike Boxes, Portland, OR

High Impact

Using a bicycle signal head at these locations can help separate bicycle movements from conflicting motor vehicles by providing priority to bicycle movements allowing cyclists to enter the traffic stream, improving visibility.

Figure 6.50: Bike Signal Head

TRANSPORTATION ALTERNATIVES: PEDESTRIANS

In this section, the alternatives focus on improvements for pedestrian travel. The low, medium, and high impact refers specifically to the benefit of pedestrians. Unlike alternatives for vehicular and bicycle travel which were broken down by segment, the pedestrian alternatives are location specific.

Summary of Pedestrian Issues

Throughout the corridor, there are pedestrian facilities (sidewalk or shared-use paths) on both sides of the roadway. At signalized and all-way stop control intersections, there are a number of protected pedestrian crossing locations, and two uncontrolled, marked mid-block crossings at South High School and Essentia Health. The crossing at Essentia Health has flashing beacons on both sides of 17th Avenue. Marked crosswalks alone, without other improvements, have not been found to reduce pedestrian crash rates, and in some instances have been found to increase pedestrian-vehicle conflicts on multi-lane roads with average daily volumes above 12,000 vehicles per day. 17th Avenue west of 38th Street has daily volumes that exceed 12,000 vehicles per day currently; 17th Avenue between 38th Street and 25th street is expected to see daily volumes above 12,000 by 2040. There are multiple locations along the corridor that could benefit from improved crossing facilities.

ALTERNATIVES

Low Impact

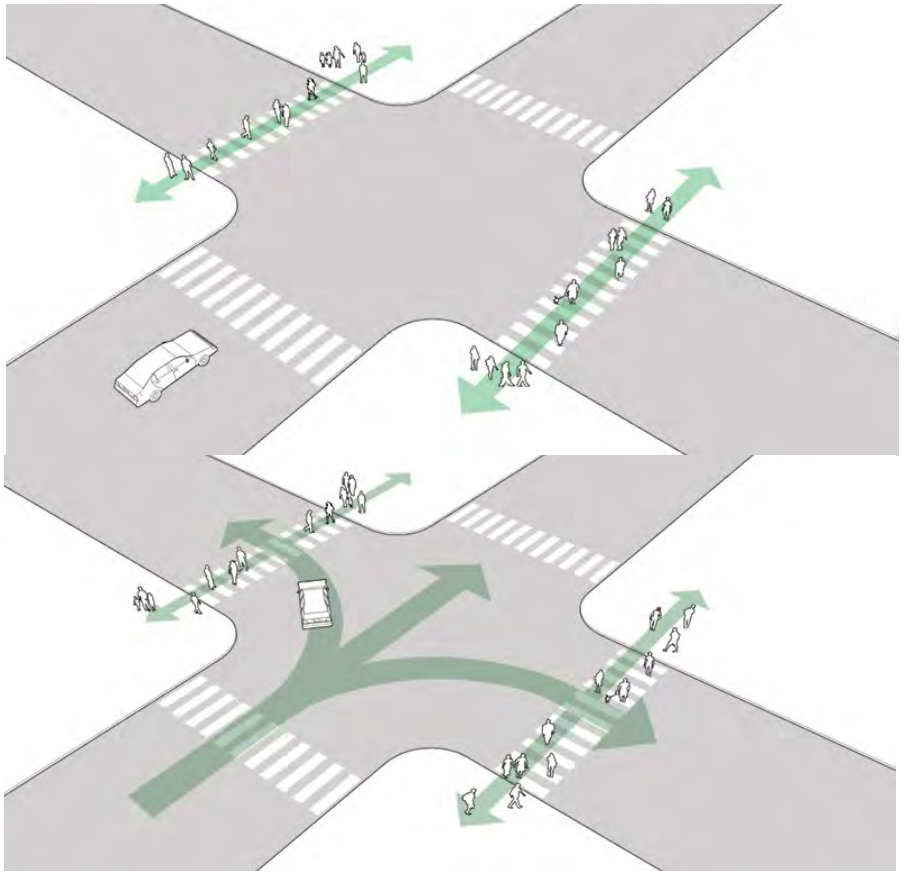
The low impact pedestrian alternative would provide lead pedestrian intervals at each signalized intersection along the corridor (45th Street, 42nd Street, 25th Street, and University Drive, plus any future traffic signal).

Lead pedestrian intervals give pedestrians a small amount of time, typically three or five seconds, to begin crossing the street before a green light is given to vehicles. This allows pedestrians to enter the crosswalk and improve visibility before vehicles can begin making their movements. Research has found incorporating leading pedestrian intervals can reduce pedestrian-vehicle crashes by 60 percent. Lead pedestrian interval is demonstrated in Figure 6.51.

This alternative would improve pedestrian crossing safety at existing (and any future) signalized intersections, but would not improve pedestrian crossing at non – signalized intersections. Because this alternative likely only requires retiming, this is a very low-cost alternative.

The scoring is presented in Figure 6.55.

Figure 6.51: Lead Pedestrian Interval



Medium Impact

The Medium Impact alternative for pedestrians incorporates the lead pedestrian interval at signalized intersections as well as improvements at the following four locations:

- Essentia Health (east of University Drive). Supplement the current beacons with mast arm beacons.
- South High School (west of 17th Street). Install in-roadway sign.
- West Gateway Circle. Install in-roadway sign.
- 40th Street. Phased improvements. Install pedestrian refuge island in the two way left-turn lane on west side of intersection. Evaluate signalization with access management.

Rectangular rapid flashing beacons have a flashing yellow light to bring attention to a pedestrian crossing. The beacon can be manually activated by pedestrians when they need to cross, or can be programmed to run

automatically. Research has found RRFBs have a compliance rate between 72 and 96 percent and a 30 percent increase in yielding distance of 10 feet or more. RRFBs have also been found to reduce vehicle-pedestrian crash potential by 69 percent.

In-roadway signs have been found to have an 87 percent compliance rate in yielding to pedestrians on two-lane roads with low speeds as well as increasing yielding distance. In-street crosswalk signs in cold-weather climates are typically removed during winter to allow for snow clearing without destroying the signs. The in-roadway signs are also a low-cost alternative.

Pedestrian refuge islands reduce the unprotected crossing length for pedestrians by allowing them to cross one direction of traffic at a time. Pedestrian refuge islands have been found to reduce vehicle-pedestrian conflicts up to 46 percent at unsignalized intersections on multi-lane roads.

The scoring is presented in Figure 6.55.

High Impact

The High Impact alternative for pedestrians incorporates the lead pedestrian interval at signalized intersections and improvements at the following four locations:

- Essentia Health (east of University Drive). Maintain the flashing beacon, install overhead beacon with a raised crosswalk.
- South High School (west of 17th Street). Install rectangular rapid flashing beacons.
- West Gateway Circle. Install rectangular rapid flashing beacons.
- 40th Street. Phased improvements. Install pedestrian refuge island in the two way left-turn lane on west side of intersection and install rectangular rapid flashing beacons. Evaluate signalization with access management.

Automatic beacons could be beneficial before and after school hours at the South High School crossing location.

The scoring is presented in Figure 6.55.

SUMMARY OF ALTERNATIVES

A summary of the low, medium, and high impact pedestrian alternatives is shown in Figure 6.55.

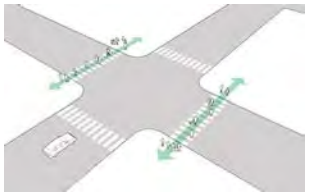
Figure 6.52: In-Roadway Signs

Figure 6.53: Raised Median and High-Visibility Beacon, Fargo

Figure 6.54: Rectangular Rapid Flashing Beacon

Figure 6.55: Summary of Pedestrian Alternatives

Pedestrian Alternatives



Lead Pedestrian Intervals (LPI)

In-Roadway Signs

Rapid Flashing Beacon with Pedestrian Refuge Island

Overhead Mount High Visibility Beacon

Rectangular Rapid Flashing Beacon

Raised Crosswalk

No Impact: Do Nothing

Mode Category	Technical Score	Notes
Vehicular Efficiency	●●●●●○○○○○	Long queues at major intersections. Lack of turn lanes creates conflicts.
Bicycle and Pedestrian Mobility	●●●●○○○○○○	Large and congested intersections are difficult for pedestrians to cross. Vehicles often encroach into crosswalks. Some locations have no protected crossing within one-half mile.
Cost and Impacts	●●●●●●●●●●	No cost.

Low Impact: LPI at Signalized Intersections

Mode Category	Technical Score	Notes
Vehicular Efficiency	●●●●○○○○○○	Pedestrian actuated to minimize delays to vehicles from LPI, but would still impact signal timing and vehicle operations.
Bicycle and Pedestrian Mobility	●●●●●○○○○○	LPI found to reduce pedestrian crashes up to 60 percent.
Cost and Impacts	●●●●●●●●●●	Signal retiming only.

Medium Impact: LPI and Spot Improvements

Mode Category	Technical Score	Notes
Vehicular Efficiency	●●●●○○○○○○	Pedestrian actuated to minimize delays to vehicles from LPI, but would still impact signal timing and vehicle operations.
Bicycle and Pedestrian Mobility	●●●●●●●●○○	LPI found to reduce pedestrian crashes up to 60 percent. Refuge islands reduce vehicle-pedestrian conflicts up to 46 percent. In-roadway signs and pedestrian actuated RRFBs improve yielding compliance.
Cost and Impacts	●●●●●●●●○○	Signal retiming. Some possible impacts to sidewalks with new beacons. Construction costs associated with refuge island.

High Impact: LPI and Spot Improvements

Mode Category	Technical Score	Notes
Vehicular Efficiency	●●●●○○○○○○	Pedestrian actuated to minimize delays to vehicles from LPI, but would still impact signal timing and vehicle operations.
Bicycle and Pedestrian Mobility	●●●●●●●●●●	LPI found to reduce pedestrian crashes up to 60 percent. Refuge islands reduce vehicle-pedestrian conflicts up to 46 percent. In-roadway signs and pedestrian actuated RRFBs improve yielding compliance.
Cost and Impacts	●●●●●●●○○○	Signal retiming. Some possible impacts to sidewalks with new beacons. Construction costs associated with refuge island. No ROW impacts.

TRANSPORTATION ALTERNATIVES: TRANSIT

In this section, the alternatives focus on improvements for transit travel. The low, medium, and high impact refers specifically to the benefit of transit. These alternatives were not scored independently, but their benefits have been incorporated into the overall multimodal assessment scores presented later.

Summary of Transit Issues

Three routes run on 17th Avenue currently, with two routes crossing 17th Avenue. MATBUS will begin transitioning to dedicated stops in 2018, and will consider the recommendations incorporated into this study when determining the dedicated stop locations on 17th Avenue.

From a transit supportive density perspective, there are few areas along the corridor that have residential densities to support improved transit service, but there are many transit dependent populations along the corridor that are not served by frequent transit service. With the focus on infill, there is also an opportunity for high density development around the intersection of 17th Avenue and University Drive, which could become a transit node if properly redeveloped.

On the east side of 17th Avenue (38th Street to 5th Street), there are five shelters with benches, on the west side (51st Street to 38th Street), there are no shelters but there are benches at some corners. The shelters that do exist are MATBUS standard; they do not incorporate technology, heat, or lighting, and some lack street-facing curb ramps for ADA compliance (17th Street and 35th Street). A shelter currently located on 17th Avenue is shown in Figure 6.56.

Figure 6.56: Existing Transit Shelter at East Gateway Circle

Neither the 2016 Transit Development Plan nor the 2040 Long Range Transportation Plan recommended significant improved service along 17th Avenue. They instead focused on streamlining the operations of Route 16 and improving headways on the more direct and popular Route 15 that runs on 13th Avenue, just north of 17th Avenue. However, a concurrent Metro COG study, the Transit Facility Analysis, has projected service will double (30-minute headways) for Route 16 along the 17th Avenue corridor, and the introduction of potentially two new routes to run on portions of 17th Avenue west of 38th Street. These improvements are important for transit riders, but are unlikely to dramatically change the operation of 17th Avenue and unlikely to warrant dedicated transit lanes. Without significant redevelopment and infill, even improved to 15-minute headways would not be a significant impact to transit ridership on 17th Avenue. For these reasons, alternatives to support transit on 17th Avenue will focus on small-scale stop-level improvements.

