Appendix A

Average Daily Traffic Volume Maps

NOT TO SCALE

Mandan Inset 1

Mandan Inset 2

Bismarck Inset 1

Bismarck Inset 2

Bismarck Inset 3

Bismarck Inset 4

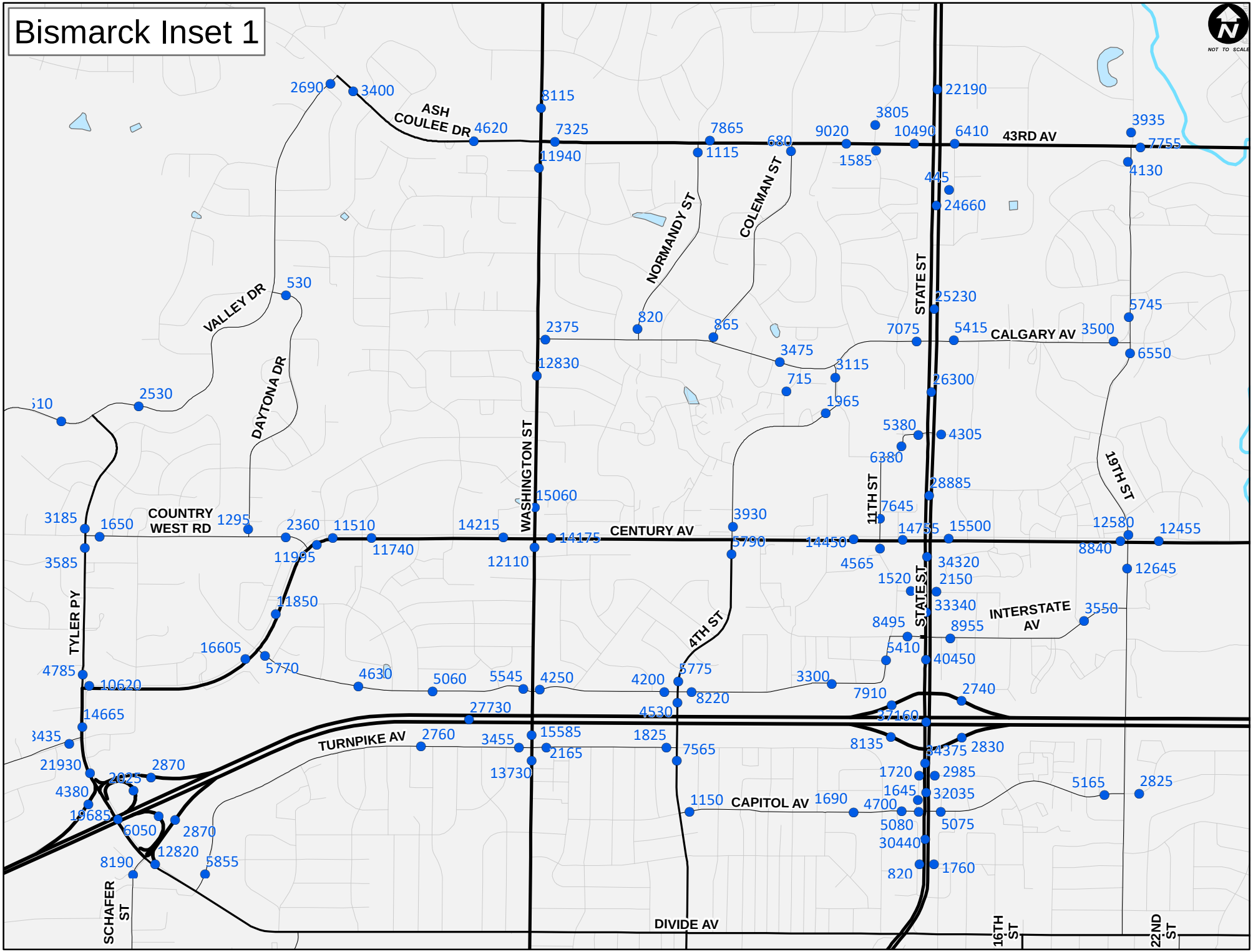
37TH ST NW
HWY 1806
27TH ST
1806
OLD RED TRL
SUNSET DR
14TH ST
MANDAN AVE
DIVISION ST
COLLINS AVE
3RD AVE
6TH ST
6TH ST NW
6TH AVE
2ND ST NE
1ST ST
13TH AVE
MAIN ST
6TH AVE
3RD ST
6
HWY 6
8TH AVE
19TH ST
HWY 1806
MEMORIAL HWY
RIVER RD
CLAIRMONT RD
BURNT BOAT DR
VALLEY DR
TYLER PKWY
ASH COULEE DR
43RD AVE
STATE ST
83
CALGARY AVE
NEBRASKA DR
CENTENNIAL RD
ROOSEVELT SR
CENTURY AVE
SHILOH DR
INTERSTATE AVE
94
TURNPIKE AVE
CAPITOL AVE
DIVIDE AVE
19TH ST
17TH AVE
WASHINGTON ST
4TH ST
16TH ST
22ND ST
BISMARCK EXPY
3RD ST
C AVE
9TH ST
D AVE
35TH ST
52ND AVE
MAIN AVE
ROSSER AVE
BROADWAY AVE
5TH ST
26TH ST
BOWEN AVE
40TH AVE
MCKENZIE DR
46TH AVE
ARBOR AVE
7TH ST
AIRPORT RD
APPLE CREEK RD
DENVER AVE
RENO AVE
UNIVERSITY DR
12TH ST
MORRISON AVE
WACHTER AVE
1804
RIVERWOOD DR
WHISPER DR
LONDON AVE
TAIVSI RD
YEGEN RD
LINCOLN RD

ID	Name	ID	Name
1	3rd St & Bowen Ave	34	Washington St & Burleigh Ave
2	Washington St & Bowen Ave (N)	35	52nd St & Main Ave
3	Washington St & Bowen Ave (S)	36	Burlington Dr & Morrison Dr
4	Washington St & Arbor Ave	37	19th St & Shiloh Dr
5	6th St & Boulevard Ave	38	Collins Ave & 1st St NW
6	7th St & Arbor Ave	39	10th Ave & Main St
7	9th St & Arbor Ave	40	Memorial Hwy & 3rd St SE
8	19th St & 43rd Ave	41	46th Ave & McKenzie Dr
9	19th St & Calgary Ave	42	37th St & Old Red Tr
10	19th St & Capital Ave	43	Old Red Tr & 34th St
11	Tyler Pkway & Century Ave	44	Sunset Dr & 27th St
12	3rd St & Boulevard Ave	45	Sunset Dr & Old Red Tr
13	3rd St & Thayer Ave	46	Sunset Dr & Division St
14	Washington St & Turnpike Ave	47	Collins Ave & 14th St
15	Washington St & Reno Ave	48	Sunset Dr & 2nd St
16	Washington St & Wachter Ave	49	2nd Ave & 2nd St
17	Airport Rd & Broadway Ave	50	Sunset Dr & 1st St
18	3rd St & Rosser Ave	51	4th Ave & 1st St NW
19	4th St & Rosser Ave	52	3rd Ave & 1st St NW
20	5th St & Rosser Ave	53	2nd Ave & 1st St NW
21	6th St & Rosser Ave	54	1st Ave & 1st St NW
22	State St & Boulevard Ave	55	3rd Ave & 1st St NE
23	Tyler Pkwy & Valley Dr	56	6th Ave & 1st St NE
24	Tyler Pkwy & Country West Rd	57	9th Ave & 1st St NE
25	Roosevelt Dr & Hitchcock Dr	58	Memorial Hwy & Main St
26	16th St & Boulevard Ave	59	6th Ave & 3rd St
27	16th St & E Ave C	60	40th Ave & 19th St
28	16th St & Rosser Ave	61	40th Ave & 21st St
29	3rd St & Denver Ave	62	40th Ave & Shoal Lp
30	3rd St & Wachter Ave	63	40th Ave & McKenzie Dr
31	Washington St & Ave C	64	46th Ave & 21st St
32	Washington St & Rosser Ave	65	46th Ave & South Bay Dr
33	Washington St & London Ave		

Legend

- Collector
- Minor Arterial
- Principal Arterial
- Interstate

P:\MPO\BismarckMandan\1913-00511 IntersectionAnalysis\GIS\2. MXDB. Report Maps\0a - Traffic Volume Map (Inset List).mxd



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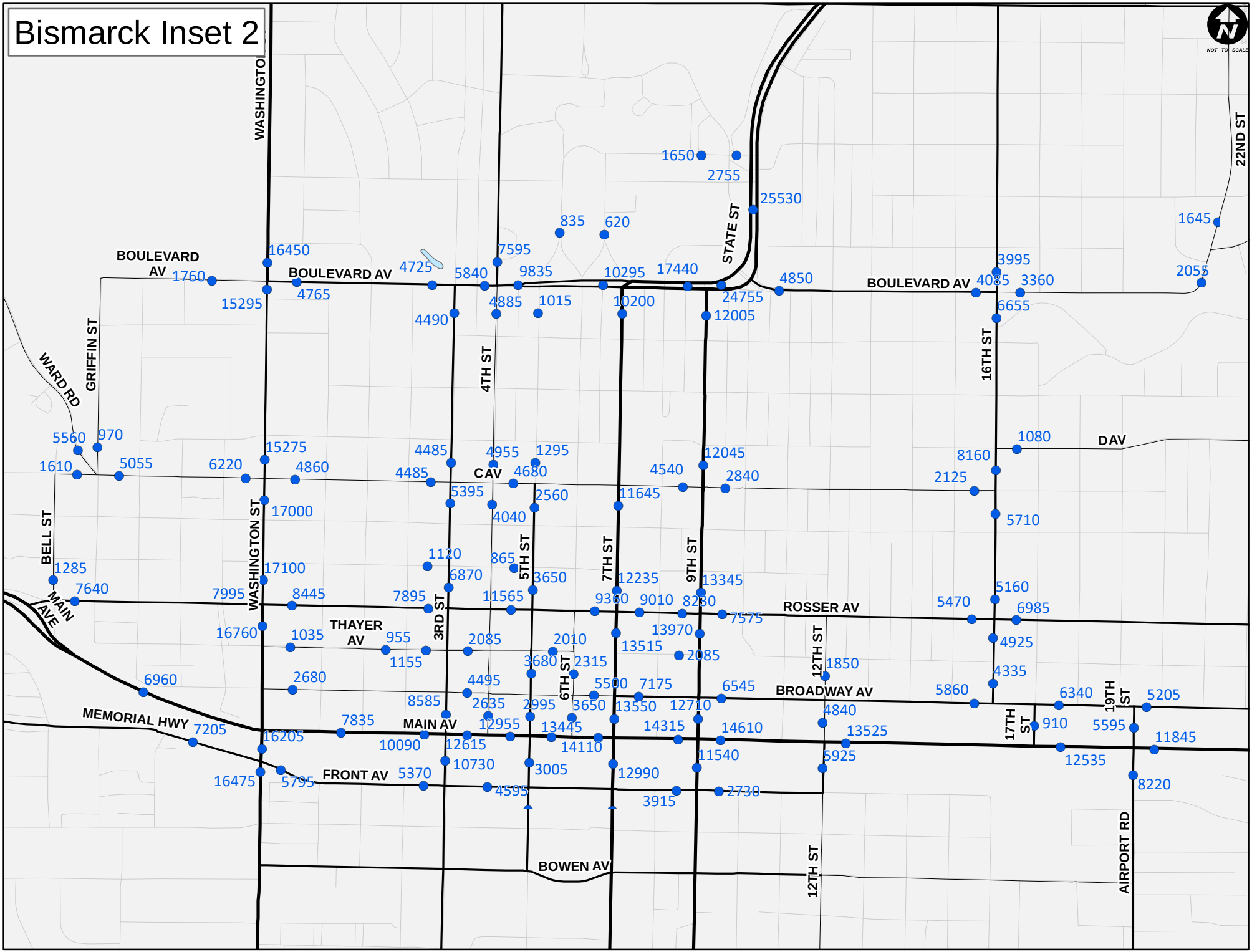