Dedicated Stop Locations

Dedicated stop locations in the United States generally range from 300 feet to 1,320 feet (1/4 mile) apart, with consideration given to daily boarding's, origins/destinations, special populations (elderly and/or those with mobility challenges), and context (arterial express bus or local route).

EAST OF I-29

Based on these factors and current ridership, the following dedicated stops would be recommended for 17th Avenue east of I-29:

- 5th Street
- 8th Street
- University Drive
- 14th Street
- 16th Street
- South High (maintain existing stop location)
- 23rd Street
- 25th Street
- East Gateway Circle (maintain existing stop location)
- West Gateway Circle
- 32nd Street
- 34th Street
- 35th Street
- 38th Street (on 38th Street)

This list of dedicated stops is very similar to the list of stops shown on the MATBUS live bus tracker with a few modifications. It provides a stop, on average every 1,040 feet (0.2 miles) and at major destinations like the University Drive commercial area, Lewis and Clark Elementary, South High) and relatively high ridership locations in residential areas along the corridor. The University Drive/Essentia stop location should be moved to the intersection of University Drive and 17th Avenue when redevelopment occurs.

WEST OF I-29

This area is more suburban and serves some of the longer and more complex routes. There is less residential density but more destination driven ridership. The following dedicated stops would be recommended for 17th Avenue west of I-29, on the south side of 17th Avenue only:

- 44th Street
- 43rd Street
- 42nd Street
- 40th Street

ALTERNATIVES

LOW IMPACT

The low impact transit alternative is accomplished through low impact improvements to the overall transportation system, with the vehicular, pedestrian, and bicycle improvements already discussed, and the implementation of dedicated stops. These improvements benefit transit operations by reducing bus delays at congested intersections (additional left turn lane at 45th Street; improved traffic flow at 38th Street, 34th Street, and 32nd Street) and improving pedestrian crossing safety with lead pedestrian intervals, and the provision of bicycle facilities and safety enhancements throughout the corridor. Improving the other modes of transportation will have a direct effect on transit operations and user experience and safety.

MEDIUM IMPACT

The medium impact transit alternative would seek to improve rider comfort and information at the most significant boarding locations. Well-designed bus stops can improve the transit experience, decrease perceived wait times, and contribute to increased ridership. At stop locations with regular daily ridership, amenities should at a minimum include ADA landing pads and curb ramps, heating, lighting, trash cans, and traveler information (preferred real-time, but static route information at a minimum). Opportunities also exist to incorporate public art or MATBUS branding.

For example, the Metro Transit shelter shown in Figure 6.57, brings the shelter closer to the road to make boarding easier. They include solar powered, motion activated lighting, radiant heat, trash cans, benches, and route information. At higher ridership locations, they include security features, like CCTVs, and real time traveler information, like digital display signs, shown in Figure 6.58.

East Side

The following locations, served by Route 16, would benefit from enhanced amenities at existing shelters and/or additional shelters, and would provide a shelter every half-mile to three-quarter-mile east of I-29. The following stop locations are prioritized based on daily ridership.

Figure 6.57: Metro Transit Shelter, Minneapolis, MN

Figure 6.58: Real Time Traveler Information

- East Gateway Circle intersection. There is a bench on the north side of 17th Avenue and a bench and shelter on the south side. A shelter should be installed on the north side of 17th Avenue. Both shelters should be improved to have enhanced amenities.
- 35th Street intersection. There is a bench and shelter on the south side of 17th Avenue. A shelter should be installed on the north side of 17th Avenue; both shelters should be improved to have enhanced amenities.
- South High School. This stop only has benches on the north and south side. Enhanced shelters and curb ramps should be installed at this location on both sides of 17th Avenue.
- University Drive There are shelters on both sides of 17th Avenue at this location.

Ridership along this route is relatively low. East Gateway Circle, Essentia Health, and the South High School stop locations have an average of three daily boardings per day. The 35th Street intersection currently only has on average two daily boardings, but that is likely to increase with the completion and occupation of the apartments south of 17th Avenue and west of 35th Street.

West Side

The following locations, served primarily by Route 24 and Route 14, have about five daily boardings currently. However, with potential new routes to serve south Fargo and south West Fargo, ridership is likely to increase in this area. The following stop locations are prioritized based on current daily ridership.

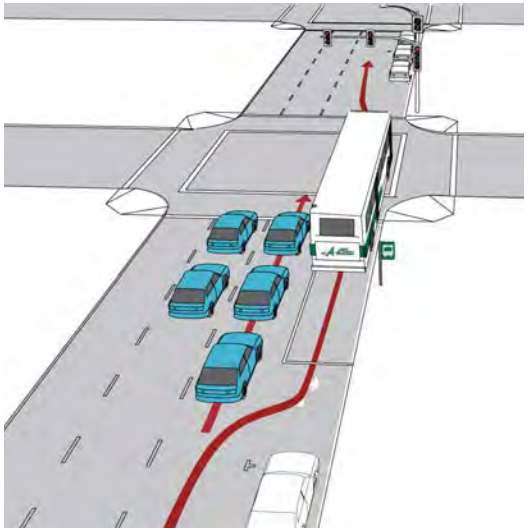
- 44th Street Intersection. There is currently a bench on the south side of 17th Avenue. Route 24 only travels east on this segment so an enhanced shelter is only necessary on the south side. However, if new routes travel in both directions, enhanced shelters would be recommended for both sides.
- 43rd Street Intersection. There are no amenities at this location. While the 42nd Street intersection has higher daily boardings, it's constrained right-of-way and proximity to the West Acres transfer hub, indicates a more appropriate shelter facility would be on the south side of the 43rd Street.

There is currently no service on 17th Avenue between 42nd Street and 38th Street nor west of 45th Street. If new route alignments or improved service is implemented in either of these segments enhanced shelters should be considered.

HIGH IMPACT

The high impact transit alternative would implement queue jumping. Queue jumping allows a bus to re-enter the traffic stream ahead of traffic by giving a green signal to the bus before other lanes get a green signal, as shown in Figure 6.59. Queue jumping is most beneficial at signalized intersections with low or moderately frequent bus routes and at intersections with high peak hour volumes with relatively low right-turns. A dedicated right-turn lane or a "bus pocket" (essentially a dedicated bus turn lane or turnout at the intersection) would be necessary to effectively implement queue jumping. These intersections and approaches are candidate locations for queue jumping:

Figure 6.59: Queue Jumping

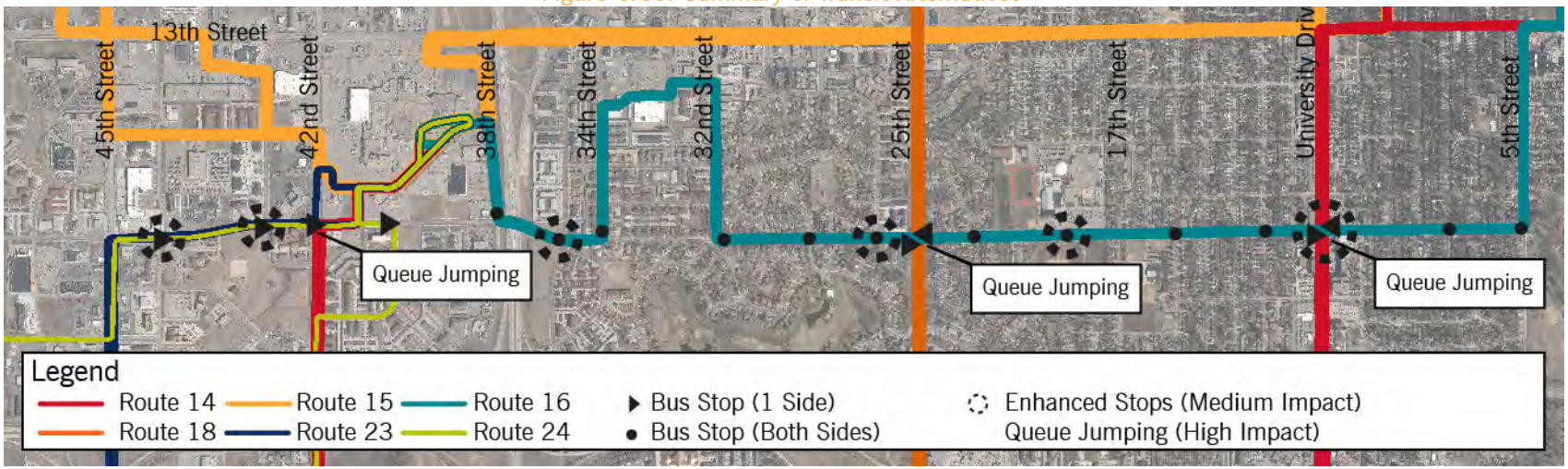


- 42nd Street eastbound. No routes currently use 17th Avenue going westbound at 42nd Street.
- 25th Street eastbound and westbound. The eastbound approach currently has a right turn lane but the westbound does not, so a bus pocket would need to be installed.
- University Drive eastbound and westbound. There are no dedicated right turn lanes on the westbound approach currently. These locations however, have wide lanes so there would be minimal curb impacts to incorporate right turn lanes. Additional turn lanes at this intersection would also improve vehicular operations.

SUMMARY OF ALTERNATIVES

A summary of the transit alternatives, including dedicated stops, enhanced stops, and queue jumping is shown in Figure 6.60.

Figure 6.60: Summary of Transit Alternatives



MULTIMODAL ASSESSMENT

To complete the multimodal assessment, the low, medium, and high impact alternatives for vehicular, bicycle, pedestrian, and transit were combined into one low impact, medium impact, and high impact alternative. These alternatives are analyzed using the same approach as above. Ultimately, the prioritized plan is likely to include a mix of no, low, medium, and high impact improvements for various modes through each segment. However, the purpose of this exercise is to understand the overall impacts of combined solutions relative to cost, impacts, and benefits.

No Impact

The no impact alternative would not make any improvements anywhere along the corridor.

Low Impact

The low impact alternative incorporates the following improvements at the following locations:

- Vehicular Improvements
  - 5th Street to University Drive: No change
  - University Drive to 25th Street: No change
  - 25th Street to 38th Street: Widen at the intersections and add merge lanes after, maintain existing traffic control
  - 38th Street to 51st Street: Access management along the corridor and spot improvements at 42nd Street and 45th Street intersections
- Bicycle Improvements
  - 5th Street to University Drive: Sharrows
  - University Drive to 25th Street: Bike lanes
  - 25th Street to 38th Street: Shared-use path on south side of 17th Avenue
  - 38th Street to 51st Street: Safety improvements at intersections
  - Improve pavement markings at major intersections
- Pedestrian Improvements
  - Lead pedestrian intervals at signalized intersections
- Transit Improvements
  - Other vehicular, bicycle, and pedestrian improvements
  - Dedicated stops

The low impact alternative would make improvements to vehicular operations at key bottlenecks and crash segments. It would provide basic bicycle facilities appropriate for their context, improve pedestrian safety at signalized intersections, and improve transit operations and user experience. The scoring is presented in Figure 6.61.

Medium Impact

The medium impact alternative incorporates the following improvements at the following locations:

- Vehicular Improvements
  - 5th Street to University Drive: No change
  - University Drive to 25th Street: No change
  - 25th Street to 38th Street: Traffic signals at 38th Street, 34th Street, and 32nd Street
  - 38th Street to 51st Street: Access management along the corridor and spot improvements at 42nd Street and 45th Street intersections, with widening between 45th Street to 42nd Street to a five-lane section
- Bicycle Improvements
  - 5th Street to University Drive: Bike lanes
  - University Drive to 25th Street: Buffered bike lanes
  - 25th Street to 38th Street: Shared-use path on south side of 17th Avenue and on-street bike lanes
  - 38th Street to 51st Street: Shared-use path on north side of 17th Avenue
  - Install bicycle boxes at signalized intersections and improve pavement markings
- Pedestrian Improvements
  - Lead pedestrian intervals at signalized intersections
  - In-roadway signs at South High School and West Gateway Circle
  - Pedestrian refuge island at 40th Street
  - Replace current beacon at Essentia Health east of University Drive with post mounted pedestrian actuated high-visibility beacons
- Transit Improvements
  - Dedicated stops
  - Enhanced transit stops at select locations (East Gateway Circle, 35th Street, South High School, 44th Street, 43rd Street)

The medium impact alternative would improve most study intersections to acceptable operations and address the most crash prone areas along the

corridor. This alternative provides dedicated bike lanes from 5th Street to 25th Street and shared-use paths from 25th Street to 51st Street, providing facilities across the entire corridor. Pedestrian crossing safety would be improved at signalized intersections as well as existing pedestrian crossing locations. Transit improvements seek to enhance the user experience. The scoring is presented in Figure 6.62.

High Impact

The high impact alternative incorporates the following improvements at the following locations:

- Vehicular Improvements
  - 5th Street to University Drive: No change
  - University Drive to 25th Street: No change
  - 25th Street to 38th Street: Roundabouts at 38th Street, 34th Street, and 32nd Street
  - 38th Street to 51st Street: Access management along the corridor and spot improvements at the 42nd Street, 44th Street, and 45th Street intersections, with median divided four lane section from 47th Street to 38th Street
- Bicycle Improvements
  - 5th Street to University Drive: Cycle track on south side of 17th Avenue
  - University Drive to 25th Street: Cycle track on south side of 17th Avenue
  - 25th Street to 38th Street: Cycle track on south side of 17th Avenue with striped buffer
  - 38th Street to 51st Street: Raised cycle track on south side of 17th Avenue
  - Install bicycle boxes and bicycle signal heads at signalized intersections, improve pavement markings at major intersections.
- Pedestrian Improvements
  - Lead pedestrian intervals at signalized intersections
  - Install post mount pedestrian actuated high-visibility beacon at South High School and West Gateway Circle
  - Install pedestrian refuge island with post mount pedestrian actuated high-visibility beacons at 40th Street
  - Replace current beacon at Essentia Health east of University Drive with post mounted pedestrian actuated high-visibility beacons and supplement with overhead beacon
- Transit Improvements
  - Queue jumping at signalized intersections
  - Dedicated stops
  - Enhanced transit stops at select locations (East Gateway Circle, Essentia Health, South High School, 35th Street, 44th Street, 43rd Street)

The high impact alternative would improve vehicular operations and safety across the corridor. It would create a high-quality bicycle facility across the entire length of the corridor, which would likely draw new bicycle trips onto the corridor. Pedestrian crossing safety would be improved at major intersections with lead pedestrian interval and pedestrian actuated high-visibility beacons. Transit improvements focus on improved operations and user experiences. The scoring is presented in Figure 6.63.

Summary

A summary of the improvements and their score is shown in Table 6.7.

Table 6.7: Summary of Multimodal Alternatives

Alternative	Summary of Improvements	Overall Score
Do Nothing	No improvements are made. Vehicular, pedestrian, bicycle, and transit operations and safety remain unchanged.	5.0
Low Impact	Improvements address the most significant bottlenecks and crash locations and provides minimal improvements for bicyclists and pedestrians. Low cost improvements.	5.6
Medium Impact	Improvements address bottlenecks and high crash locations with traffic signals, turn lanes, and access management. Dedicated on-street space for bicyclists, with pedestrian safety improvements. Some construction impacts.	6.1
High Impact	Widening and spot improvements west of 38th Street improve vehicular operations and safety. Roundabouts improve traffic flow while slowing traffic. Continuous and dedicated separated bicycle facility with pedestrian crossing improvements. Large construction costs expected.	7.5

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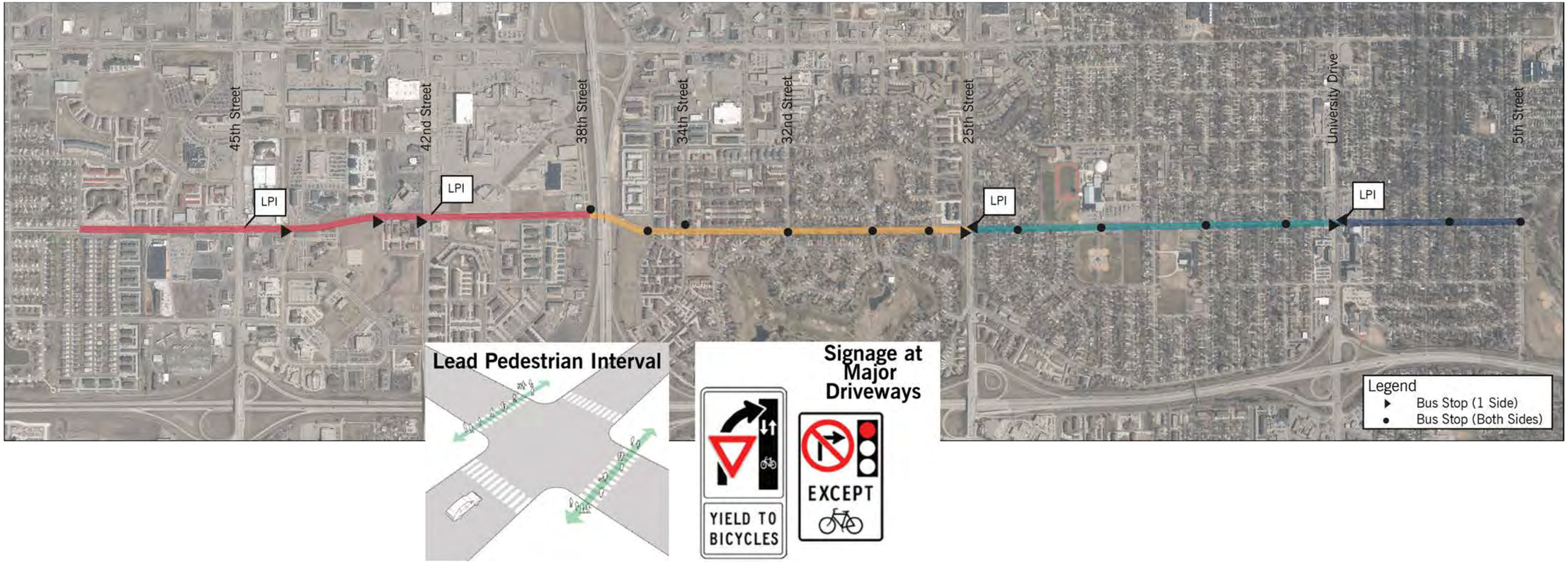
Figure 6.61: Multimodal Summary of Low Impact Alternatives

Low Impact Alternative



Mode Category	Technical Score	Notes	Overall Score
Vehicular Efficiency	●●●●●○○○○○	Addresses the most significant bottlenecks and vehicular crash locations through spot improvements and access management.	●●●●●●○○○○
Bicycle and Pedestrian Mobility	●●●●●○○○○○	Provides minimal improvements for bicyclists and pedestrians across the corridor, but does improve crossing safety at signalized intersections.	
Cost and Impacts	●●●●●●●○○○	Requires signal timing improvements and restriping along the corridor. Construction impacts at spot improvement and access management locations.	

Low Impact Alternative

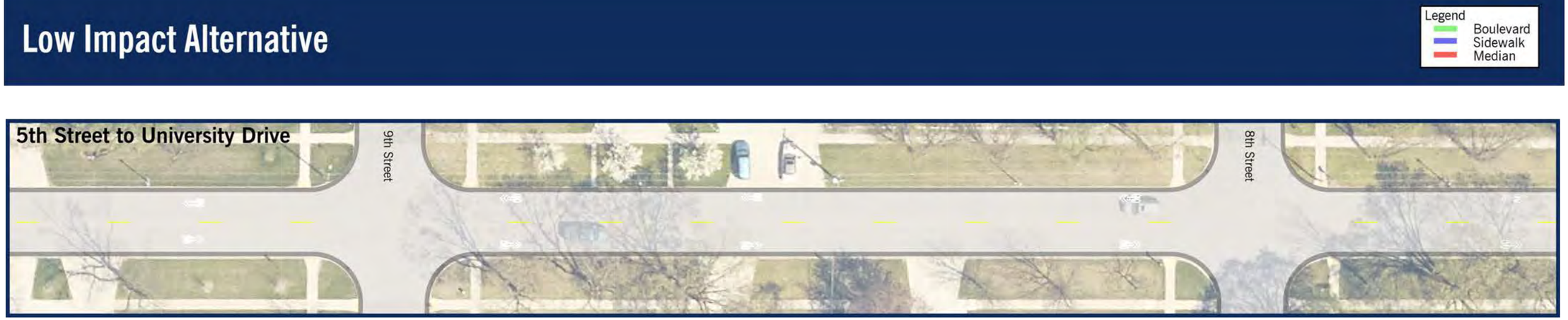


Figure 6.62: Multimodal Summary of Medium Impact Alternatives

Medium Impact Alternative

Mode Category	Technical Score	Notes	Overall Score
Vehicular Efficiency	●●●●●●●○○○	Traffic signals improve operations at 38th Street, 34th Street, and 32nd Street intersections. Spot improvents at 45th Street, 42nd Street. Widening between 45th Street and 42nd Street to improve safety. Access management between 38th Street and 47th Street.	●●●●●●○○○○
Bicycle and Pedestrian Mobility	●●●●●●○○○○	Dedicated on-street space for bicycles from 5th Street to 38th Street and shared-use path on both sides from 38th Street to 45th Street. Improved pedestrian and bicycle crossing safety with lead intervals, and crossing enhancements at South High School, West Gateway Circle, Essentia Health, and 40th Street.	
Cost and Impacts	●●●●●○○○○○	Construction impacts from widening and spot improvements, shared-use path, and installation of traffic signals. Restriping required.	