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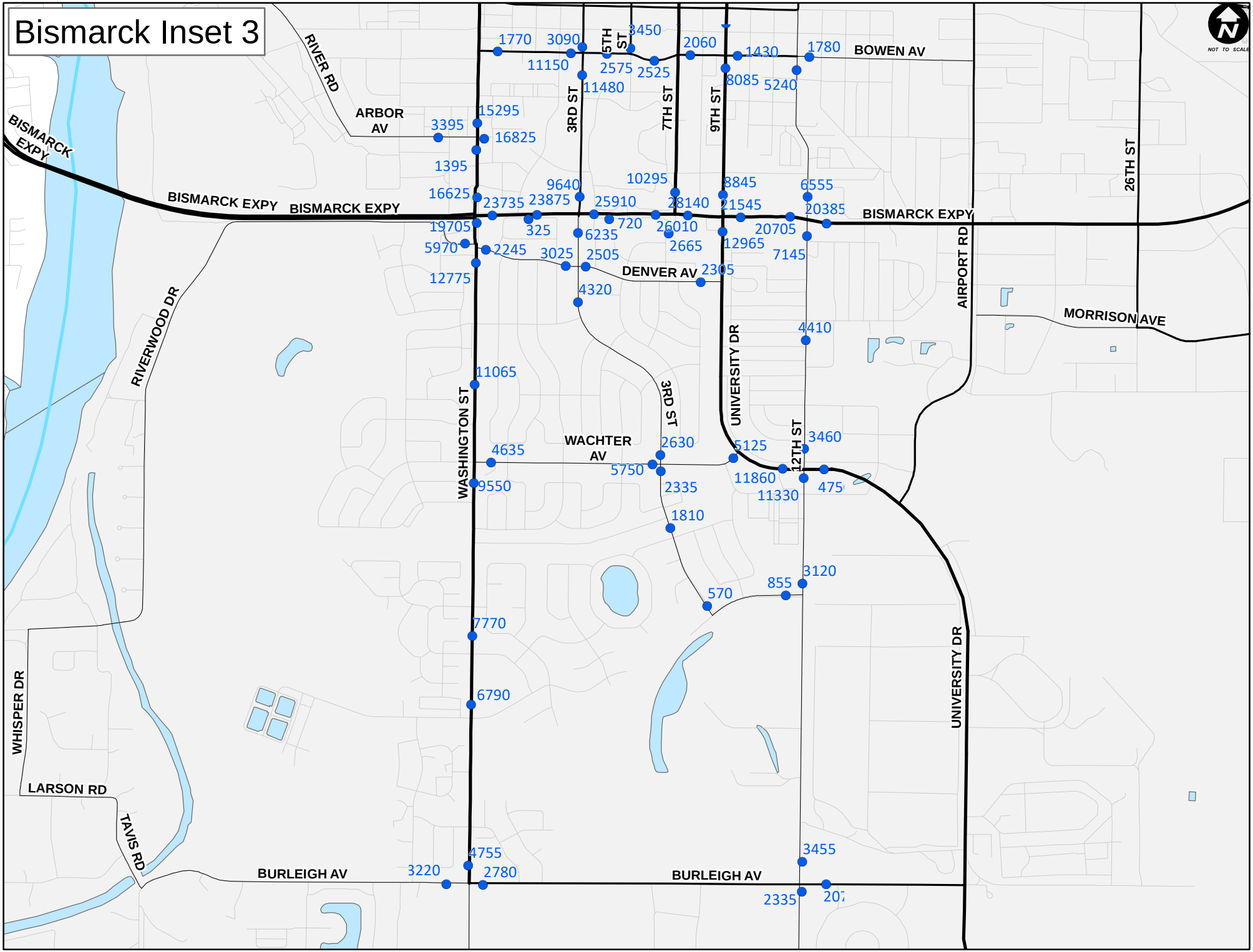
Bismarck Inset 3
NOT TO SCALE
RIVER RD
ARBOR AV
BISMARCK EXPY
BISMARCK EXPY
BISMARCK EXPY
BISMARCK EXPY
BOWEN AV
3RD ST
5TH ST
7TH ST
9TH ST
26TH ST
AIRPORT RD
MORRISON AVE
DENVER AV
RIVERWOOD DR
WASHINGTON ST
WACHTER AV
3RD ST
UNIVERSITY DR
12TH ST
UNIVERSITY DR
WHISPER DR
LARSON RD
TAVIS RD
BURLEIGH AV
BURLEIGH AV
1770
3090
3450
2060
1430
1780
11150
2575
2525
8085
5240
11480
15295
3395
16825
1395
16625
9640
10295
8845
6555
23735
23875
25910
28140
21545
20385
19705
325
6235
720
26010
20705
5970
2245
3025
2505
2665
12965
7145
12775
2305
4320
4410
11065
4635
2630
5125
3460
5750
2335
11860
475
9550
11330
1810
3120
855
570
7770
6790
4755
3455
3220
2780
2335
207
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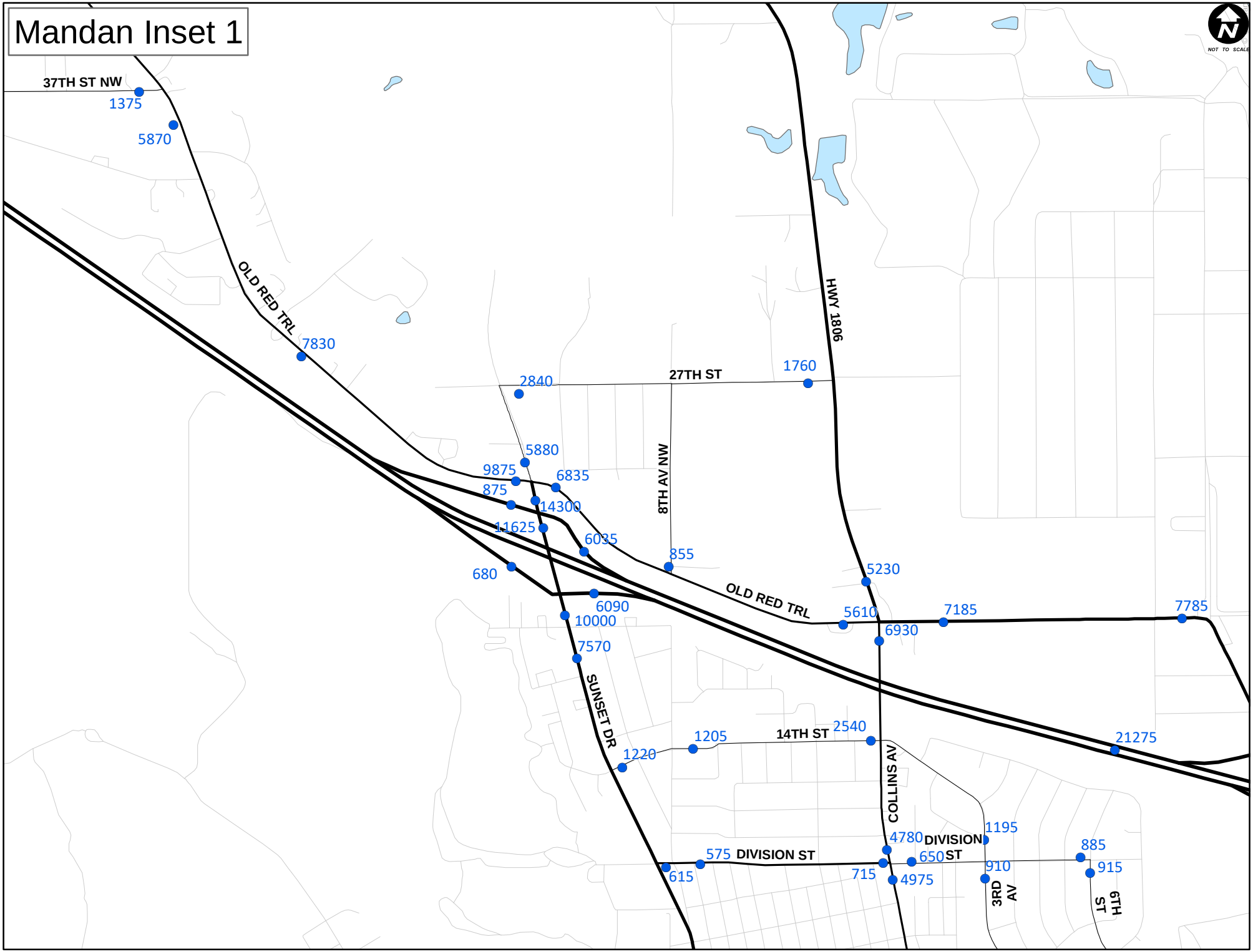
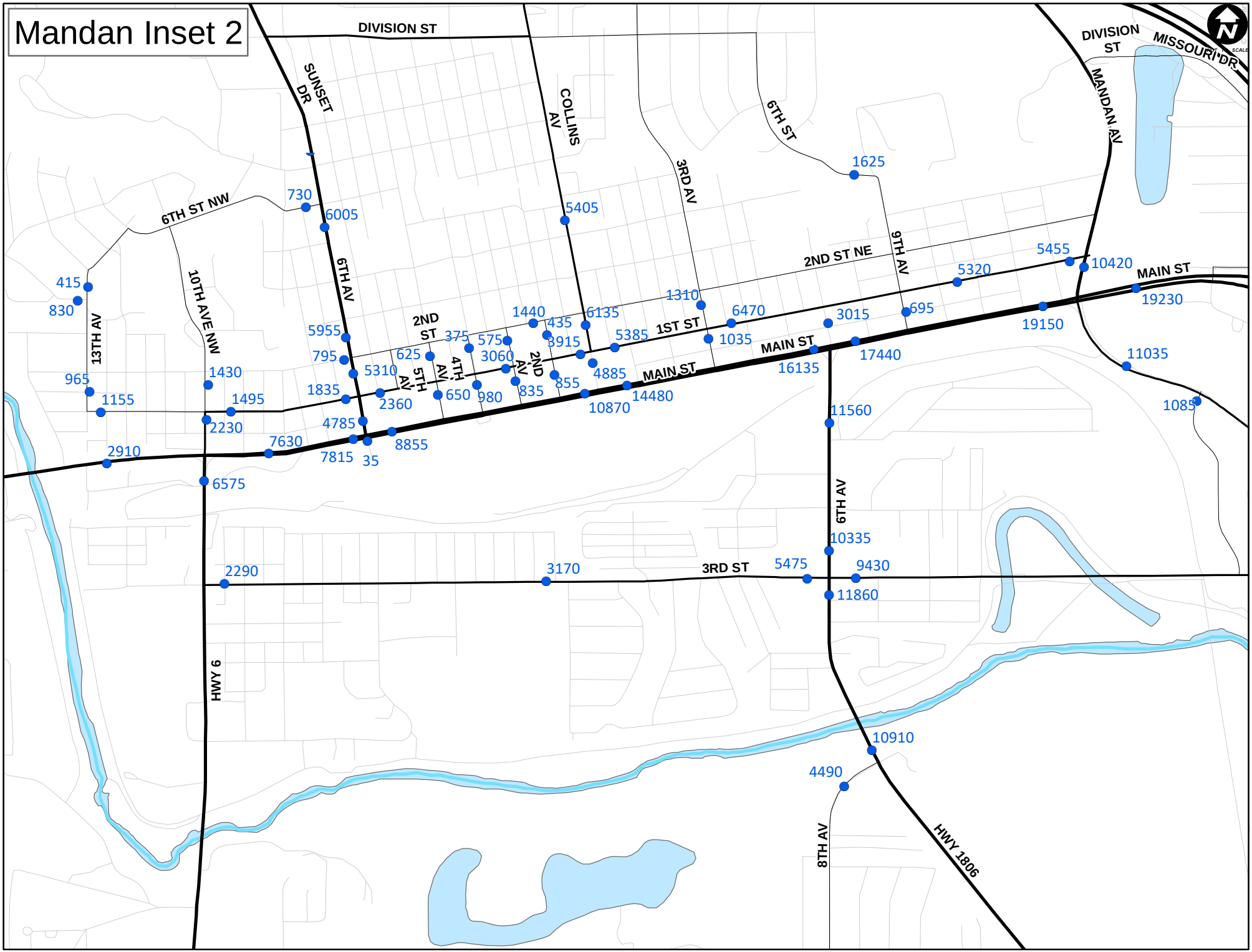

Mandan Inset 1
NOT TO SCALE
37TH ST NW
1375
5870
OLD RED TRL
7830
HWY 1806
27TH ST
2840
1760
5880
9875
6835
875
14300
8TH AV NW
11625
6035
855
680
OLD RED TRL
5230
6090
10000
5610
7185
7785
6930
7570
SUNSET DR
1205
14TH ST
2540
1220
21275
COLLINS AV
4780
DIVISION ST
1195
575
DIVISION ST
650
885
615
715
4975
910
915
3RD AV
9TH ST
P:\MPO\BismarckMandan\1913-00511_IntersectionAnalysis\GIS\2. MXD\B. Report Maps\00b-g - Traffic Vol Insets.mxd



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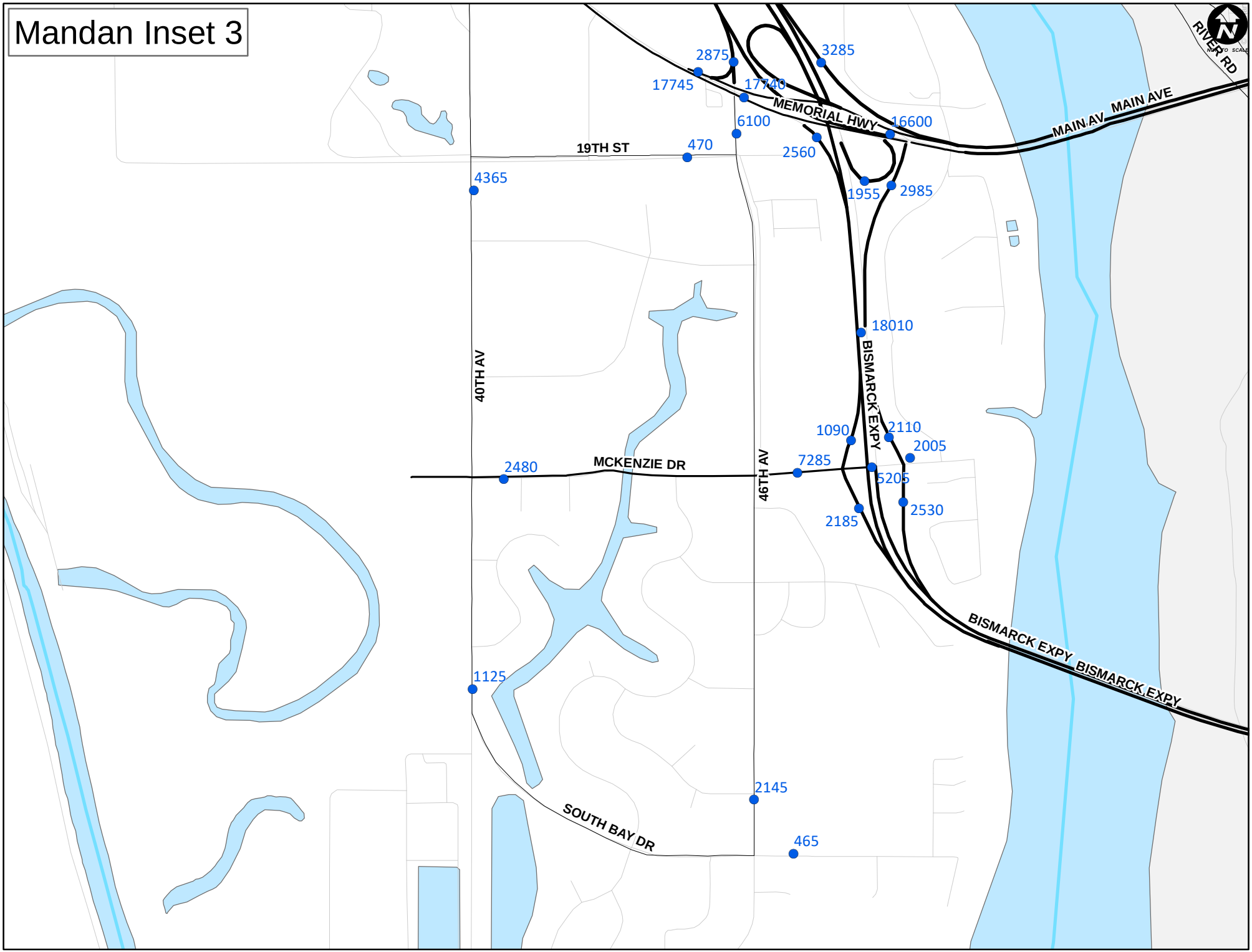
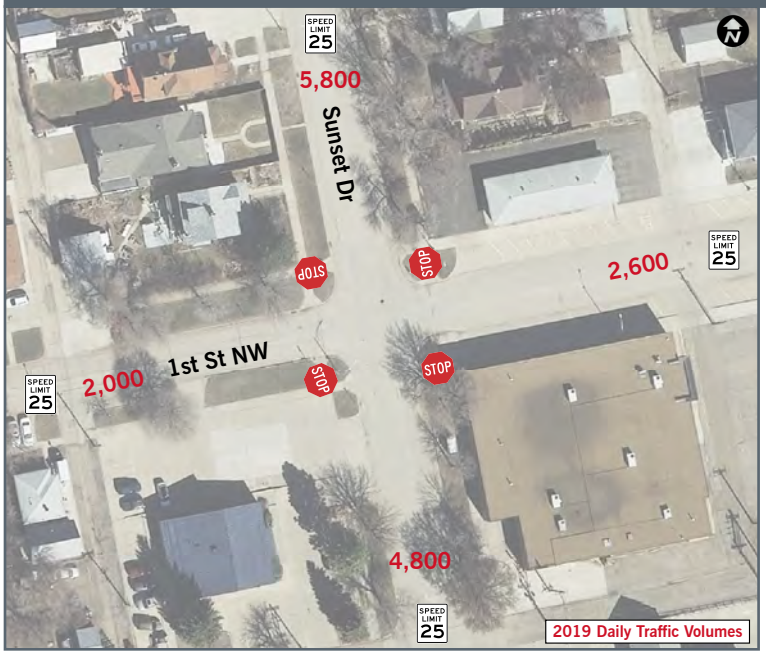