Medium Impact Alternative

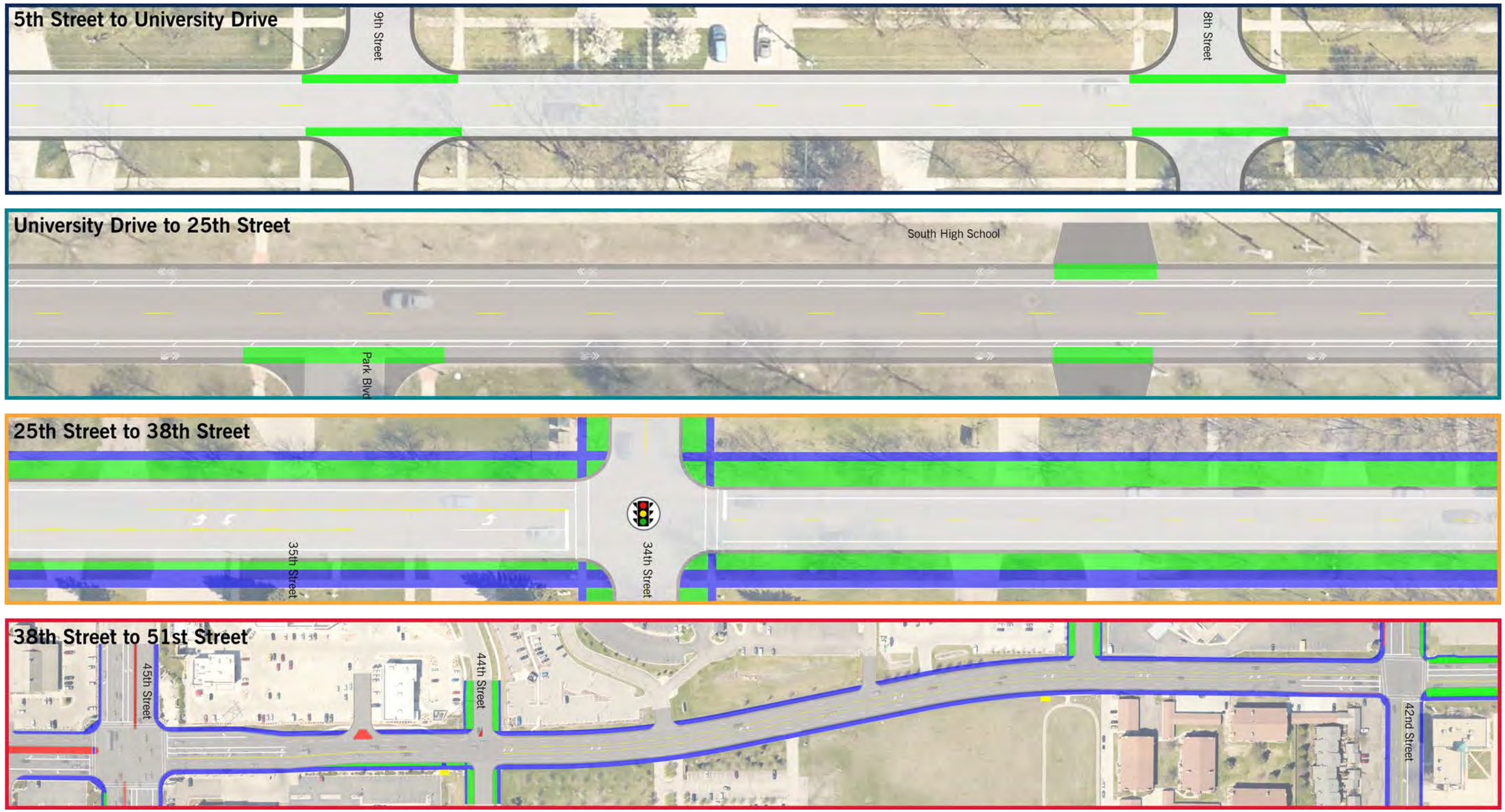
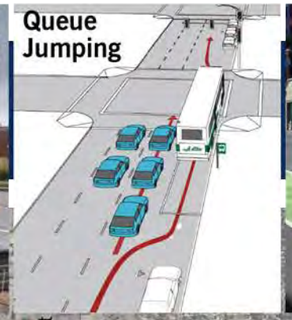
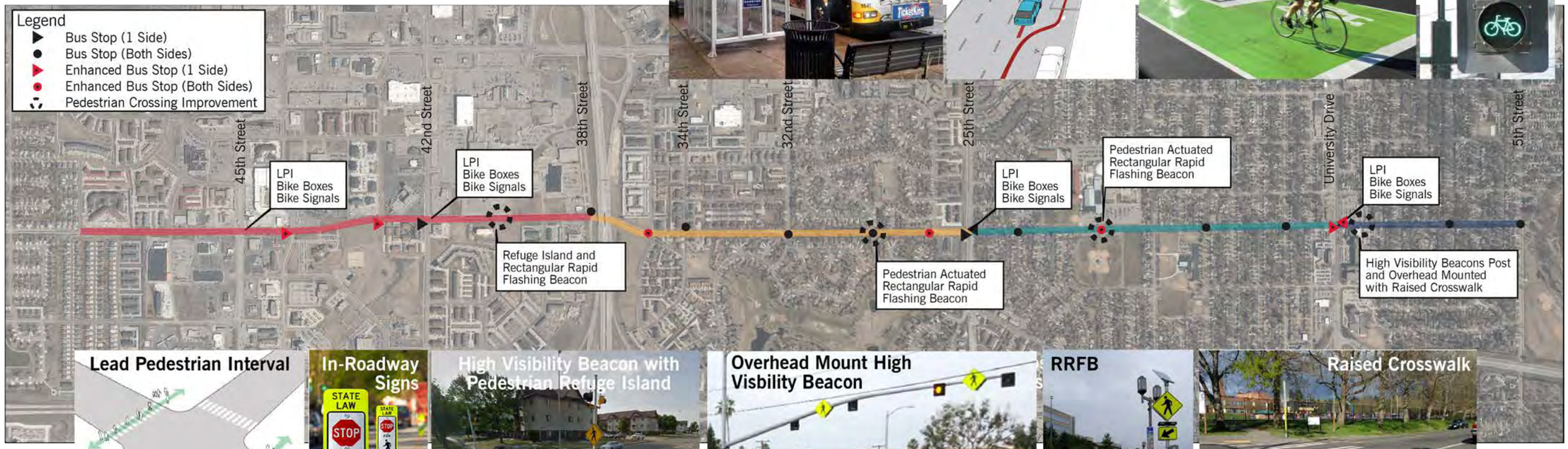


Figure 6.63: Multimodal Summary of High Impact Alternatives

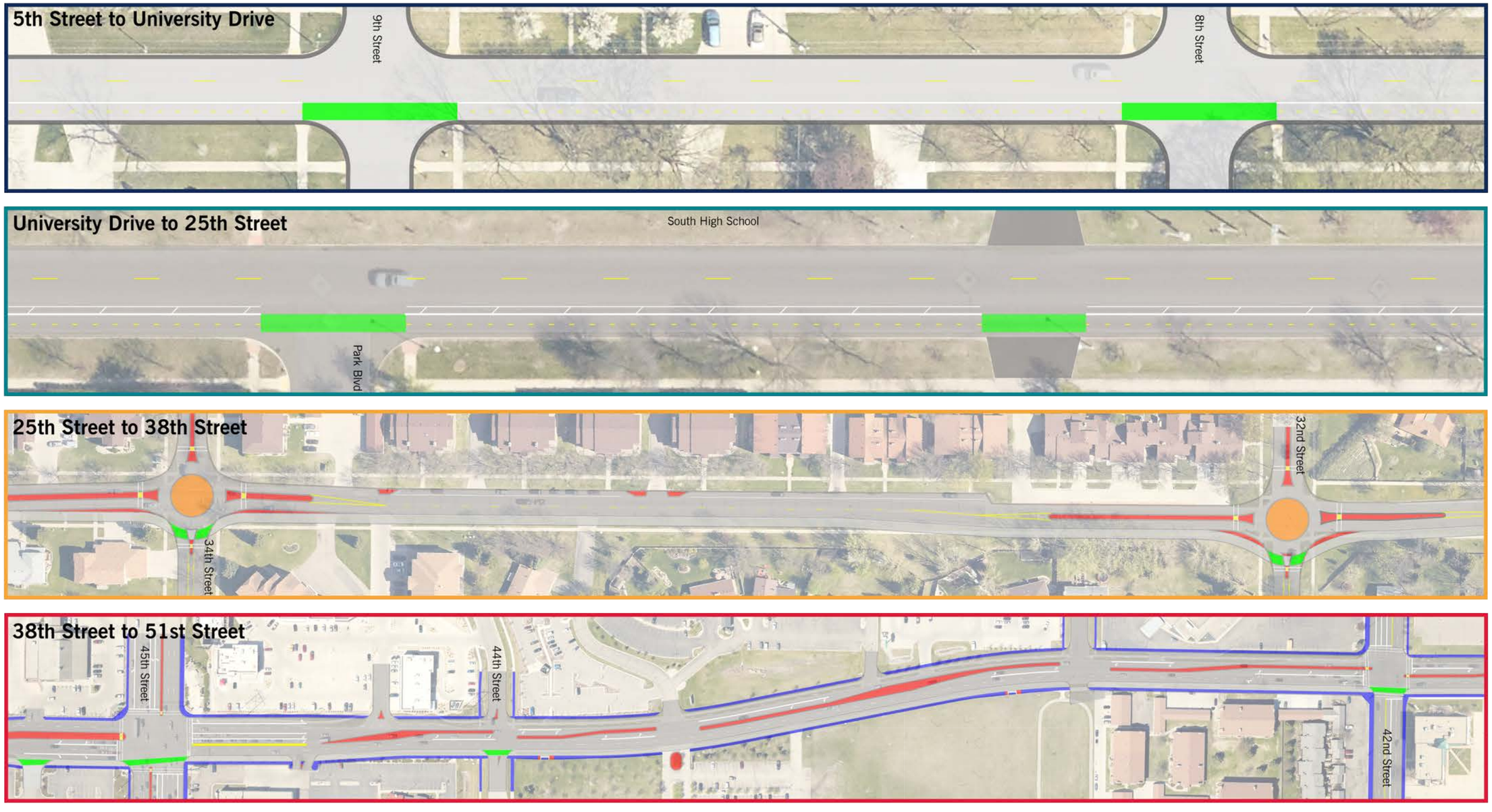
High Impact Alternative





Mode Category	Technical Score	Notes	Overall Score
Vehicular Efficiency	●●●●●●●●●●	Widening and spot improvements in the west segment improve vehicle operations and safety. Roundabouts at 38th Street, 34th Street, and 32nd Street intersections improve vehicular operations and safety and act to calm traffic, preserving the residential nature of the corridor.	●●●●●●●○○○
Bicycle and Pedestrian Mobility	●●●●●●●●●●	A continuous, dedicated, and separated bicycle facility improves bicycle mobility and safety. Pedestrian crossing improvements improve pedestrian safety and mobility.	
Cost and Impacts	●○○○○○○○○○	Large construction impacts, particularly on the west side to accommodate all improvements. Roundabouts on the east side may require ROW. Limited cost and impacts east of 25th Street.	

High Impact Alternative



WHAT WE HEARD: ALTERNATIVES

PUBLIC INPUT MEETING #2

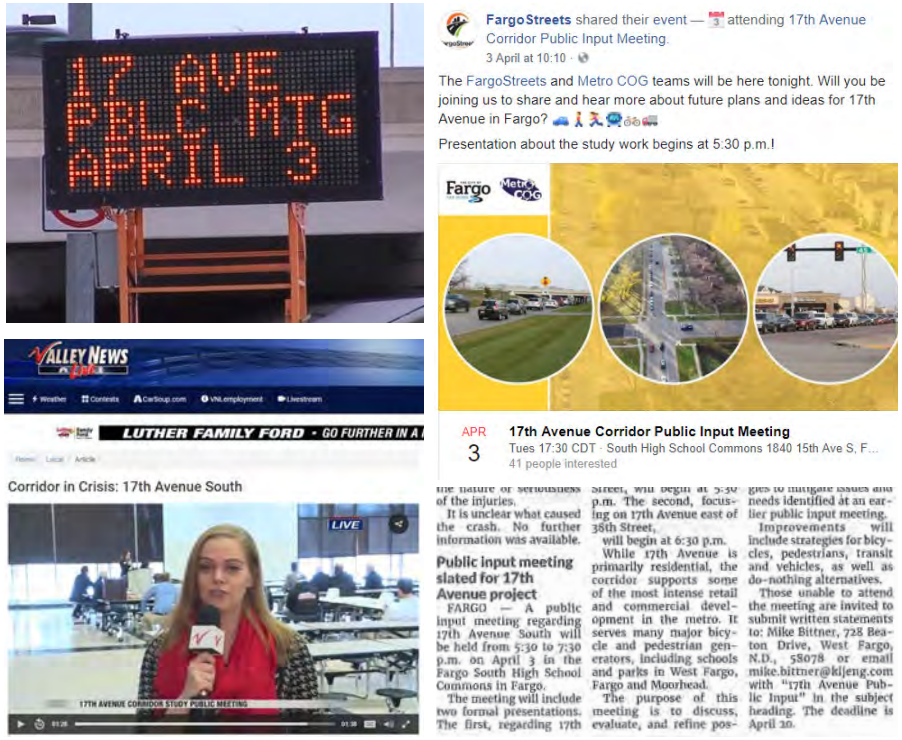
The second public input meeting for the 17th Avenue Corridor Study was held on April 3rd at Fargo South High School. The second round included an open house and presentation, split into two sections. The first for the segment of 17th Avenue west of 38th Street and the second for the segment of 17th Avenue east of 38th Street.