Mandan Inset 3
2875
3285
17745
17740
MEMORIAL HWY
6100
16600
MAIN AV
MAIN AVE
RIVER RD
19TH ST
470
2560
4365
1955
2985
18010
40TH AV
BISMARCK EXPY
1090
2110
2005
MCKENZIE DR
2480
7285
46TH AV
5205
2530
2185
BISMARCK EXPY
BISMARCK EXPY
1125
2145
SOUTH BAY DR
465
P:\MPO\BismarckMandan\1913-00511_IntersectionAnalysis\GIS\2. MXD\B. Report Maps\00b-g - Traffic Vol Insets.mxd

Appendix B

Alternatives Analysis Worksheets for Cluster Analysis Locations

Sunset Drive and 1st Street NW
Mandan

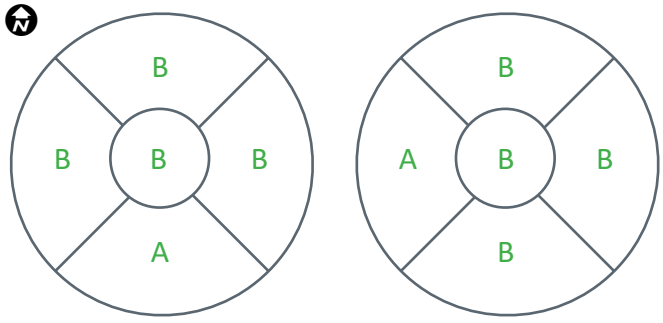


Sunset Drive and 1st Street NW is an all-way stop controlled (AWSC) intersection located on the northwest edge of downtown Mandan. Downtown businesses are located to the south, with primarily single family residential to the north.

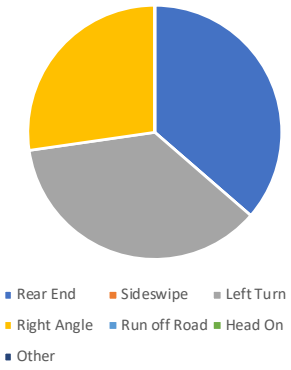
Angled street parking is present on both sides of the east approach, which has resulted in some comments related to sight-distance issues.

This intersection operates efficiently, but induces unnecessary delay caused by the unwarranted AWSC. Sunset Drive carries more than twice as much traffic as 1st Street NW but receives equal priority. Uneven distribution can often breed non-compliance which is a safety concern for vehicles and pedestrians alike. The unwarranted AWSC is speculated to be a contributor of the critical crash trends occuring at this intersection.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



11 Total Crashes

Critical Crash Rate?
- ☑ Yes
- ☐ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant without marked crosswalks. Bus Route 6 (Purple Route) runs through the intersection with a sheltered stop on the east side of the south leg.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

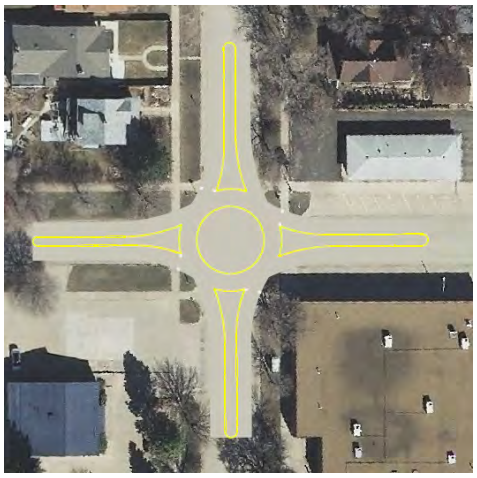
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  5/8 Minimum Traffic Volumes

Existing all-way stop control is not warranted based on observed traffic volumes.

Alternative 1: Mini-Roundabout



Safety
Data shows a 54 percent reduction in serious crashes and minimal changes to overall crash occurances after converting all-way stop control to a single lane roundabout. Research has also shown that unwarranted all-way stop control often results in poor compliance, which could be causing the elevated crash rates under existing conditions.

Multimodal Conditions
Removing stop control on all approaches can result in more vehicle/pedestrian conflicts, however uncompliant drivers at the existing all-way stop control also create safety issues for pedestrians. Lower entering speeds for vehicles also reduces the potential for high speed conflicts.

Traffic Operations
This alternative would improve all approaches to operate at LOS A in the AM and PM peak hours.

Cost and Impacts
If a mini-roundabout is implemented within the existing roadway footprint, impacts to curblines and adjacent property will be mimimal, with an estimated project cost of $75,000.

Other Notes
None

Alternative 2: Two-Way Stop Control, Pedestrian Bump-Outs, and Parking Removal

Safety
Unwarranted all-way stop control can result in non-compliant drivers, increasing crash potential when other drivers expect opposing traffic to stop. Removing northbound/southbound stop control could however make gap selection more difficult during peak hour traffic conditions. Bump-outs will reduce sight visability concerns.

Multimodal Conditions
Removing northbound/southbound stop control requires pedestrians crossing Sunset Drive to wait for acceptable gaps. Implementing pedestrian bump-outs will reduce crossing exposure and constrict speeds. Research shows an approximate 40% reduction in pedestrian crashes after bump-out installation.

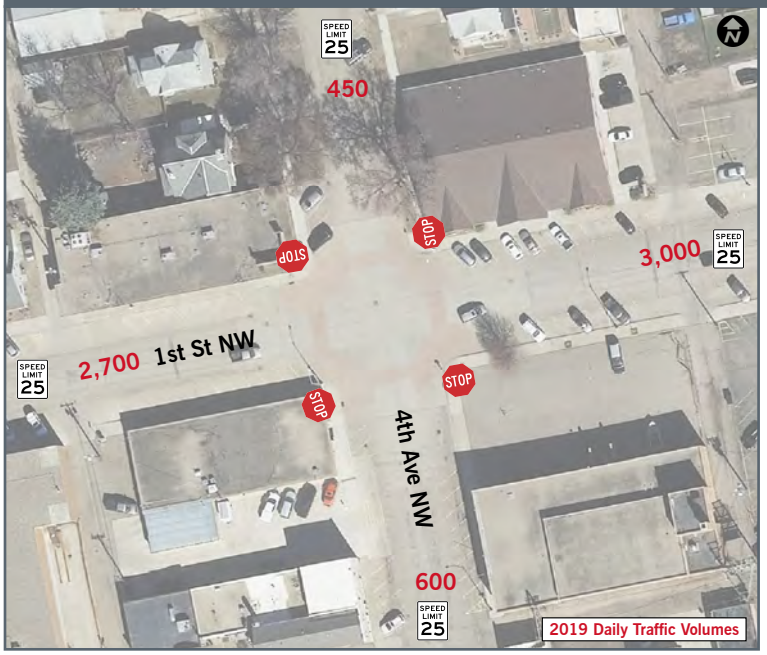
Traffic Operations
This alternative would decrease the eastboud operations from LOS B to LOS C in the AM Peak hour. It would also decrease both the eastbound and westbound approaches to LOS C in the PM peak hour.

Cost and Impacts
Estimated $50,000 cost for bump-outs.

Other Notes
If crossing Sunset Drive becomes challenging, a pedestrian beacon system can be retrofitted to this concept to improve crossing safety.

Summary: A mini-roundabout offers benefits in terms of safety, operations, and pedestrian crossings. From an isolated intersection perspective, this intersection would benefit from conversion to a mini-roundabout given the existing critical crash trends. This intersection will be studied further within the context of the 1st Street NW cluster.

4th Avenue NW and 1st Street NW
Mandan

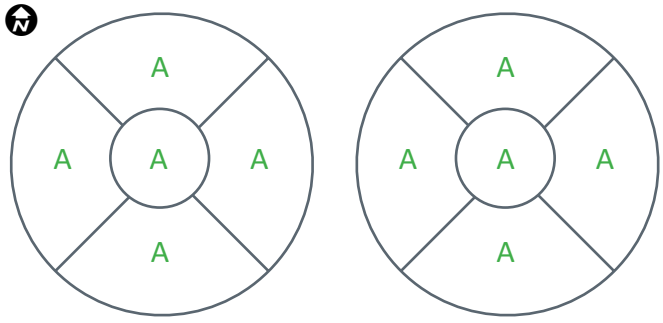


4th Avenue NW and 1st Street NW is an all-way stop controlled (AWSC) intersection in downtown Mandan. Commercial land uses are on each quadrant of the intersection, with single family residential further to the north and other downtown businesses to the south.

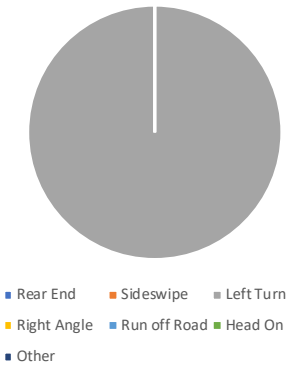
Angled street parking is provided on both sides of each intersection approach, with some comments being received about poor sight lines as a result of parked vehicles.

The traffic control at this intersection is not warranted based on traffic volumes and is not particularly close to being warranted. AWSC is traditionally most effective at intersections with even traffic distributions. Uneven distribution can often breed non-compliance which is a safety concern for vehicles and pedestrians alike. AWSC can also induce a feeling of unnecessary delay which has been proven to increase speeding downstream of an unwarranted AWSC.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant and colored pavement to mark crosswalk areas.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

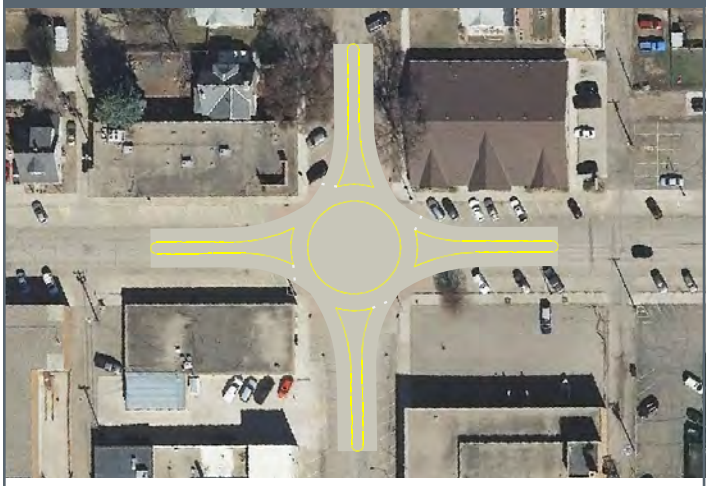
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Existing all-way stop control is not warranted based on observed traffic volumes.

Alternative 1: Mini-Roundabout



Safety
Data shows a 54 percent reduction in serious crashes and minimal changes to overall crash occurances after converting all-way stop control to a single lane round-about. Research has also shown that unwarranted all-way stop control often results in poor compliance. Roundabout design will help minimize sight distance issues.

Multimodal Conditions
Removing stop control on all approaches can result in more vehicle/pedestrian conflicts, however uncom-pliant drivers at the existing all-way stop control also create safety issues for pedestrians. Lower entering speeds for vehicles also reduces the potential for high speed conflicts.

Traffic Operations
The intersection would remain at LOS A throughout the day with a single lane roundabout.

Cost and Impacts
If a mini-roundabout is implemented within the existing roadway footprint, impacts to curblines and adjacent property will be mimimal, with an estimated project cost of $75,000.

Other Notes
If roundabouts are implemented nearby, there is ad-ditonal value to implementing a roundabout here for traffic control consistency.

Alternative 2: Two-Way Stop Control, Pedestrian Bump-Outs, and Parking Removal

Safety
Unwarranted all-way stop control can result in non-compliant drivers, increasing crash potential when other drivers expect opposing traffic to stop. Low traffic volumes will make finding gaps in traffic possible. Removing parking and adding bump-outs near the in-tersection on 1st Street would improve sight distance.