Marketing Efforts

A variety of techniques were used to inform the public about their opportunity to provide input on multimodal alternatives for the 17th Avenue corridor based on the findings from the Alternatives Analysis.

- A press release and box ad were published in The Forum newspaper.
- Fliers were distributed to local businesses along the corridor and neighborhood associations.
- Postcards were sent to properties adjacent to the corridor.
- Social media posts on Fargo Street's Facebook and Twitter accounts and Metro COG's Facebook page.

Figure 7.1:Summary of Marketing Efforts



- Multiple articles on local radio, newspaper, and television news outlets.
- Emails sent through Fargo Streets.
- Variable message signs placed on 17th Avenue.
- Flier posted in MATBUS shelters and sent out through Rider Alert system.

Public Input Meeting

Nearly 100 people came out to the meetings.

At the meetings, attendees were given multiple opportunities to provide comments.

- A written comment form that included a mailing address and e-mail address. People could elect to leave the forms with the team that evening or send them in later. While no one left written comments at the meeting, fourteen public comments were received via email.
- Ballots to rank their preferred alternatives for vehicle, bicycle, pedestrian, and transit alternatives across the entire study area of 17th Avenue. The ballots collected at the meeting were consolidated with the online survey results to develop the publicly preferred alternatives.

Figure 7.2: Attendees During the Formal Presentation

Written Comments

The written comments received varied in their support for and against the alternatives discussed at the meeting and in the Alternatives Analysis. However, generally, the following issues were the most common:

- Four comments were received regarding cost
- Four comments were received regarding congestion
- Equal comments (three) for and (three) against bicycle and pedestrian
- Three comments were concerned about green space and trees along the boulevard

Survey

The survey was available at the meeting and online. 150 people filled out the survey online, with another five to 25 people completing the survey at the public meeting (depending on the question). The survey results are discussed in more detail in the Alternatives Analysis chapter.

Most of the respondents live along or near the corridor and use 17th Avenue for their commute. Over half of the respondents had not participated in any of the study's public engagement events held to this point.

Figure 7.3: Relationship to 17th Avenue

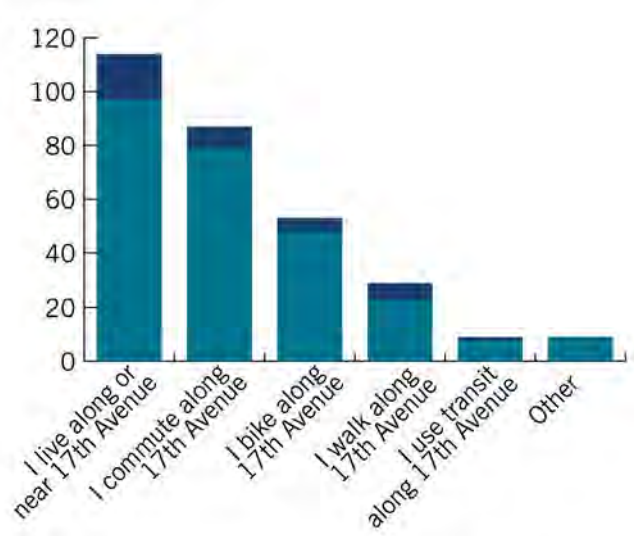


Figure 7.4: Relationship to 17th Avenue

Stakeholder Meetings

Stakeholder meetings were held with representatives from Happy Harry's and the Adam's Development (large commercial development south of 17th Avenue, including Home Depot) regarding the access changes west of 45th Street. They were generally not supportive of the access revisions included in the alternatives. Any potential changes and project development will need further discussions with individual property owners.

Next Steps

The Study Team incorporated the community support score and the Study Review Committee support score to prioritize the alternatives and develop an implementation plan.

IMPLEMENTATION STRATEGIES

ALTERNATIVES SUMMARY

The implementation chapter of the report summarizes the results of the alternatives evaluation, scoring, and ranking to help guide the selection of improvements to be carried through to implementation.

Alternatives were scored and ranked using the following scoring categories:

- Technical Score
- Study Review Committee Support Score
- Public Support Score
- Overall Score

Detailed discussion related to the alternatives evaluated in this study can be found in the Alteratives Analysis chapter.

Technical Score

The technical score describes expected vehicular safety and mobility, bicycle and pedestrian safety and mobility, and cost and impacts of the alternative. The objective technical scores were adjusted based on the value profile, which was completed during the first round of public input. Higher scores indicate the alternative better met technical and community needs of the corridor segment. The maximum technical score an alternative can receive is 10, but due to the value profile adjustments, no alternative scored higher than 9.8 and no alternative scored less than a 3.3. The transit and pedestrian improvements were not assigned a technical score.

Detailed information related to the technical scoring can also be found in that chapter. Key results are summarized in this chapter.

Study Review Committee Support Score

The Study Review Committee (SRC) support score describes the amount of support the SRC gave the alternatives under consideration. The SRC reviewed the technical analysis at the third SRC meeting held on February 16th, 2018 and the public input at the fourth SRC meeting held on May 4th, 2018

At the fourth SRC, members were asked to select their favored alternatives for vehicles, bicycles, and pedestrians. A summary of steering committee input is presented below, with more detailed results available in Appendix A.

Community Support Score

The public support score describes the amount of community support for the alternatives under consideration. After alternatives were presented at the second public input meeting, held April 3rd, 2018, the community was invited to take an online survey to provide feedback to the alternatives. The online survey results were combined with the feedback received at the public meeting. Input was received through April 20th.

Information related to the alternatives was disseminated in the following ways:

- Public input meeting held April 3rd, 2018
- Report posted to website
- Multiple news articles in various outlets across the city
- Facebook and twitter posts
- City e-mail list

The public was asked to select their rank the alternatives in order from the most preferable to the least preferable. To better incorporate feedback from the public meeting and the online survey, only the first choice selections were used.

SUMMARY OF COMMUNITY INPUT

The online survey was completed by 144 members of the community with an additional 20 members completing the survey at the second public meeting. It is important to note that the survey at the public meeting was divided into individual questions, so the number of responses collected per question vary.

A summary of the community input received at the meeting, as well as the survey results can be found in Appendix A.

Overall Score

An overall score was calculated to factor technical benefits, SRC support, and community support. The overall score is the average of the three scores, all weighted equally. The purpose of this analysis is to concisely summarize the different evaluation techniques to allow for decision makers to make informed decisions. In other words, the summary scores are not recommendations. Rather, they are merely a tool to summarize a lot of information from varying sources.

It is important to note, SRC support scores for bicycle alternatives are only shown for the overall corridor alternatives, not the individual segment. This was done to identify a consistent bicycle alternative for the entire corridor.

SUMMARY OF ALTERNATIVES

5th Street to University Drive
BICYCLE ALTERNATIVES

From 5th Street to University Drive, the High Impact: Cycle Track alternative received the greatest overall score. The public gave the same number of first choice votes (29) to the Medium Impact: Bike Lanes and High Impact: Cycle Track alternatives.

» Cycle Track: $160,000

Table 8.1: Summary of 5th Street to University Drive Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				6.8
Medium Impact: Bike Lanes				5.2
Do Nothing				3.6
Low Impact: Sharrows				3.0

PEDESTRIAN ALTERNATIVES

The high impact alternative to install post and overhead flashing beacons with a raised crosswalk at the Essentia Health crossing was the highest ranked alternative. It received the most first choice votes from the public and had unanimous support from the SRC.

» Post and overhead mounted RRFBs with raised crosswalk: $90,000

Table 8.2: Summary of 5th Street to University Drive Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Post and Overhead RRFB with Raised Crosswalk				6.8
Medium Impact: Post and Overhead RRFB				3.3
Low Impact: Do Nothing				3.2

Figure 8.1: 17th Avenue between 5th Street and University Drive

University Drive to 25th Street
BICYCLE ALTERNATIVES

From University Drive to 25th Street, the bicycle alternatives received varying support. The High Impact: Cycle Track alternative received the most first choice votes from the community. Ultimately, 74 percent of people who voted preferred improved bicycle facilities.

» Cycle Track: $190,000

Table 8.3: Summary of University Drive to 25th Street Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				6.5
Medium Impact: Buffered Bike Lanes				4.4
Do Nothing				3.2
Low Impact: Bike Lanes				3.2

PEDESTRIAN ALTERNATIVES

The high impact alternative to install pedestrian actuated rectangular rapid flashing beacons at the Fargo South High School crossing received the highest overall score. It received the most first choice votes from the community (57 percent) and the SRC.

» Pedestrian actuated RRFB: $15,000

Table 8.4: Summary of University Drive to 25th Street Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Pedestrian Actuated RRFB				6.1
Medium Impact: In-Roadway Sign				4.0
Low Impact: Do Nothing				3.2

Figure 8.2: 17th Avenue between University Drive and 25th Street

25th Street to 38th Street

BICYCLE ALTERNATIVES

From 25th Street to 38th Street, the bicycle alternatives received varying support. The High Impact: Cycle Track alternative received 36 percent of first choice votes. Ultimately, 71 percent of people who voted preferred improved bicycle facilities.

» Cycle Track: $675,000

Table 8.5: Summary of 25th Street to 38th Street Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				5.3
Medium Impact: Shared Use Path and Bike Lanes				3.3
Do Nothing				2.1
Low Impact: Shared Use Path				1.8

VEHICLE ALTERNATIVES

From 25th Street to 38th Street, the vehicle alternatives received varying support. The SRC was split between the High Impact: Roundabouts alternative and Medium Impact: Traffic Signals alternative. From the community support perspective, the traffic signals alternative received just one more first place vote than the roundabout alternative. Ultimately, 79 percent of people who voted preferred improved traffic control. However, if right-of-way and utility impacts are too great, traffic signals may be considered.

» Roundabouts: $1,100,000

Table 8.6: Summary of 25th Street to 38th Street Vehicle Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Roundabouts				5.5
Medium Impact: Traffic Signals				5.0
Do Nothing				2.3
Low impact: Stop Control with Merge Lanes				2.1

PEDESTRIAN ALTERNATIVES

The high impact alternative to install pedestrian actuated rectangular rapid flashing beacons received the highest overall score for the West Gateway Circle intersection. It received the most first choice votes from the community (63 percent).

» Pedestrian actuated RRFB: $15,000

Table 8.7: Summary of 25th Street to 38th Street Pedestrian Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Pedestrian Actuated RRFB				6.3
Medium Impact: In-Roadway Sign				3.9
Low Impact: Do Nothing				3.1

Figure 8.3: 17th Avenue between 25th Street and 38th Street

38th Street to 51st Street

Bicycle Alternatives

From 38th Street to 51st Street, the High Impact: Cycle Track alternative received the highest overall score. The community preferred the High Impact: Cycle Track alternative with 36 percent of first choice votes. Ultimately, 60 percent of people who voted preferred improved bicycle facilities (the medium and high impact alternatives).

» High Impact: Cycle Track: $3,925,000

Table 8.8: Summary of 38th Street to 51st Street Bicycle Alternatives

Alternative	Technical Score	SRC Support	Community Support*	Overall Score
High Impact: Cycle Track				5.1
Medium Impact: North Side Shared Use Path				3.3
Do Nothing				2.6
Low Impact: Intersection Safety Improvements				1.9

Vehicle Alternatives

From 38th Street to 51st Street, the High Impact: Widen to Median Divided Section from 38th Street to 47th Street vehicle alternative received the highest overall score. The SRC supported the High Impact: Widen to Median Divided Section and the Road Diet: 3-Lane Section with Buffered Bike Lanes equally (43 percent). The community most supported the High Impact: Widen to Median Divided Section (34 percent). The Do Nothing (21 percent) and the Road Diet: 3-Lane Section with Buffered Bike Lanes (20 percent) also received support.