Multimodal Conditions
Removing eastbound/westbound stop control requires pedestrians crossing 1st Street to wait for acceptable gaps. Implementing pedestrian bump-outs will reduce crossing exposure and constrict speeds. Research shows bump-outs reduce pedestrian crashes by around 40 percent.

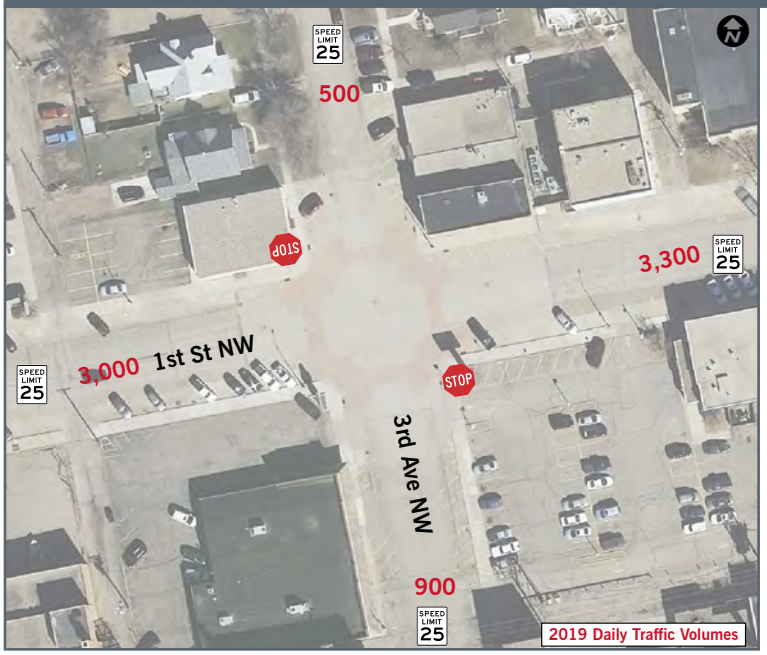
Traffic Operations
Minor approach operations would lower slightly with LOS B expected in the peak hours. While LOS B is con-sidered very efficient, this represents a full LOS grade reduction.

Cost and Impacts
Estimated cost of $100,000 for bulb-outs and some on-street parking would be removed.

Other Notes
None

Summary: Both a roundabout and TWSC offer superior traffic conditions compared to AWSC, given the minimal traffic volumes on 4th Avenue are far from meeting warrants. TWSC is the most cost-effective solution of the two. Ulti-mately, the decision is dependent on decisions at adjacent locations. If roundabouts are added elsewhere on the corridor consider roundabout control for consistency, otherwise consider northbound/southbound stop control.

3rd Avenue NW and 1st Street NW
Mandan

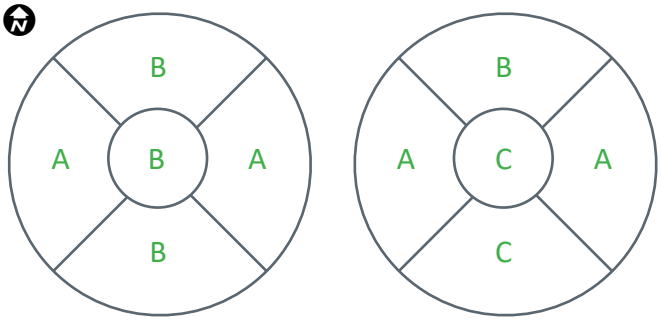


1st Street NW and 3rd Avenue NW is a two-way stop controlled (TWSC) intersection in downtown Mandan. Downtown businesses are located on each intersection quadrant, with single family residential further to the north and downtown businesses to the south.

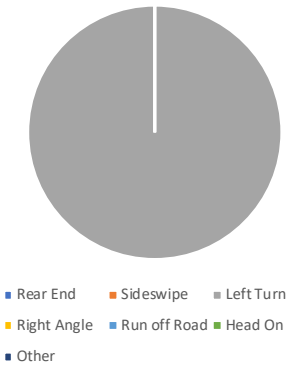
Angle parking is present on both sides of the road on each intersection approach, resulting in some comments about poor sight lines.

This intersection operates efficiently, has a minimal crash history and does not meet warrants to consider up-regulated traffic control.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant and colored pavement to mark crosswalk areas.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Remove Parking

Safety
Removing some parking on 1st Street would improve sight lanes for northbound and southbound vehicles, reducing crash potential.

Multimodal Conditions
Improved sight lines reduce potential for vehicle/pedestrian conflicts.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Minimal costs, but would remove some on-street parking spaces. A recent parking study revealed a surplus of parking on 1st Street.

Other Notes
If this alternative is implemented, parking should be prohibited on 1st Street within 30 feet of the intersection.

Alternative 1: Pedestrian Bump-Outs

Safety
Traffic calming benefits from intersection bump-outs reduce vehicle speeds and crash potential. Sight lines between vehicles and pedestrians are also improved.

Multimodal Conditions
Improved sight lines for pedestrians reduce potential for vehicle/pedestrian conflicts. Research shows an approximate pedestrian crash reduction of 40 percent after installing bump-outs.

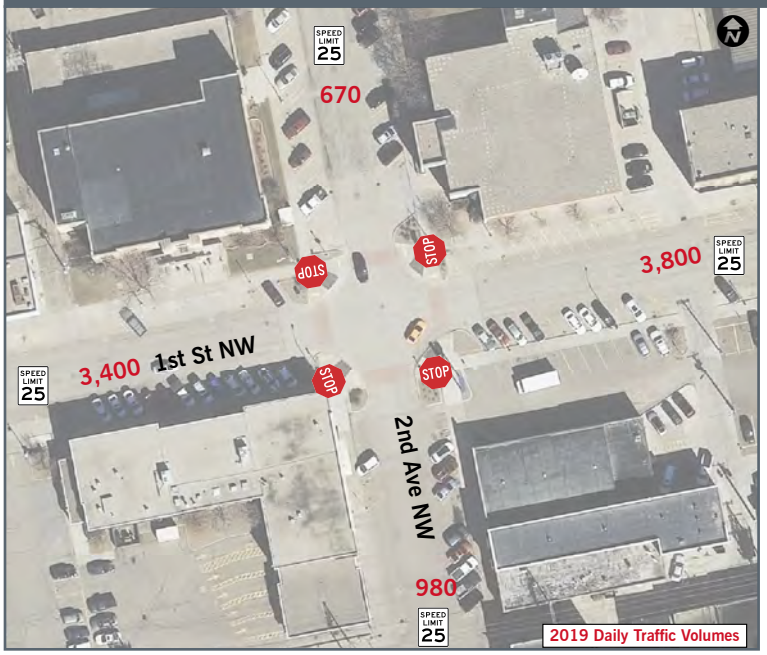
Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Estimated cost of $50,000 for bump-outs. Bump-outs will remove a small number of on-street parking spaces.

Other Notes
If this alternative is implemented, parking should be prohibited on 1st Street within 30 feet of the intersection.

Summary: Consider prohibiting parking on 1st Street within 30 feet of the intersection. Dependent upon the larger vision for 1st Street, consider curb bulb-outs to improve pedestrian crossings. This intersection will be studied further within the context of the 1st Street NW cluster.

2nd Avenue NW and 1st Street NW
Mandan

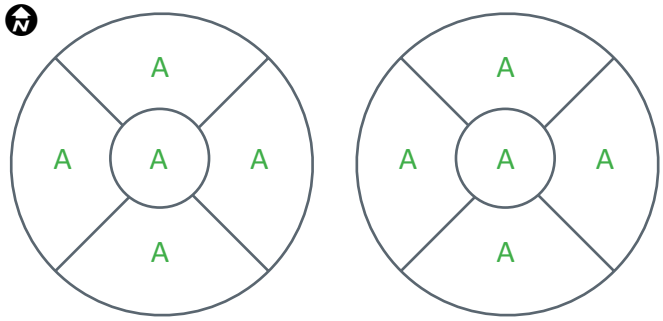


1st Street NW and 2nd Avenue NW is an all-way stop controlled (AWSC) intersection in downtown Mandan. Downtown businesses are located on each intersection quadrant, with single family residential further to the north.

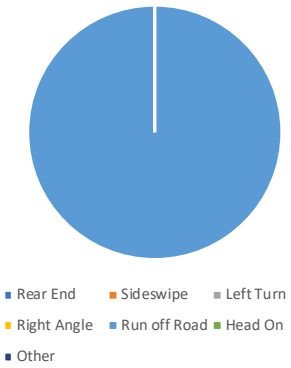
Angle parking is provided on each side of the street on all intersection approaches, which has resulted in comments related to poor sight lines. A recent parking study indicates a surplus of parking on 1st Street.

The traffic control at this intersection is not warranted based on traffic volumes and is not particularly close to being warranted. AWSC is traditionally most effective at intersections with even traffic distributions. Uneven distribution can often breed non-compliance which is a safety concern for vehicles and pedestrians alike. AWSC can also induce a feeling of unnecessary delay which has been proven to increase speeding downstream of an unwarranted AWSC. This intersection experienced a pedestrian crash.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant, colored pavement to mark crosswalk areas, and bump-outs.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**
  - 0/8 Warrant 1: Eight Hour Traffic Volumes
  - 0/4 Warrant 2: Four Hour Traffic Volumes
  - 0/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**
  - 0/8 Minimum Traffic Volumes

The existing all-way stop control is not warranted based on observed traffic volumes.

Alternative 1: Mini-Roundabout

Safety
Data shows a 54 percent reduction in serious crashes and minimal changes to overall crash occurances after converting all-way stop control to a single lane roundabout. Research has also shown that unwarranted all-way stop control often results in poor compliance. Roundabout design will help minimize sight distance issues.

Multimodal Conditions
Removing stop control on all approaches can result in more vehicle/pedestrian conflicts, however uncompliant drivers at the existing all-way stop control also create safety issues for pedestrians. Lower entering speeds for vehicles also reduces the potential for high speed conflicts.

Traffic Operations
The intersection would remain at LOS A throughout the day with a single lane roundabout.

Cost and Impacts
If a mini-roundabout is implemented within the existing roadway footprint, impacts to curblines and adjacent property will be mimimal, with an estimated project cost of $75,000.

Other Notes
If roundabouts are implemented nearby, there is additonal value to implementing a roundabout here for traffic control consistency.

Alternative 2: Two-Way Stop Control, Pedestrian Bump-Outs, and Parking Removal

Safety
Unwarranted all-way stop control can result in non-compliant drivers, increasing crash potential when other drivers expect opposing traffic to stop. Low traffic volumes will make finding gaps in traffic possible. Removing parking and adding bump-outs would improve sight distance.

Multimodal Conditions
Removing eastbound/westbound stop control requires pedestrians crossing 1st Street to wait for acceptable gaps. Implementing pedestrian bump-outs will reduce crossing exposure and constrict speeds. Research shows bump-outs reduce pedestrian crashes by around 40 percent.

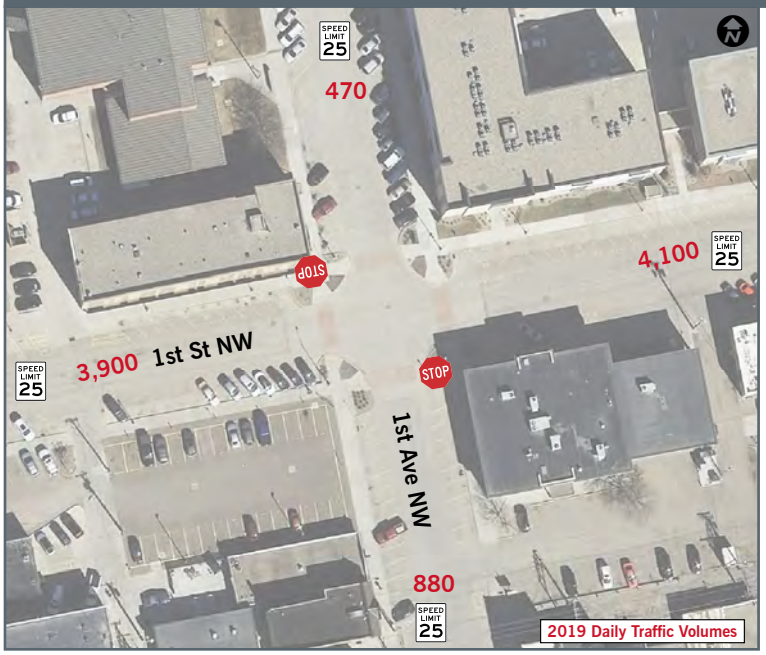
Traffic Operations
Minor approach operations would lower slightly with LOS B expected in the peak hours. While LOS B is considered very efficient, this represents a full LOS grade reduction.

Cost and Impacts
Estimated cost of $50,000 for bulb-outs and some on-street parking would be removed.

Other Notes
Given the moderate traffic volumes on 1st Street NW, crossing should be acceptable. If not, a pedestrian beacon can be added to this design.

Summary: Both a roundabout and TWSC offer superior traffic conditions compared to an AWSC, given the minimal traffic volumes on 2nd Avenue are far from meeting warrants. TWSC is the most cost-effective solution of the two. Ultimately, the decision is dependent on decisions at adjacent locations, if roundabouts are added elsewhere on the corridor consider roundabout control for consistency, otherwise consider northbound/southbound stop control.

1st Avenue NW and 1st Street NW
Mandan

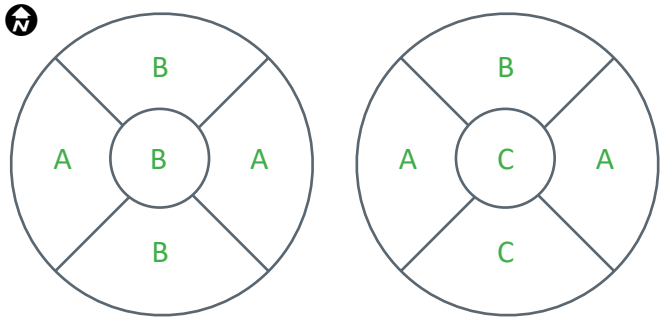


1st Street NW and 1st Avenue NW is a two-way stop controlled (TWSC) intsersection in downtown Mandan. Apartments are located on the north quadrants, with downtown businesses on the south quadrants. Further north of the intersection is primarily single family residential, with downtown Mandan to the south.

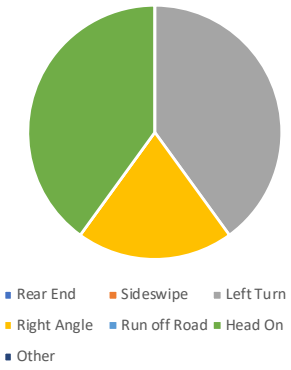
Angle parking is provided on each side of the street on all intersection approaches, which has resulted in comments related to poor sight lines. A recent parking study indicates a surplus of parking on 1st Street.

This intersection operates efficiently and does not meet warrants to consider up-regulated traffic control. The intersection does display higher than average crash rates. All five crashes were angle or head-on, which are crash types that are most routinely associated with serious injuries. Sight distance challenges may contribute to poor gap decision making.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



5 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant, colored pavement to mark crosswalk areas, and bump-outs.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

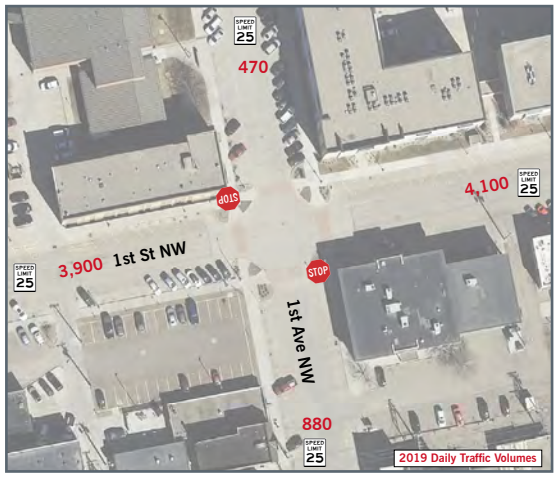
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Remove Parking



Safety
Removing some parking on 1st Street would improve sight lanes for northbound and southbound vehicles, reducing crash potential.

Multimodal Conditions
Improved sight lines reduce potential for vehicle/pedestrian conflicts.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

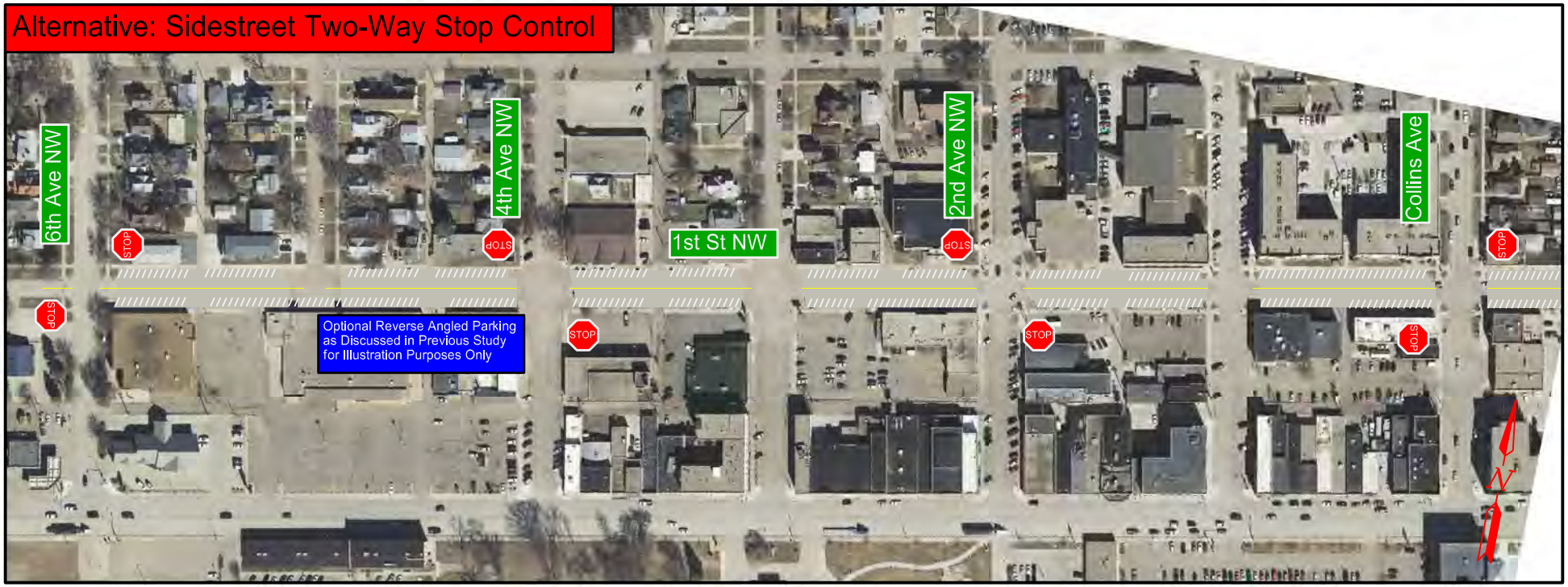
Cost and Impacts
Minimal costs, but would remove some on-street parking spaces.

Other Notes
If this alternative is implemented, parking should be prohibited on 1st Street within 30 feet of the intersection.

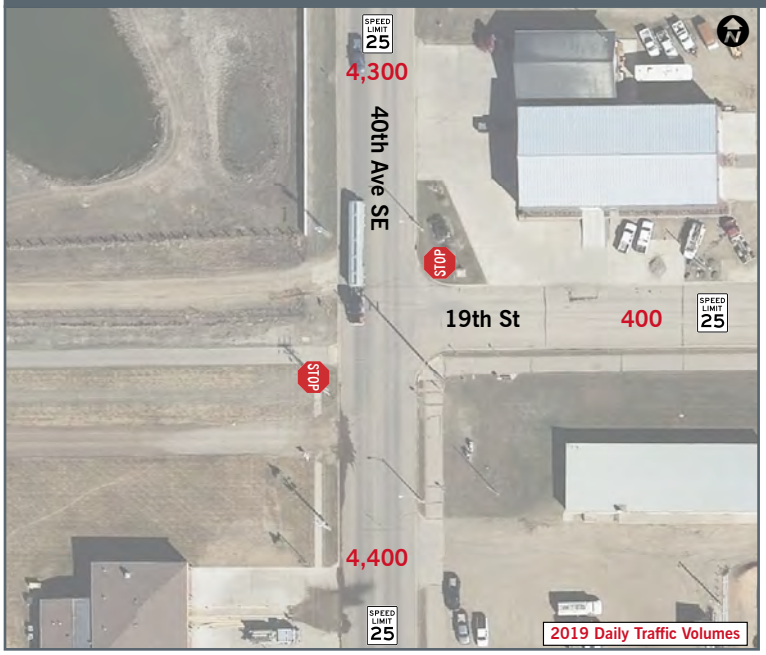
No other alternatives considered at this location.

Summary: Consider prohibiting parking on 1st Street within 30 feet of the intersection. The higher than average crash rate with serious crash types make improving visability a priority. This intersection will be studied further within the context of the 1st Street NW cluster.


1st Street NW - Mandan, ND
Alternative: Mini-Roundabouts
6th Ave NW
4th Ave NW
1st St NW
2nd Ave NW
Collins Ave


Alternative: Sidestreet Two-Way Stop Control
6th Ave NW
4th Ave NW
1st St NW
2nd Ave NW
Collins Ave
STOP
Optional Reverse Angled Parking as Discussed in Previous Study for Illustration Purposes Only

40th Avenue SE and 19th Street
Mandan



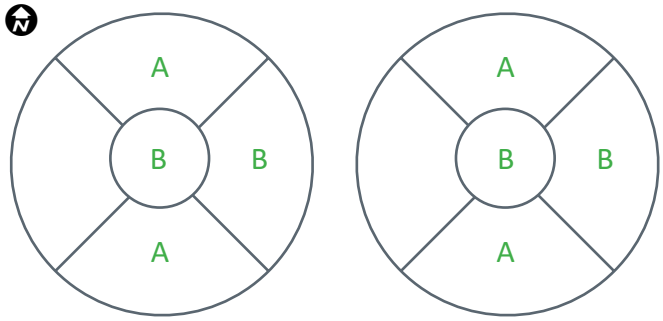
40th Avenue and 19th Street is a two-way stop controlled (TWSC) intersection in south Mandan. The intersection is abutted by light industrial land uses and several apartment buildings. The TWSC intersection operates very effectively with minimal delays and minimal crash history.

A shared-use path crossing located on the south approach of the intersection connects south Mandan to the rest of the City. On-street parking is permitted on each intersection approach. Concerns have been raised related to sightlines when parked vehicles are present.

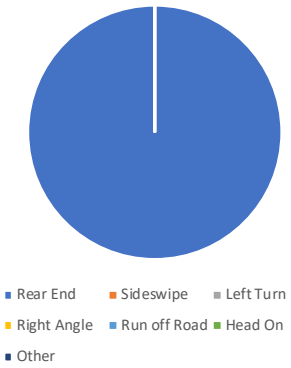
Some concerns related to speeding on 40th Avenue exist, with speed data confirming an 85th percentile speed of 32 mph (7 mph above speed limit).

40th Avenue is one of the highest growth areas in the community, expecting over 100% traffic growth by 2030.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

The Prairie West to Expressway Bike Route passes through the intersection on the south side of 19th Street. There are also sidewalks and a marked crosswalk on the south leg. Bus Route 5 (Brown Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

0/8 Warrant 1: Eight Hour Traffic Volumes
0/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**

0/8 Minimum Traffic Volumes

Alternative 1: Three-Lane Section Bump-Outs and Refuge Island

Safety
Data shows a 20 percent crash reduction after converting a two-lane roadway to a three-lane roadway with a two-way left turn lane. The bump-outs reduce sight distance obstructions from parking.

Multimodal Conditions
The combination of a pedestrian refuge island, two-way left-turn lane, and bump-outs will help constrict traffic speeds and reduce pedestrian exposure. Research shows both bump-outs and refuge islands reduce pedestrian crashes by around 40 percent independently.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative. Along the corridor, traffic operations would improve by preventing left-turning traffic from decelerating in the through lane.

Cost and Impacts
Bump-outs would require minor reconstruction, but the three-lane conversion would not require adjusting curblines. Southbound on-street parking would be removed. Estimated cost of $100,000 per mile for three-lane section, $70,000 for a pedestrian refuge island, and $50,000 for bump-outs.

Other Notes
Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited. The pedestrian refuge island would create better connectivity to the shared use path to the west of this intersection.

Alternative 2: Bump-Out and Refuge Island

Safety
Bump-outs serve as a traffic calming devise and also improve sight-lines, reducing travel speeds and the potential for angle conflicts.

Multimodal Conditions
The combination of a pedestrian refuge island and bump-outs will help constrict traffic speeds and reduce pedestrian exposure. Research shows both bump-outs and refuge islands reduce pedestrian crashes by around 40 percent independently.

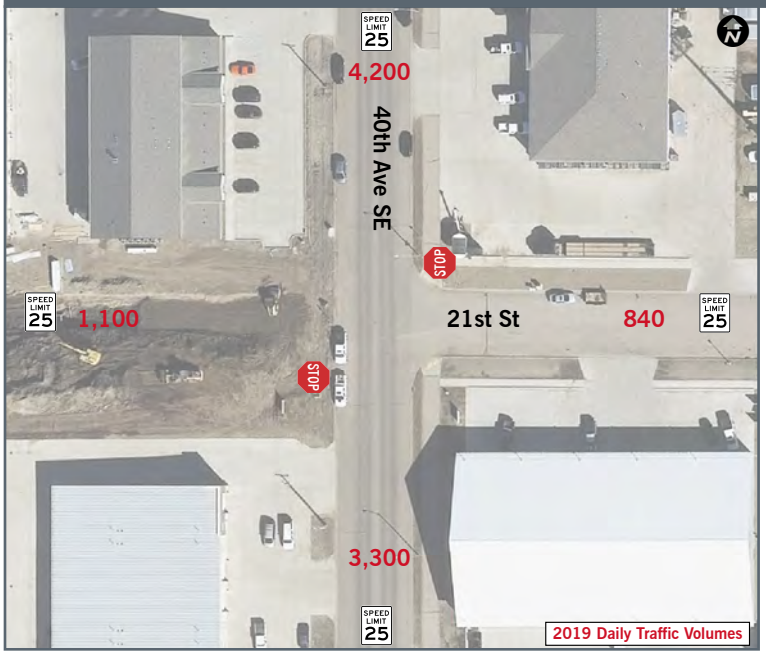
Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction, and the pedestrian refuge island would require some parking removal, signing, and striping. Estimated cost of $70,000 for a pedestrian refuge island, and $100,000 for bump-outs.

Other Notes
Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited. The pedestrian refuge island would create better connectivity to the shared use path to the west of this intersection.

Summary: The bump-outs and the refuge island improve safety for vehicles by reducing traffic speeds and improving sight lines, and for pedestrians by reducing vehicle speeds and crossing exposure. Operations benefit from providing a left-turn lane in the first alternative. Since crash history and level of service don’t indicate an existing issue, maintaining the existing configuration in the short-term with added No Parking signing could be considered. This intersection will be assessed further with the 40th Avenue cluster.

40th Avenue SE and 21st Street
Mandan



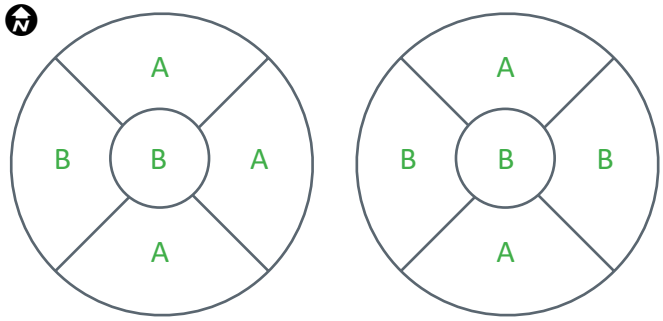
40th Avenue and 21st Street is a two-way stop controlled (TWSC) intersection in south Mandan. This intersection is abutted by light industrial and commercial land uses as well as some apartment buildings. On-street parking is permitted on each intersection approach. Concerns have been raised related to sight lines when parked vehicles are present.