» High Impact: Widen to Median Divided Section: $5,545,000

It is important to note that there is a significant amount of overlap with the Cycle Track alternative and the Widen to Median Divided Section alternative, so the costs should not be added together.

Table 8.9: Summary of 38th Street to 51st Street Vehicle Alternatives

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Widen to Median Divided Section from 38th Street to 45th Street with Access Management and Spot Improvements				4.8
Road Diet: 3-Lane Section with Buffered Bike Lanes				3.2
Medium Impact: Widen 42nd Street to 45th Street with Spot Improvements				2.6
Low Impact: Spot Improvements and Access Management				2.0
Do Nothing				1.9

Pedestrian Alternatives

The high impact alternative to install pedestrian actuated rectangular rapid flashing beacons received the highest overall score for the 40th Street intersection. It received the most first choice votes from the community (55 percent).

» Pedestrian actuated RRFB and refuge island: $45,000

Table 8.10: Summary of 38th Street to 51st Street Pedestrian Alternatives

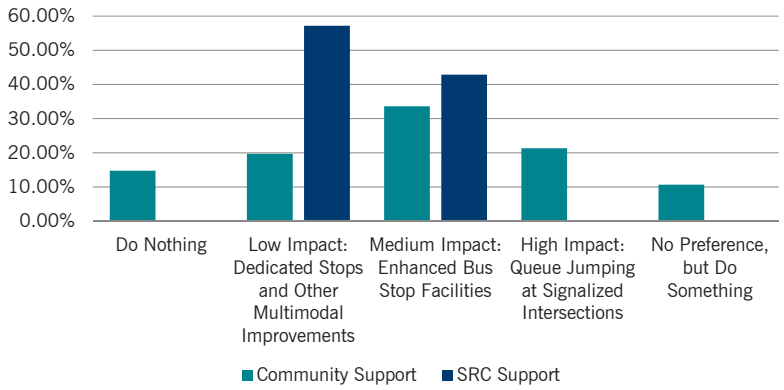
Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Refuge Island and RRFB				7.0
Medium Impact: Refuge Island				3.3
Low Impact: Do Nothing				3.0

Figure 8.4: 17th Avenue between 42nd Street and 45th Street

Transit

Support was split for the transit alternatives. The community most supported the Medium Impact: Enhanced Bus Stop Facilities (34 percent), while the SRC most supported the Low Impact: Dedicated Stops and Other Multimodal Improvements (57 percent). MATBUS is currently undergoing a study to develop new stop level designs so no costs are available at this time.

Figure 8.5: Summary of Transit Alternatives



Bicycle Corridor

17th Avenue has long been identified as a desirable bicycle route. The 2016 Bicycle-Pedestrian Plan, completed by Metro COG, recommended a short-term bicycle facility for the 17th Avenue corridor. It provides direct connection to several of the largest parks in all three metro cities: Lindenwood Park, Rabanus Park, and South High School Parks in Fargo, Gooseberry Park in Moorhead, and Elmwood Park in West Fargo. 17th Avenue is an excellent combination of quiet roads, key infrastructure, and location to serve as a backbone for the metro-wide bike network.

Ensuring corridor consistency of bicycle facilities will be important for implementation and the success and utilization of the facilities. Selecting either bike lanes on both sides of the corridor or a cycle track on the south side of the corridor will minimize crossings as the corridor transitions. Summing the number for first choice votes for the bike alternatives from 5th Street to 51st Street results in the following:

- 35 percent selected the cycle track alternative as their first choice
- 28 percent selected do nothing as their first choice
- 26 percent selected bike lanes/shared use path as their first choice
- 11 percent selected low impact improvements (sharrows, bike lanes, shared use path, and intersection safety improvements)

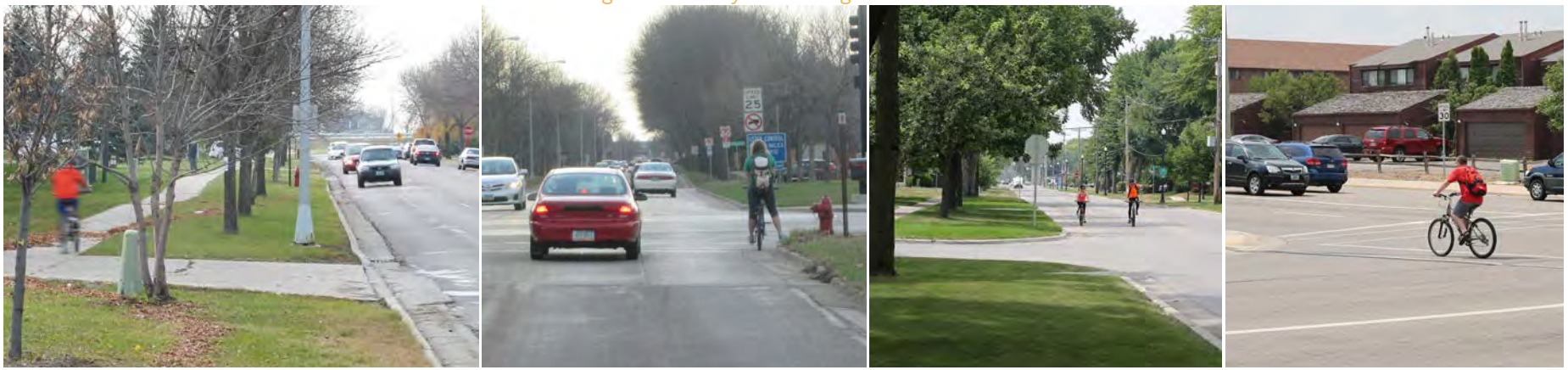
Table 8.11: Bicycle Corridor Facilities

Alternative	Technical Score	SRC Support	Community Support	Overall Score
High Impact: Cycle Track				5.9
Medium Impact: Bike Lanes				4.0
Do Nothing				2.9
Low Impact: Spot Improvements				2.5

Ultimately, 61 percent of the public selected high-quality bike facilities as their first choice, but it is likely that the cycle track alternative would receive the widest support. Nationwide research also shows it would likely result in the highest utilization.

Consideration should also be given to the polarizing nature the cycle track could have – 73 percent of people who selected do nothing as their first choice either selected the cycle track alternatives as their last choice or prioritized no other alternative.

Figure 8.6: Bicyclists along 17th Avenue



PRIORITIZATION OF IMPROVEMENTS

To assist in the prioritization of projects identified in this corridor study, the amount of estimated benefit was calculated for all improvements along a segment. This was done by averaging the technical scores for all improvements (bicycle, pedestrian, vehicle) on each segment and comparing this to the average technical score of the do nothing alternative. The percent difference between the average technical score for the improvements and the average technical score for the do nothing was then calculated. A higher percent difference between these averages indicates a higher amount of benefits associated with the improvements. Further, some needs exist under current conditions, while others are projected future needs or significantly worsen over time, so the estimated benefits was calculated for 2030 and 2040. This also helps establish a timeline of needs.

Using the methodology describe above, the segment between 25th Street to 38th Street has the highest current need, followed by the 38th Street to 51st Street segment. The remaining segments between 5th Street and 25th Street have the lowest needs, but their improvements come at the lowest cost so could be implemented sooner given fiscal constraints.

25th Street to 38th Street

Poor vehicular operations and lack of dedicated bicycle facilities give this segment of 17th Avenue the highest existing needs. The highest ranked alternatives for this segment would incorporate mini roundabouts at the 32nd Street and 34th Street intersections and a full roundabout at the 38th Street intersection. A cycle track would be constructed on the south side of the road.

Through a series of overlays, the surface quality of 17th Avenue has been acceptable. However, along the entire eastern segment of the corridor, from 38th Street to 5th Street, there are significant areas of shifting and failing concrete. Tying the reconstruction project to the improvements identified through this study would result in much higher costs than estimated in Table 8.12, but would limit future impacts to the corridor.

5th Street to 25th Street

The projects identified through this segment of 17th Avenue are very low cost and could be implemented at any time. However, without improvements between 25th Street and 38th Street, the cycle track provides limited connectivity and may not be widely utilized.

Table 8.12: Estimated Benefits for All Improvements (By Segment)

Segment	Alternative	2018 Benefit	Rank	2030 Benefit	Rank	2040 Benefit	Rank	2017 Estimated Cost
5th Street to University Drive	High Impact: Cycle Track High Impact: Post and Overhead RRFB with Raised Crosswalk	29%	4	29%	4	29%	4	$250,000
University Drive to 25th Street	High Impact: Cycle Track High Impact: Pedestrian Actuated RRFB	35%	3	35%	3	35%	3	$205,000
25th Street to 38th Street	High Impact: Cycle Track High Impact: Roundabouts High Impact: Pedestrian Actuated RRFB	128%	1	138%	1	147%	1	$2,625,000
38th Street to 51st Street	High Impact: Cycle Track High Impact: Widen to Median Divided Section from 38th Street to 45th Street with Access Management and Spot Improvements High Impact: Refuge Island and RRFB	67%	2	84%	2	101%	2	$5,645,900

Extending the improvements from 38th Street to 25th Street to include the bicycle and pedestrian improvement from 25th Street to 5th Street would complete a south-side bicycle facility along 17th Avenue through Fargo. Even without changes to the segment west of 38th Street, the cycle track could tie into the existing shared use path until such time that a project is identified and constructed.

Additionally, poor pavement on this section of the corridor will require rehabilitation. Opportunities to combine pavement rehabilitation with the other multimodal improvements should be evaluated to limit impacts to the corridor.

38th Street to 51st Street

Half of all crashes along 17th Avenue in Fargo occur between 42nd Street and 45th Street. This crash potential, combined, with poor operations at the 42nd Street and 45th Street intersections, give 17th Avenue between 42nd Street and 47th Street the second highest need along the corridor. The poor operations is not an overall corridor issue currently, but is caused by capacity constraints at the intersections. As development occurs additional capacity is likely necessary throughout this segment (38th Street to 47th Street). The needs along this section can be addressed through a series of smaller projects, rather than one large project, to be done as needs warrant.

SHORT TERM SPOT IMPROVEMENTS

In the short term, a series of smaller projects can help address the safety and operational needs of the corridor.

Implementing the spot improvements at 45th Street and 42nd Street intersections would mitigate some of the congestion and reduce queueing.

- At 45th Street, change the westbound approach from a single left-turn lane with two through lanes and a right turn lane to a double left turn lane with one through, and a shared through/right lane. This mitigates long queues on the westbound approach that impacts driveways east of 45th Street. This spot improvement would also extend the lane drop to 47th Street, instead of the Happy Harry's driveway, and extend the median approximately 200 feet to minimize conflict at the driveways. This was completed Summer 2019.
- At 42nd Street, change the second eastbound through lane that drops after the intersection to a right-turn lane.

Other improvements that should be constructed in the short term include:

- RRFB and pedestrian refuge island at the 40th Street intersection to improve crossing safety for pedestrians

SHORT TERM ROADWAY RECONFIGURATION

In addition to the intersection and pedestrian improvements discussed in the short term spot improvements implementation strategies above, a 2+1+1 roadway configuration between 44th Street and 42nd Street was developed to address the safety needs of this segment, as shown in Figure 1.16. This alternative would maintain the two eastbound lanes from 45th Street to 42nd Street, but would convert the inside westbound lane to a center left-turn lane, and maintain one lane for westbound traffic. This was completed Summer 2019.