Speeding on 40th Avenue has been a concern, and speed data confirms this, with 85th percentile vehicle speeds 7 mph faster than the posted speed limit. The TWSC intersection operates very effectively with minimal delays and crash history.

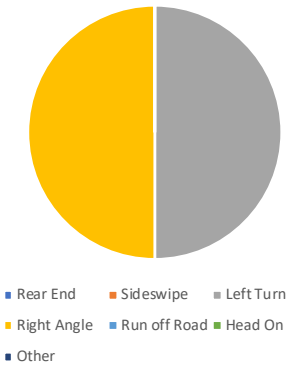
Note that the aerial image to the left is out of date, and the west intersection approach has been constructed.

40th Avenue is one of the highest growth areas in the community, expecting over 100% traffic growth by 2030.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



2 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks everwhere except the west approach and the west side of the south approach. Bus Route 5 (Brown Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Three-Lane Section with Parallel Parking on One Side and Bump-outs

Safety
Data shows a 20 percent crash reduction after converting a two-lane roadway to a three-lane roadway with a two-way left turn lane. The bump-outs reduce sight distance obstructions from parking.

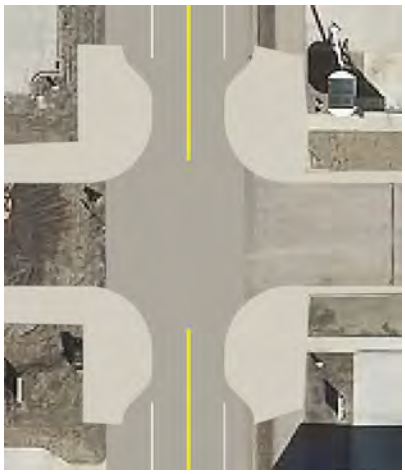
Multimodal Conditions
The three lane section and bump-outs will serve as a traffic calming device and reduce pedestrian crossing distances.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction, however the rest of the three-lane conversion would not require adjusting curblines. Southbounf on-street parking would be removed. Estimated cost of $100,000 per mile for three-lane section and estimated cost of $50,000 for bump-outs.

Other Notes
Drainage impacts must be considered with bump-outs. Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited. A 3-lane section would provide extra capacity, which could be valuable given the development potential to the west.

Alternative 2: Bump-Outs



Safety
Bump-outs serve as a traffic calming devise and also improve sight-lines, reducing travel speeds and the potential for angle conflicts.

Multimodal Conditions
Improved sight lines for pedestrians reduce potential for vehicle/pedestrian conflicts. Research shows an approximate pedestrian crash reduction of 40 percent after installing bump-outs.

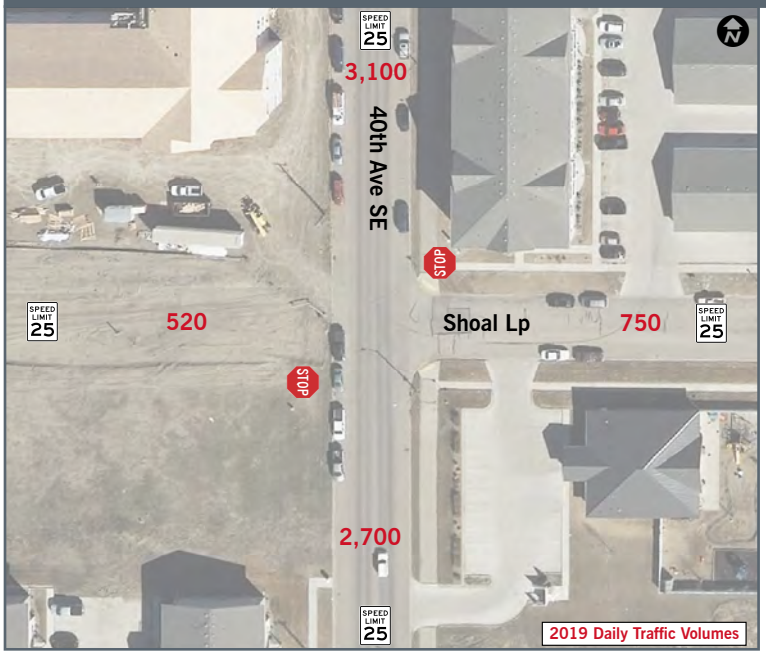
Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction with an estimated cost of $100,000.

Other Notes
Drainage impacts must be considered with bump-outs. Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited.

Summary: In isolation, both the three-lane section and bump-out alternatives appear to provide benefit to future traffic safety and operations as growth continues in the area. The current needs of the intersection and corridor do not demand any immediate improvements. This intersection will be studied further in the 40th Avenue cluster discussion.

40th Avenue SE and Shoal Loop
Mandan



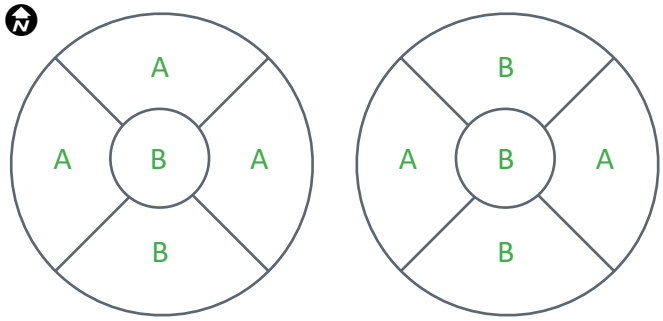
This two-way stop controlled intersection is in southeast Mandan, with surrounding land use being primarily multifamily residential. On-street parking is permitted on all intersection approaches, which has resulted in sight-distance concerns when parked vehicles are near the intersection.

Some concerns related to speeding on 40th Avenue exist, with speed data confirming an 85th percentile speed of 32 mph (7 mph above speed limit). The TWSC intersection operates very effectively with minimal delays and crash history.

Note that the aerial image to the left is out of date, and the west intersection approach has been constructed.

40th Avenue is one of the highest growth areas in the community, expecting over 100% traffic growth by 2030.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017

0 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant except for a 200 foot gap on the west edge of 40th Avenue south of Shoal loop. Bus Route 5 (Brown Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Three-Lane Section with Parallel Parking on One Side

Safety
Data shows a 20 percent crash reduction after converting a two-lane roadway to a three-lane roadway with a two-way left turn lane. The bump-outs reduce sight distance obstructions from parking.

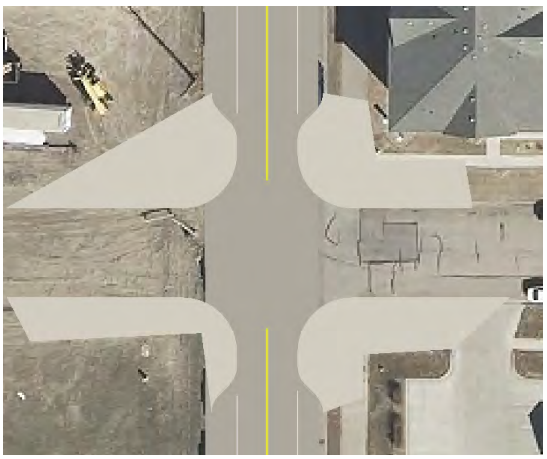
Multimodal Conditions
The three lane section and bump-outs will serve as a traffic calming device and reduce pedestrian crossing distances.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction, however the rest of the three-lane conversion would not require adjusting curblines. Southbound on-street parking would be removed. Estimated cost of $100,000 per mile for three-lane section and estimated cost of $50,000 for bump-outs.

Other Notes
Drainage impacts must be considered with bump-outs. Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited. A 3-lane section would provide extra capacity, which could be valuable given the development potential to the west.

Alternative 2: Bump-Outs



Safety
Bump-outs serve as a traffic calming devise and also improve sight-lines, reducing travel speeds and the potential for angle conflicts.

Multimodal Conditions
Improved sight lines for pedestrians reduce potential for vehicle/pedestrian conflicts. Research shows an approximate pedestrian crash reduction of 40 percent after installing bump-outs.

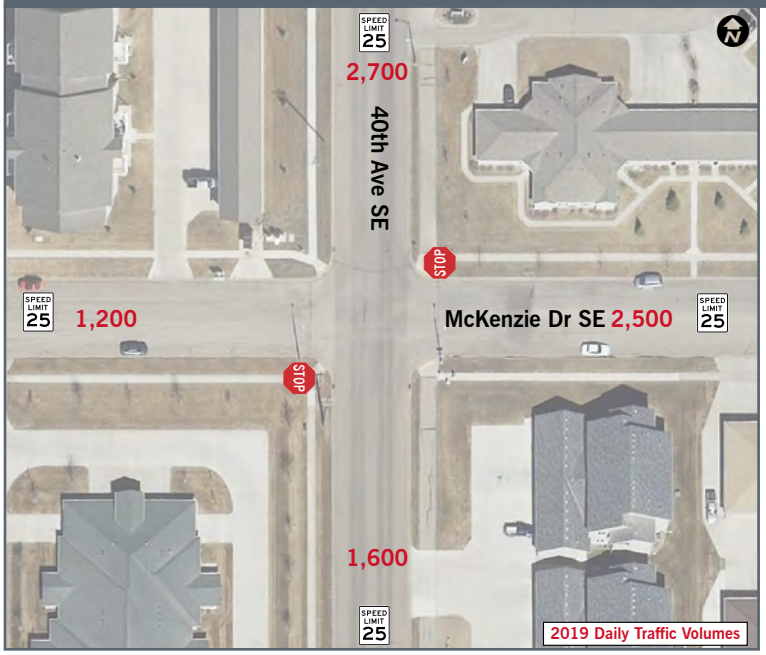
Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction with an estimated cost of $100,000.

Other Notes
Drainage impacts must be considered with bump-outs. Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited.

Summary: In isolation, both the three-lane section and bump-out alternatives appear to provide benefit to future traffic safety and operations as growth continues in the area. The current needs of the intersection and corridor do not demand any immediate improvements. This intersection will be studied further in the 40th Avenue cluster discussion.

40th Avenue SE and Mackenzie Drive SE
Mandan



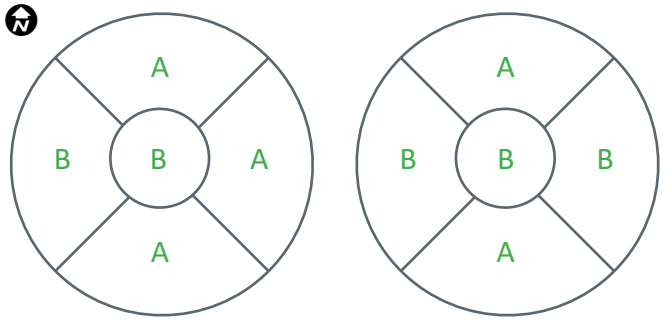
40th Avenue SE and Mackenzie Drive SE is a two-way stop controlled (TWSC) intersection in southeast Mandan, with surrounding land use being primarily multi-family residential. On-street parking is permitted on all intersection approaches, which has resulted in sight-distance concerns when parked vehicles are near the intersection.

Some concerns related to speeding on 40th Avenue exist, with speed data confirming an 85th percentile speed of 32 mph (7 mph above speed limit).

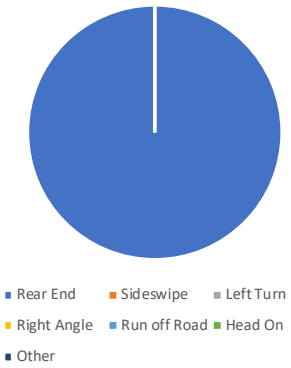
The TWSC intersection operates very effectively with minimal delays and minimal crash history.

40th Avenue is one of the highest growth areas in the community, expecting over 100% traffic growth by 2030.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant. Bus Route 5 (Brown Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Three-Lane Section with Parallel Parking on One Side

Safety
Data shows a 20 percent crash reduction after converting a two-lane roadway to a three-lane roadway with a two-way left turn lane. The bump-outs reduce sight distance obstructions from parking.

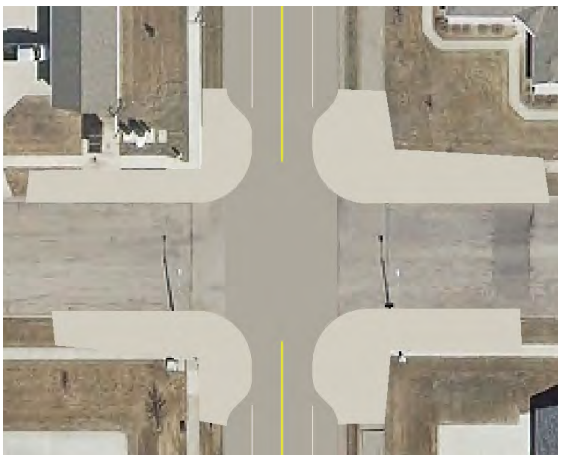
Multimodal Conditions
The three lane section and bump-outs will serve as a traffic calming device and reduce pedestrian crossing distances.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction, however the rest of the three-lane conversion would not require adjusting curblines. Southbound on-street parking would be removed. Estimated cost of $100,000 per mile for three-lane section and estimated cost of $50,000 for bump-outs.

Other Notes
Drainage impacts must be considered with bump-outs. Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited. A 3-lane section would provide extra capacity, which could be valuable given the development potential to the west.

Alternative 2: Bump-Outs



Safety
Bump-outs serve as a traffic calming devise and also improve sight-lines, reducing travel speeds and the potential for angle conflicts.

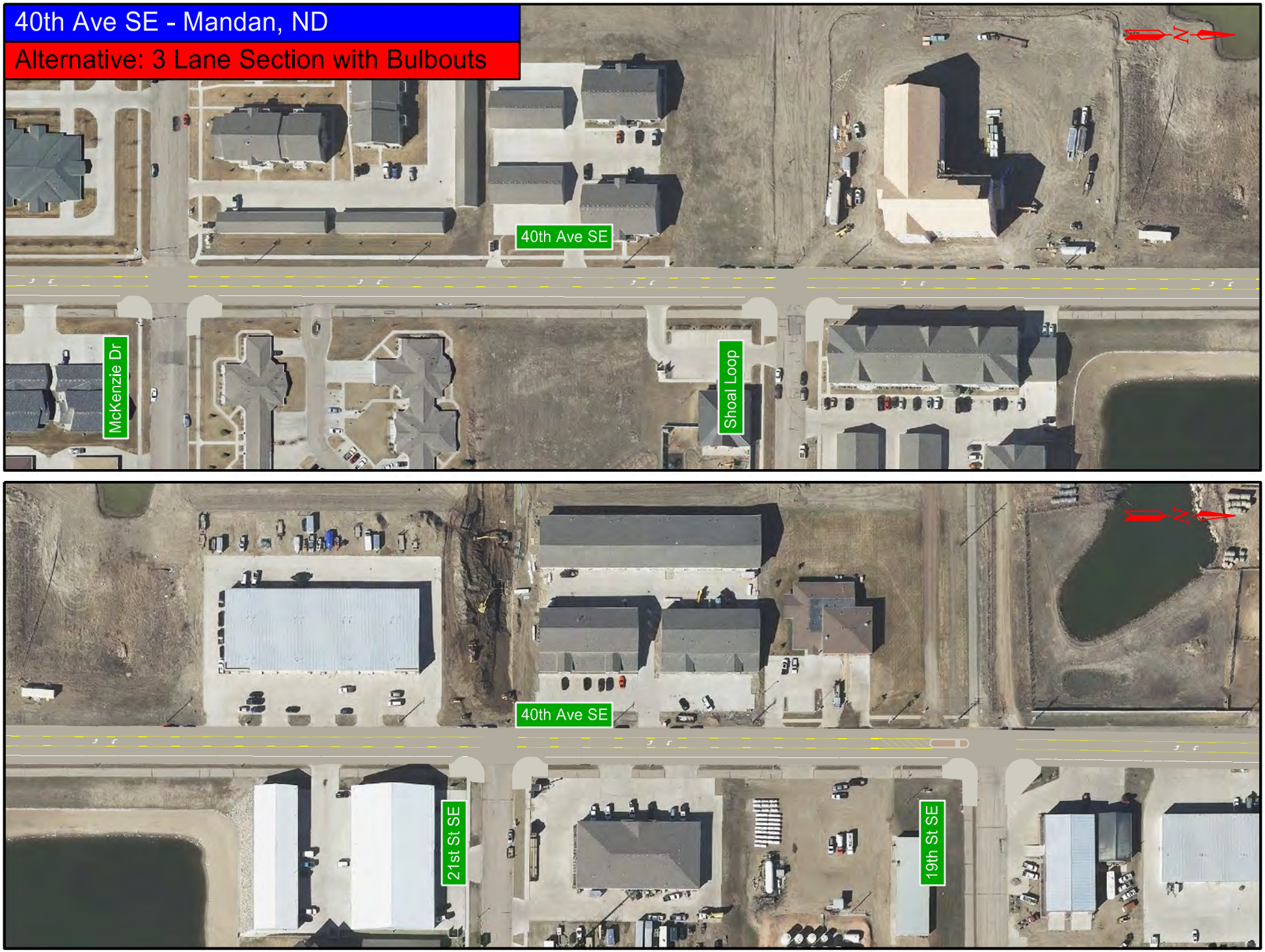
Multimodal Conditions
Improved sight lines for pedestrians reduce potential for vehicle/pedestrian conflicts. Research shows an approximate pedestrian crash reduction of 40 percent after installing bump-outs.

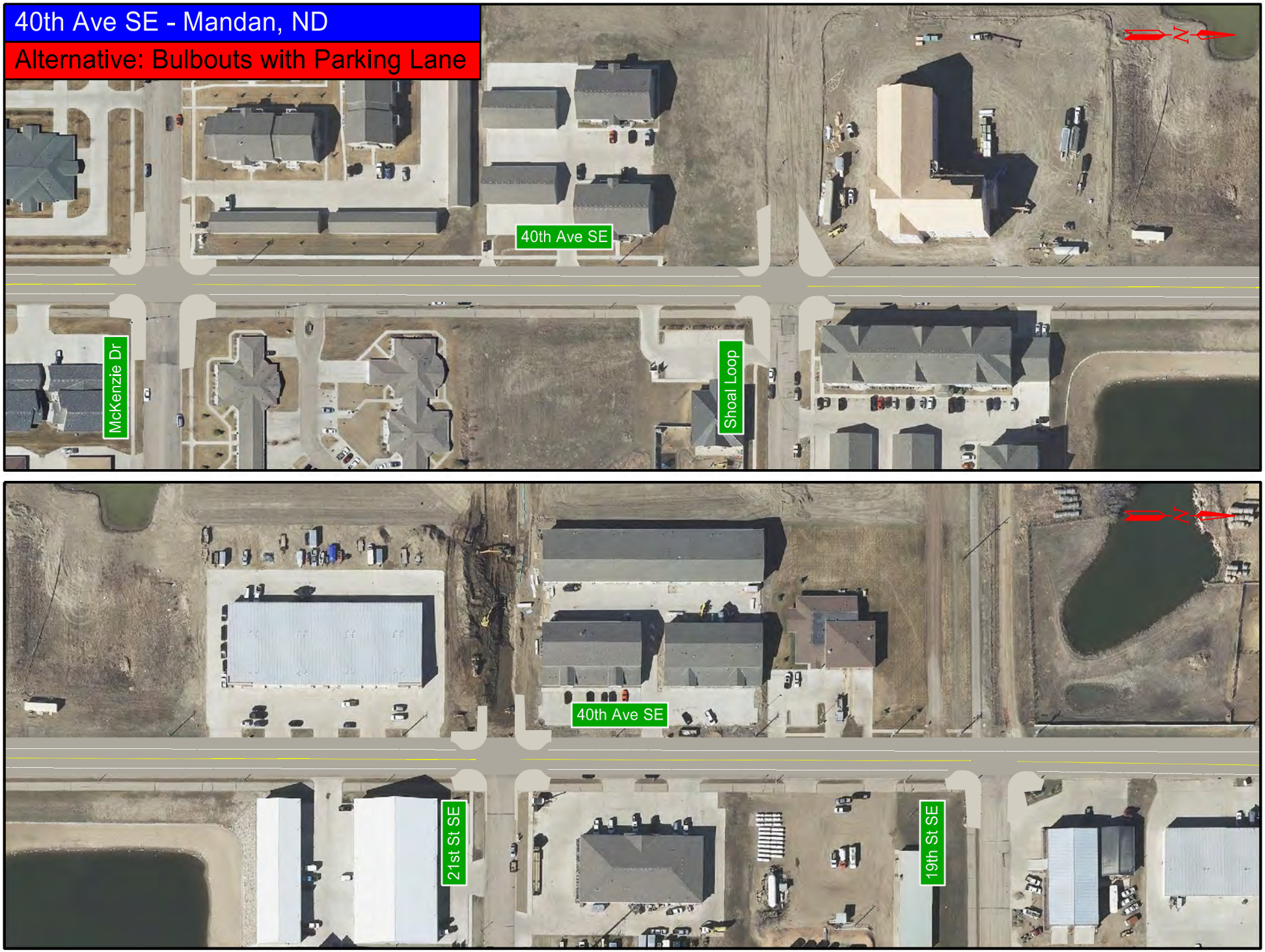
Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Bump-outs would require minor reconstruction with an estimated cost of $100,000.

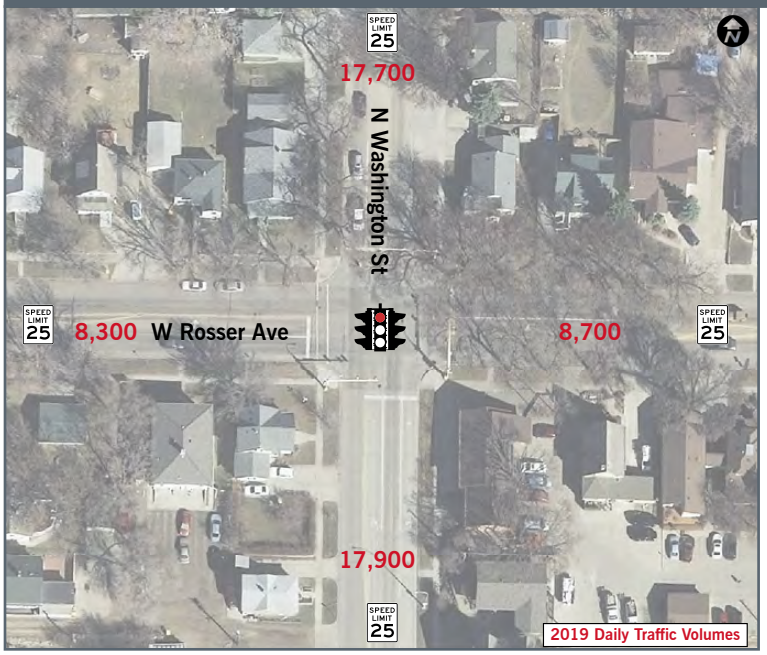
Other Notes
Drainage impacts must be considered with bump-outs. Bump-outs could be replaced by “no parking” signs 30 feet in advance of the intersection if budget is limited.

Summary: In isolation, both the three-lane section and bump-out alternatives appear to provide benefit to future traffic safety and operations as growth continues in the area. The current needs of the intersection and corridor do not demand any immediate improvements. This intersection will be studied further in the 40th Avenue cluster discussion.


40th Ave SE - Mandan, ND
Alternative: 3 Lane Section with Bulbouts
40th Ave SE
McKenzie Dr
Shoal Loop
40th Ave SE
21st St SE
19th St SE


40th Ave SE - Mandan, ND
Alternative: Bulbouts with Parking Lane
40th Ave SE
McKenzie Dr
Shoal Loop
40th Ave SE
21st St SE
19th St SE

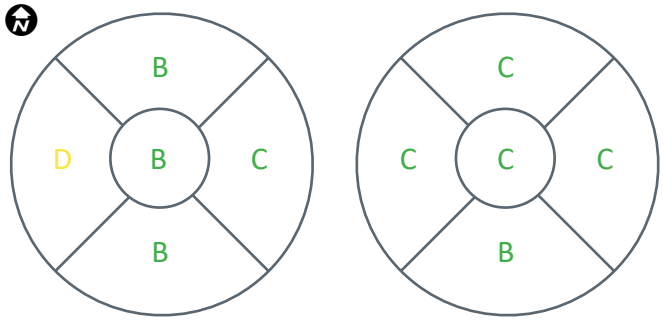
Washington Street and Rosser Avenue
Bismarck



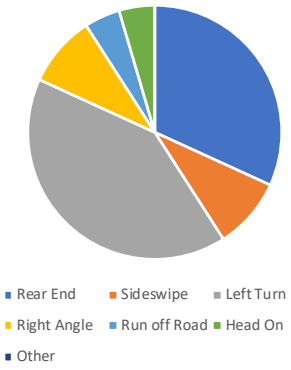
The Washington Street and Rosser Avenue signalized intersection is located just west of downtown Bismarck. This intersection has a noteworthy history of crashes and congestion but not enough in either category to be considered deficient by current standards. The northbound and southbound left-turns received public comments regarding delays and frustration. Left-turn warrant analysis conditions are met to install protected left-turn heads.

The intersection is located near downtown and surrounded directly surrounded by residential land uses. The wide cross sections make pedestrian and bicycle movements difficult. This intersection experienced a bicycle crash during the study period.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



22 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant.

Traffic Control Warrants

☑ **Meets Signal Warrants?**

13/8 Warrant 1: Eight Hour Traffic Volumes
13/4 Warrant 2: Four Hour Traffic Volumes
12/1 Warrant 3: Peak Hour Traffic Volumes

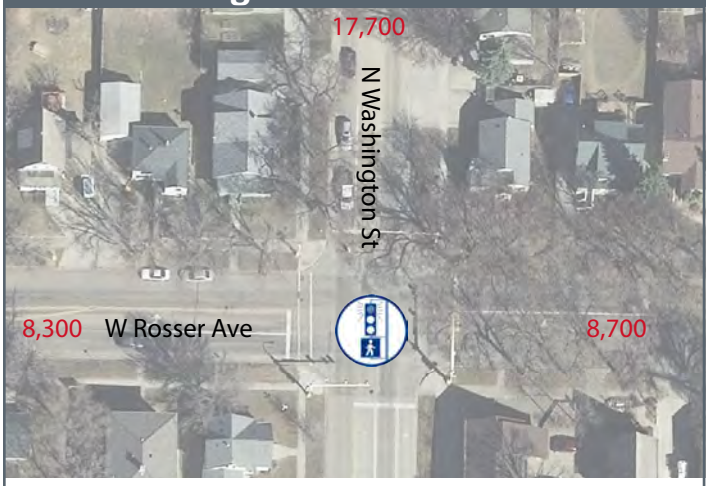
☑ **Meets Warrant for Dedicated Left-Turn Phasing?**

☑ **Meets All-Way Stop Control Warrants?**

16/8 Minimum Traffic Volumes

The NB and SB left-turns warrant a protected-permissive phase. The EB and WB left-turns do not warrant any dedicated left-turn phasing. The signal currently operates with permissive left-turn phases for all approaches

Alternative 1: Leading Pedestrian Interval



Safety
A leading pedestrian interval would have minimal impact on vehicle-to-vehicle crash potential.