A three-lane road diet alternative was presented analyzed and presented to the public at the second public input meeting. This alternative included on-street bicycle facilities between 42nd Street and 45th Street, but none from 42nd Street to 38th Street, where they would connect to the cycle track, as discussed above. The short segment of bicycle facility that would force

Figure 8.7: 2+1+1 Concept on 17th Avenue Between 44th Street and 43rd Street

a cyclist from the street to the shared-use path back to the street is likely to have limited appeal to cyclists. The three-lane section would also not be able to accommodate the southbound double left-turn lane at the 45th Street intersection because it would lack a second receiving lane and/or require a merge maneuver, similar to the west approach in front of Happy Harry's. For these reasons, the 2+1+1 configuration was developed. This configuration combines elements of the five-lane section and the road diet, which received strong support from the community and the Study Review Committee.

The 2+1+1 concept was developed to effectively utilize the existing roadway space and improve safety and operations. The 2+1+1 concept

- reflects prevailing traffic conditions. The eastbound movement carries 14 to 22 percent more traffic on a typical weekday and weekend day, respectively. The eastbound direction carries, on average, 20 percent more traffic between 7:00 AM and 8:00 PM, when nearly 90 percent of daily traffic occurs.
- would provide acceptable operations (LOS "D" or better) at the study intersections under current traffic volumes. This segment of 17th Avenue carries around 13,400 vehicles currently and with significant development along the corridor, discussed in the Future Conditions section of this report, daily traffic could increase to around 19,400 vehicles per day. Traffic operations analysis for the road diet alternative found delay is expected to increase just 12 percent compared to the current configuration. While dependent on a variety of factors, most three-lane sections can carry between 10,000 and 17,000 vehicles per day, with most four-lane sections carrying between 12,000 and 20,000 vehicles per day.
- would improve safety. Nearly half the total crashes along 17th Avenue, occur between 42nd Street and 45th Street (221 over the last five years). The center left-turn lane in the 2+1+1 alternative would reduce the rear-end crash potential through this section by allowing vehicles to move out of the through lane to safely wait for an acceptable gap. Rear-end crashes made up 28 percent of all crashes along this segment of 17th Avenue. Road diets have been found to reduce most crash types up to 46 percent.
- maintain the existing bicycle facilities on the shared-use path on the south side of the roadway.

This alternative improves safety and maintains mobility in the short-term with an estimated cost of $425,000, which includes the 45th Street and 42nd Street intersection improvements. This is a low cost improvement that is expected to have significant positive impacts to safety along the 17th Avenue corridor.

The implementation of the 2+1+1 concept will address many of the most pressing needs of this segment of 17th Avenue. However, growth should be continually monitored to determine if, or when, further expansion is needed.

Additionally, once the cycle track is completed on the east segment of 17th Avenue (38th Street to 5th Street), the buffered cycle track can be revisited in this segment as well.

MID TO LONG TERM

Many of the capacity needs along this segment of 17th Avenue are contingent on future development surrounding the corridor. At such time operational conditions warrant, construct a median divided five-lane section from 38th Street to 47th Street. This construction project would incorporate a buffered two-way cycle track on the south side of 17th Avenue to connect to the two-way cycle track east of 38th Street and the shared use path on the south side of 17th Avenue west of 45th Street. This would complete the high quality bicycle facility across the City of Fargo.

Transit

A variety of transit improvements were identified and ranked in this study, many of which have been identified in previous studies and are in process for implementation. MATBUS has ultimate authority over the implementation of transit improvements. The City should continue to work with them to encourage the implementation of dedicated stops and providing enhanced bus stop facilities at strategic locations. The City can continue to improve the multimodal connections to bus stops to expand access to transit.

Identifying Funding

While identified as a gap in the bicycle network in Metro 2040, the Fargo-Moorhead Long Range Transportation Plan (LRTP), and the 2016 Bicycle and Pedestrian Plan, no projects have been included in a cost-constrained plan. This means there has been no identified funding for 17th Avenue. With two projects identified, the City will need to identify funding opportunities.

FEDERAL FUNDING

17th Avenue is on the functionally classified roadway network, making it eligible for federal funds, specifically the Urban Roads Program which provides block funding to states to administer as necessary. However, since no projects have been included in the cost constrained LRTP or in the TIP, no funding from the Urban Roads Program is likely available through 2023.

If the City desires to use Federal funds on a 17th Avenue project, they should work with Metro COG to include the project in the 2045 LRTP, currently being updated. This project could score highly with future capacity constraints, poor pavement conditions, and a multimodal link.

Given the lack of available funding in the next five years, the use of Federal funding may be best applied to the project from 38th Street to 51st Street. The use of Federal funds would also require an environmental document be completed.

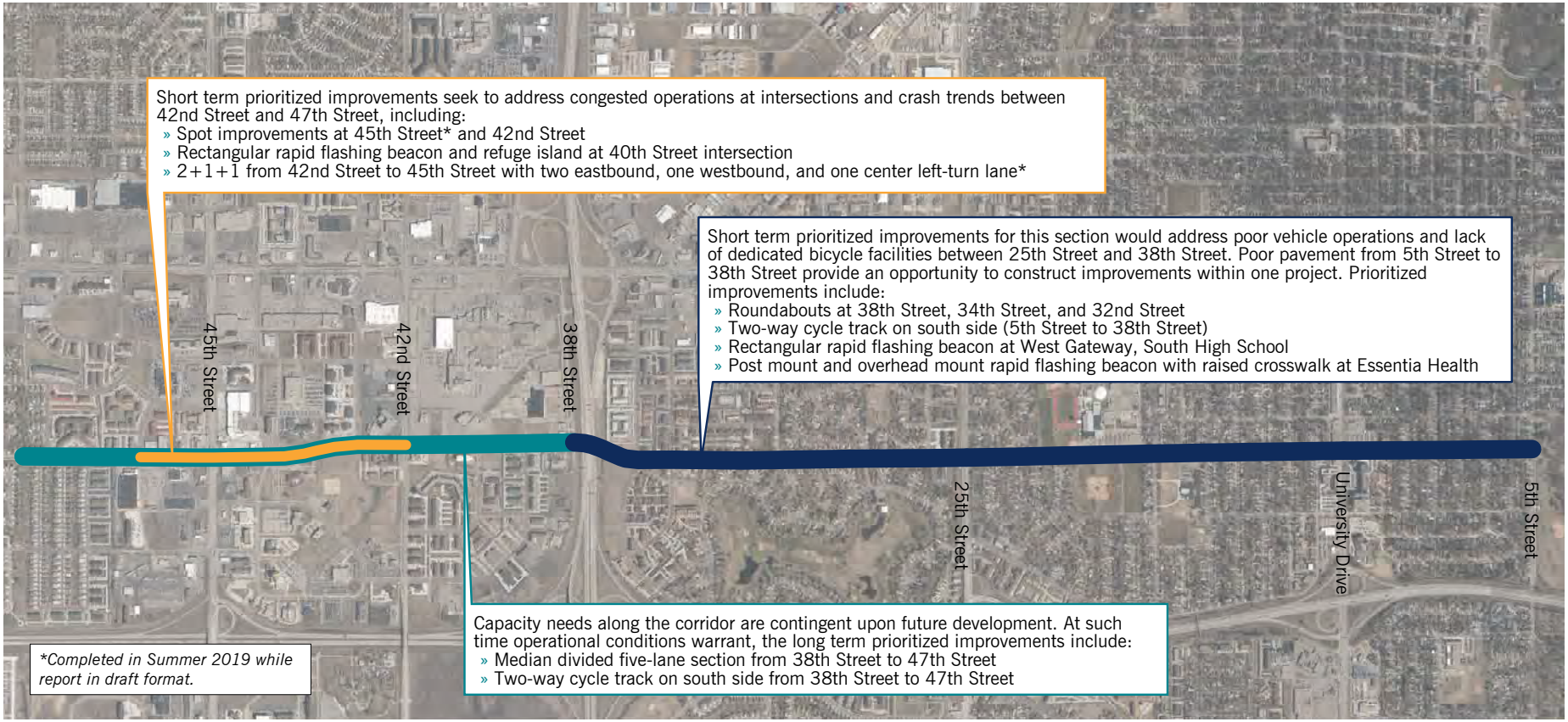
LOCAL FUNDING

The use of local funding increases flexibility and would likely accelerate implementation. Local funding would not require going through the Metro COG programming process nor an environmental document. This project would be funded through normal city funding mechanisms, including assessments.

SUMMARY OF IMPLEMENTATION

The projects prioritized in this study would create a bicycle corridor in Fargo that would extend from the eastern border and the Red River Trail across the city into West Fargo. The projects would also mitigate the congestion at intersections through revised traffic control and improve multimodal safety. The summary of implementation is shown in Figure 8.8. This summary is based on the needs established in Table 8.12, but specific project ordering will be determined through local programming procedures, funding availability, and adjacent construction plans. The 45th Street intersection and 2+1+1 lane reconfiguration between 45th Street and 42nd Street was completed in Summer 2019.

Figure 8.8: Summary of Implementation



WHAT WE HEARD: PROPOSED ROADWAY IMPROVEMENT PLAN

PUBLIC INPUT MEETING #3

In November 2018, the Fargo-Moorhead Metropolitan Council of Governments, City of Fargo, and KLJ presented the 17th Avenue Corridor Study report recommendations to the Fargo City Commission. These recommendations were based on technical analysis and public feedback received through two public meetings, four Study Review Committee meetings, surveys, public comments, and stakeholder meetings. However, the neighborhoods identified concerns they still had with the corridor recommendations, so an additional meeting was held and further public comment was requested.

The third public input meeting for the 17th Avenue Corridor Study was held on March 19th at the Hilton Garden Inn in Fargo. The third round included an open house and presentation.

Marketing Efforts

A variety of techniques were used to inform the public about their opportunity to provide input on the recommended roadway improvement plan for the 17th Avenue corridor.

- A press release and box ad were published in The Forum newspaper.
- Postcards were sent to properties adjacent to the corridor west of 38th Street and within 1/8 mile east of 38th Street.
- Social media posts on Fargo Street's Facebook and Twitter accounts and Metro COG's Facebook page.
- Emails sent through Fargo Streets.
- Fliers sent to neighborhood associations.

Public Input Meeting

More than 80 people came to the public meeting.

At the meeting, attendees were given multiple opportunities to provide comments.

- A written comment form that included a mailing address and e-mail address. People could elect to leave the forms with the team that evening or send them in later. Seven written comments were left at the meeting, with an additional seven written comments emailed after the meeting.
- Ballots to indicate support for the proposed roadway improvement plan across the entire study area of 17th Avenue. Twenty ballonts were received and consolidated with the online survey results to develop the public support ratios discussed later in this summary.

Figure 9.1: Summary of Marketing Materials

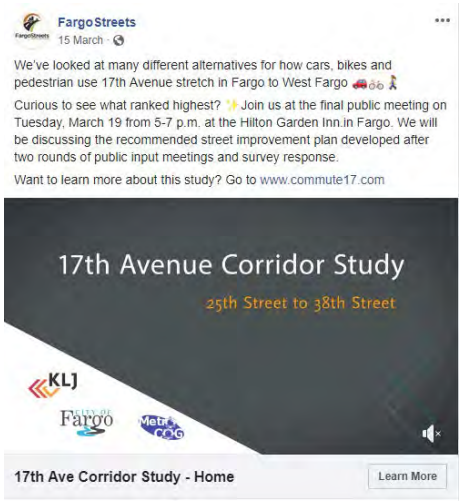


Figure 9.2: Attendees at the Public Meeting

Written Comments

Fourteen written comments were received. They generally were opposed to roundabouts, the cycle track, or both. These written comments also voiced concern for properties with driveways with direct access to 17th Avenue, traffic speed and safety, cost and assessments, and ability to turn during rush hour.

The written comments have been attached to this summary.

Survey

The survey was available at the meeting and online. 590 responses were received from the online survey and twenty responses were received from the ballots at the public meeting. The survey results are summarized below.

RELATION TO 17TH AVENUE AND THE CORRIDOR STUDY

About half of respondents live or commute along 17th Avenue and another 15 percent use 17th Avenue to walk and bike. Respondents were allowed to select as many options as necessary, so the result is greater than 100 percent.

More than 75 percent of respondents have not been involved in the study to date.

Figure 9.3: Relationship to 17th Avenue

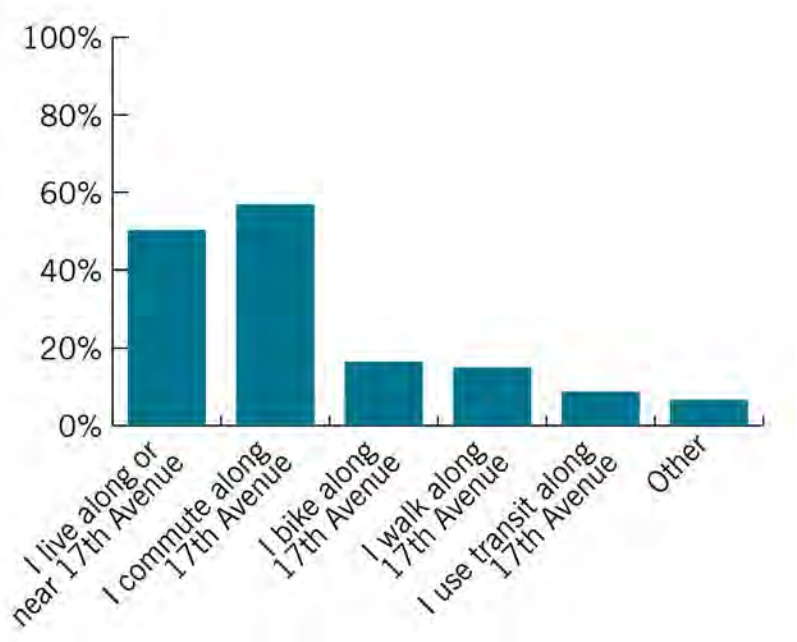
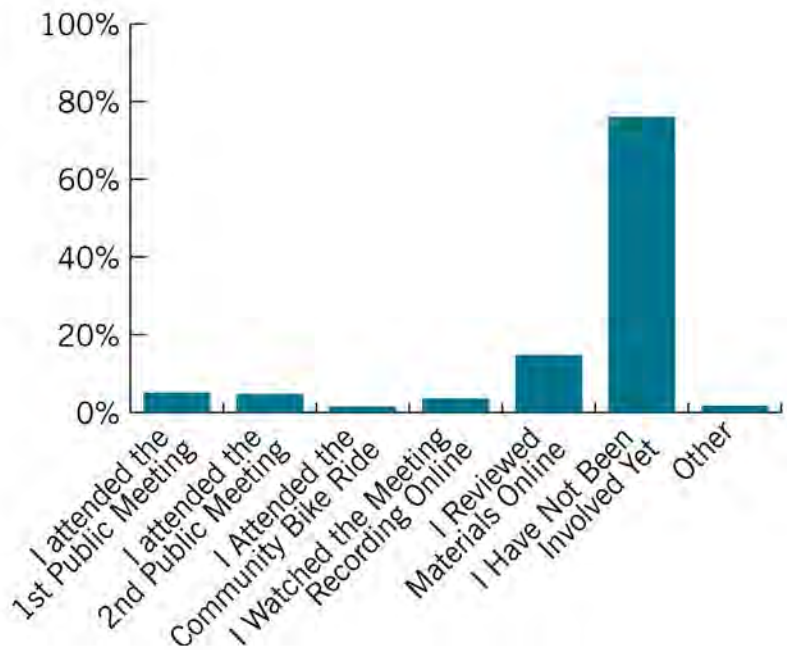


Figure 9.4: Involved in Previous Engagement Efforts

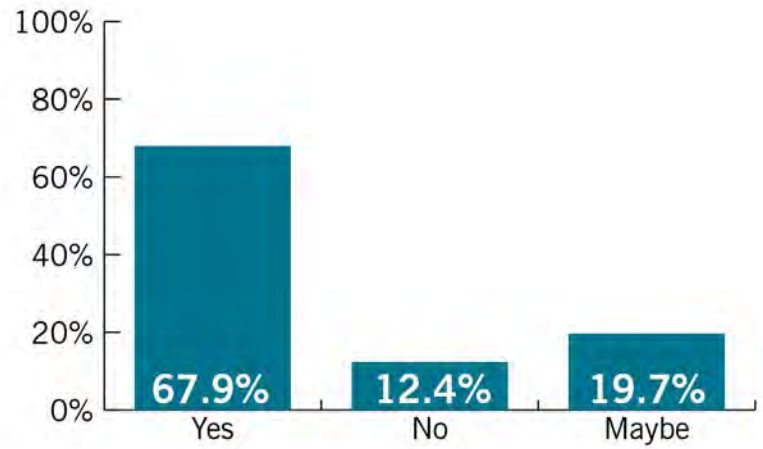


17TH AVENUE FROM 5TH STREET TO UNIVERSITY DRIVE

Nearly 68 percent of respondents support the proposed roadway improvement plan for 17th Avenue from 5th Street to University Drive. Twenty percent of respondents said they maybe support the proposed plan. When asked for questions, comments, or concerns, the top themes included:

- Concerns to cross University Avenue
- Unfamiliarity with the two-way cycle track alternative and lack of distinct barrier
- Impacts to vehicular traffic
- Potential use of bicycle facilities
- Snow removal
- Cost

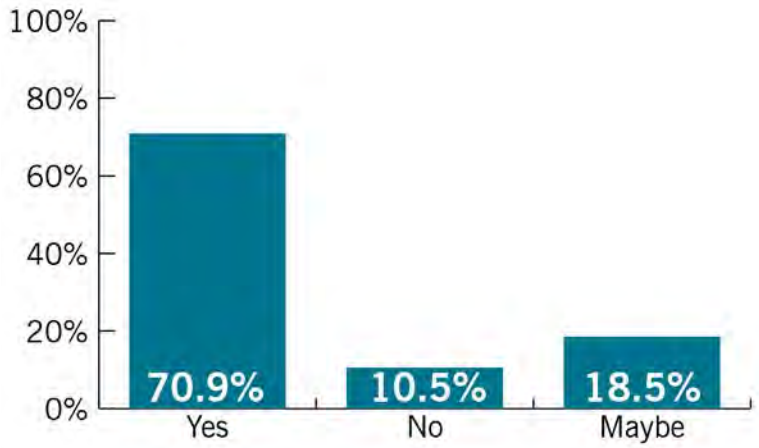
Figure 9.5: Public Support for Proposed Roadway Plan between 5th Street and University Drive



17TH AVENUE FROM UNIVERSITY DRIVE TO 25TH STREET

Nearly 71 percent of respondents support the proposed roadway improvement plan for 17th Avenue from University Drive to 25th Street. Nineteen percent of respondents said they maybe support the proposed plan. When asked for questions, comments, or concerns, the top themes included:

Figure 9.6: Public Support for Proposed Roadway Plan between University Drive and 25th Street



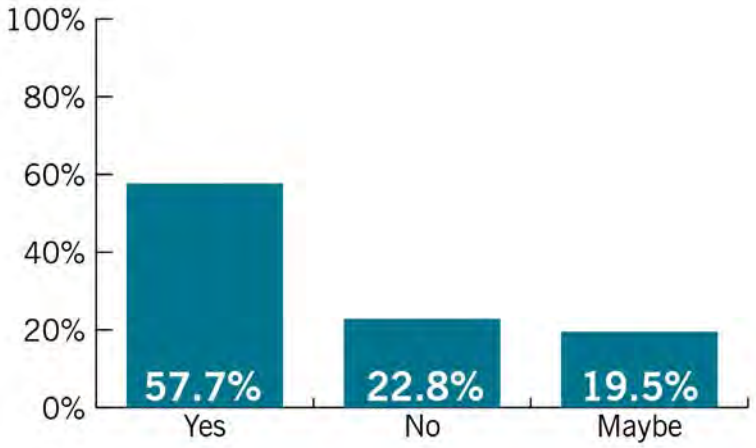
- Like improved crosswalks, and barrier between vehicle travel lanes and cycle track
- Impacts to traffic operations, especially around Fargo South High School
- Lack of turn lanes
- Snow removal
- Traffic speed and pedestrian safety
- Prefer off-road bicycle facilities
- Potential use of bicycle facilities
- Cost and property impacts

17TH AVENUE FROM 25TH STREET TO 38TH STREET

More than 58 percent of respondents support the proposed roadway improvement plan for 17th Avenue from 25th Street to 38th Street. Twenty percent of respondents said they maybe support the proposed plan. When asked for questions, comments, or concerns, the top themes included:

- Unfamiliarity with cycle track and/or roundabout operations
- Wanted to maintain turn lanes
- Potential use of bicycle facilities
- Like roundabouts but not cycle track or like cycle track but not roundabouts
- Oversized vehicles using roundabouts
- Snow removal
- Cost and property impacts

Figure 9.7: Public Support for Proposed Roadway Plan between 25th Street and 38th Street



17TH AVENUE FROM 38TH STREET TO 51ST STREET

More than 69 percent of respondents support the proposed short term roadway improvement plan for 17th Avenue from 38th Street to 51st Street and 62 percent of respondents supported the proposed long term roadway improvement plan. When asked for questions, comments, or concerns, the top themes included:

- Improved bicycle and pedestrian safety
- Traffic operations with the short-term roadway improvement plan
- Cost
- Access management impacting direct access to businesses
- Too many access points

Figure 9.8: Public Support for Proposed Short Term Roadway Plan between 38th Street and 51st Street

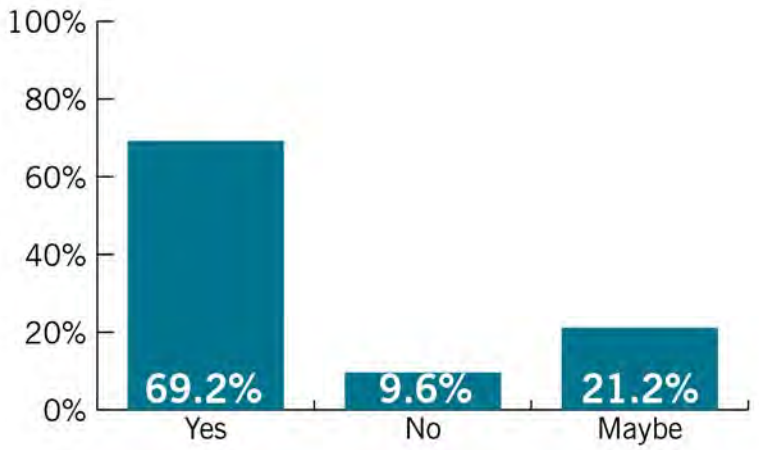
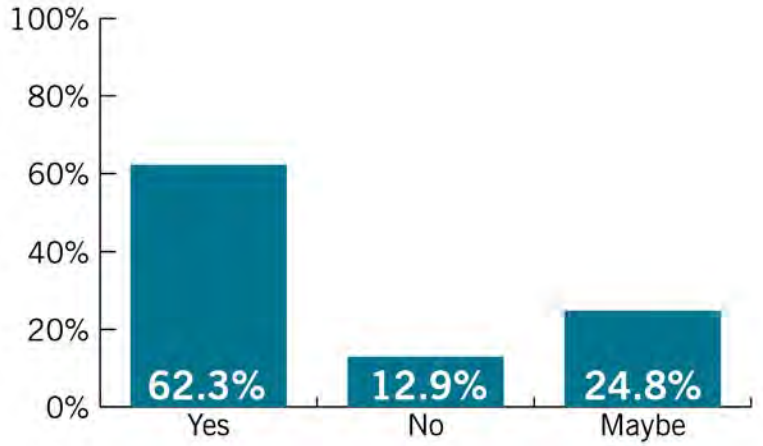


Figure 9.9: Public Support for Proposed Long Term Roadway Plan between 38th Street and 51st Street




ONLY