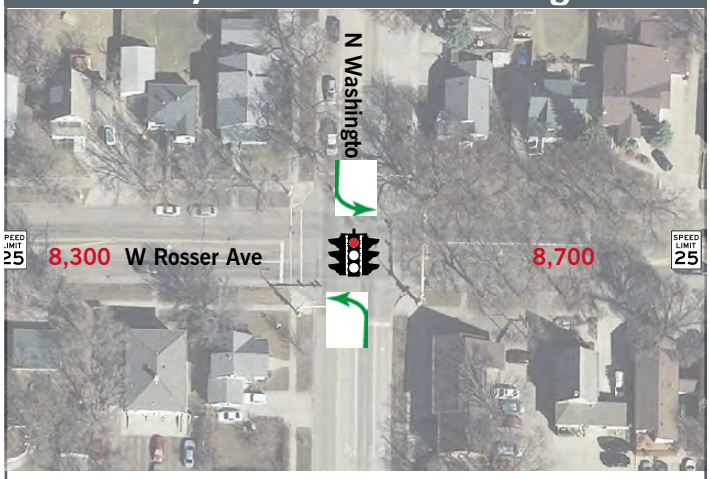
Multimodal Conditions
Research shows a 60 percent reduction in pedestrian-related crashes after implementing a leading pedestrian interval.

Traffic Operations
Peak hour intersection operations may lower to LOS C in the AM peak hour and LOS D in the PM peak hour. These lower service levels reflect what could happen if pedestrian volumes grow large enough to trigger a leading interval every cycle. A more realistic expectation would be somewhere between these results and existing LOS (B/C in the AM/PM).

Cost and Impacts
Estimated cost of retiming signals is $3,000 per intersection.

Other Notes
Limited pedestrian data is available. The traffic signal is currently pretimed, meaning it does not have pedestrian actuation to activate lead pedestrian interval when needed. To minimize operational impacts to traffic, when pedestrians aren't present, pedestrian actuation should be installed. In the short-term, this improvement can be implemented by time of day when pedestrian movements are heaviest. A pedestrian traffic study should be conducted to verify the most appropriate times.

Alternative 2: NB/SB Left-Turn Phasing



Safety
Research shows converting to protected/permitted left turn phasing reduces overall crashes on that approach by 7 percent and reduces injury crashes by 35 percent.

Multimodal Conditions
There would be minimal impacts to pedestrian crossing comfort and safety since the permitted portion of the left turn operations would remain.

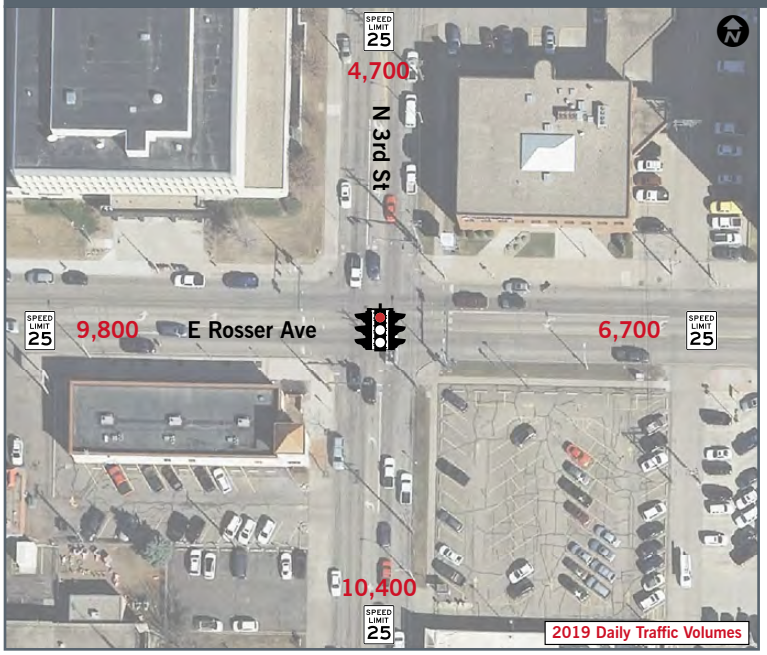
Traffic Operations
The LOS for the NB and SB left-turns improve in the AM peak by one service level. This alternative operates similar to existing conditions in overall LOS but the benefits from the a more balanced delay per vehicle spread out amongst all of the turning movements.

Cost and Impacts
Estimated cost of retiming signals is $3,000 per intersection.

Other Notes
Left-turn phasing warrants are met with current volumes.

Summary: Signal timing and phasing improvements can improve pedestrian safety and signal operations at this intersection. A leading pedestrian interval can improve pedestrian safety and work in combination with similar improvements on Rosser Avenue to the east. Left-turn phasing provides clear and cost-effective safety and congestion relief. Both of these alternatives could be used at this location. Cursory review of the pole locations would indicate that actuation could be achieved with push buttons mounted to the existing signal poles. However, an analysis would need to be completed to understand if the existing coduit has capacity for implementation.

3rd Street and Rosser Avenue
Bismarck

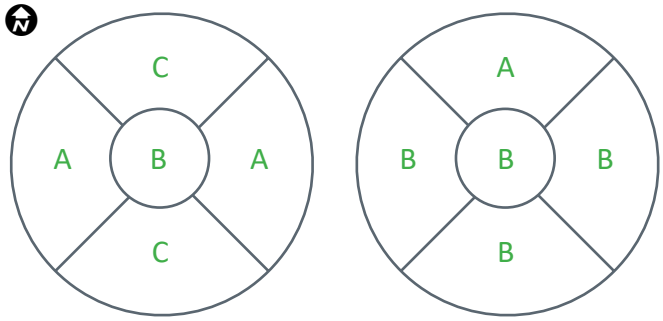


3rd Street and Rosser Avenue is a signalized intersection in downtown Bismarck. On-street parking is currently permitted on all intersection approaches. The William L. Guy Federal Building is located on the northwest intersection quadrant.

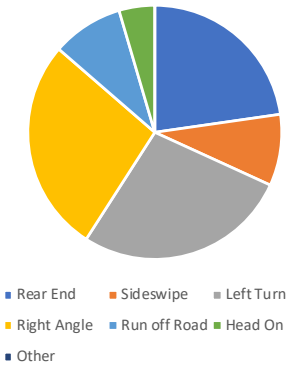
Crash data does not show a crash rate above the critical crash rate, however the intersection does experience a crash rate above the area-wide average. A pedestrian crash was also reported within the study period.

NDDOT warrants for dedicated left turn phasing are not met, however the limited queue storage available in the downtown environment exacerbates corridor progression issues when left turning vehicles have poor gap availability.

Traffic Operations
Level of Service



Crash History
01/01/2010 - 12/31/2019



22 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**
  - 1/8 Warrant 1: Eight Hour Traffic Volumes
  - 7/4 Warrant 2: Four Hour Traffic Volumes
  - 2/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☑ **Meets All-Way Stop Control Warrants?**
  - 12/8Minimum Traffic Volumes

Protected/permissive or protected only left turn phasing is not warranted based on observed traffic volumes.

Alternative 1: Leading Pedestrian Interval and Signal Progression

Safety
A leading pedestrian interval (LPI) has little impact on vehicle-to-vehicle crash potential. Coordinating signals on Rosser Avenue can lessen start and stop operations, reducing rear end crash potential.

Multimodal Conditions
Research shows a 60 percent decrease in pedestrian crashes after implementing a leading pedestrian interval.

Traffic Operations
Minimal change in operations specific to this intersection are expected, but signal coordination can improve progression along the corridor in general.

Operations with and without protected/permitted left turn phasing for eastbound and westbound left turns were studied, but minimal differences were seen in modeling.

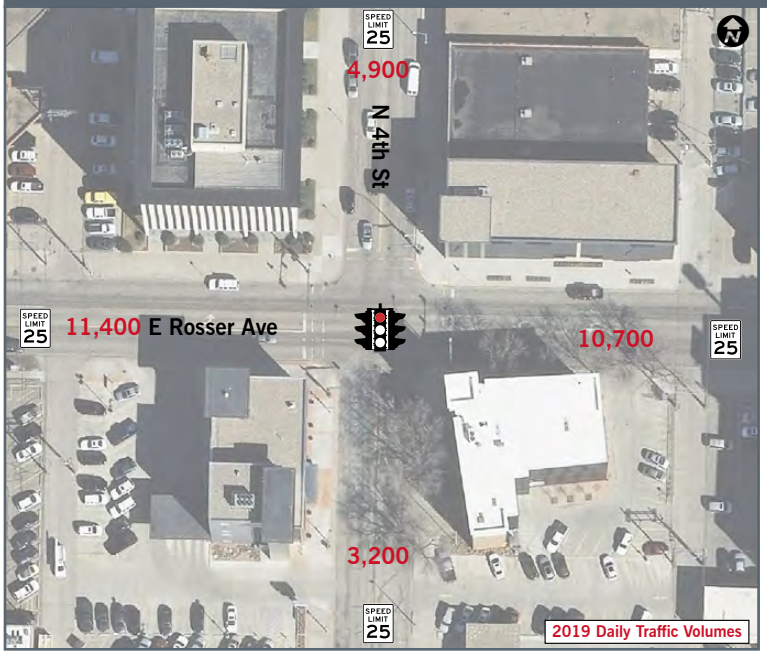
Cost and Impacts
Estimated cost of retiming signals is $3,000 per intersection.

Other Notes
Based on available pedestrian data, an average of 40 pedestrians use the intersection per hour between 8 am and 8 pm. The traffic signal and the Rosser Avenue corridor at-large are currently pretimed, meaning it does not have pedestrian actuation to activate an LPI only when needed. To minimize operational impacts to traffic when pedestrians aren't present, pedestrian actuation could be installed in the future. In the short-term, an LPI can be implemented by time of day when pedestrian movements are heaviest.

No other alternatives were studied at this location.

Summary: Through downtown Bismarck, every Rosser Avenue intersection studied had a pedestrian and/or bicycle crash indicating an institutional pedestrian/bicycle safety issue. In isolation, the leading pedestrian interval has the potential to reduce pedestrian and bicycle safety challenges. Improvement strategies will be discussed further in the cluster analysis summary for Rosser Avenue.

4th Street and Rosser Avenue
Bismarck

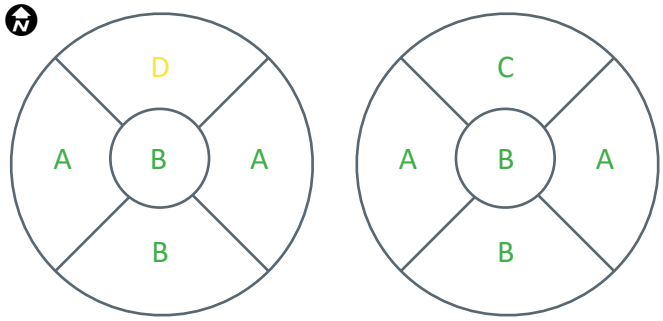


This signalized intersection is in downtown Bismarck. On-street parking is permitted on all intersection approaches.

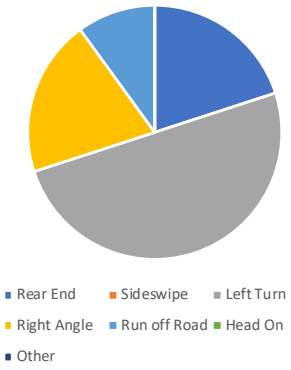
Crash data does not show a crash rate above the critical crash rate, however a left turn crash trend was identified. A bicycle crash was also reported within the study period.

NDDOT warrants for dedicated left turn phasing are not met, however the limited queue storage available in the downtown environment exacerbates corridor progression issues when left turning vehicles have poor gap availability.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



10 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant.

Traffic Control Warrants

☑ **Meets Signal Warrants?**

10/8 Warrant 1: Eight Hour Traffic Volumes
9/4 Warrant 2: Four Hour Traffic Volumes
3/1 Warrant 3: Peak Hour Traffic Volumes

☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

☑ **Meets All-Way Stop Control Warrants?**
13/8 Minimum Traffic Volumes

Protected/permitted or protected only left turn phasing is not warranted at the intersection based on observed traffic volumes.

Alternative 1: Leading Pedestrian Interval and Signal Coordination

Safety
A leading pedestrian interval has little impact on vehicle-to-vehicle crash potential. Coordinating signals on Rosser Avenue can lessen start and stop operations, reducing rear end crash potential.

Multimodal Conditions
Research shows leading pedestrian intervals reduce pedestrian crashes by 60 percent. Note that pedestrian data was not available for this intersection.

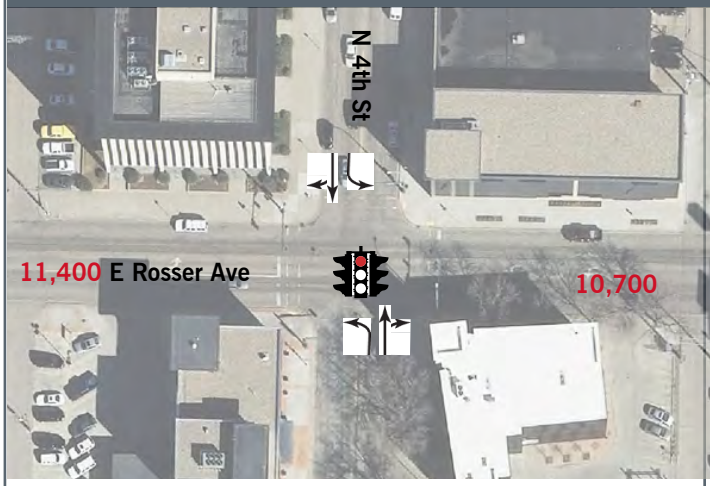
Traffic Operations
Minimal change in operations specific to this intersection are expected, but signal coordination can improve progression along the corridor in general.

Operations with and without protected/permitted left turn phasing for eastbound and westbound left turns were studied, however minimal differences were seen in modeling.

Cost and Impacts
Estimated cost of retiming signals is $3,000 per intersection.

Other Notes
Improvements should be made in combination with other intersections on Rosser Avenue. The traffic signal and the Rosser Avenue corridor at-large are currently pretimed, meaning it does not have pedestrian actuation to activate an LPI only when needed. To minimize operational impacts to traffic when pedestrians aren't present, pedestrian actuation could be installed in the future. In the short-term, an LPI can be implemented by time of day when pedestrian movements are heaviest.

Alternative 2: NB/ SB Left-Turn Lanes



Safety
Adding left turn lanes to a signalized intersection has been found to reduce overall crashes by 20 to 50 percent, and reduce rear-end crashes by around 50 percent.

Multimodal Conditions
The additional turn lanes would be provided by removing parking and would not impact pedestrian exposure.

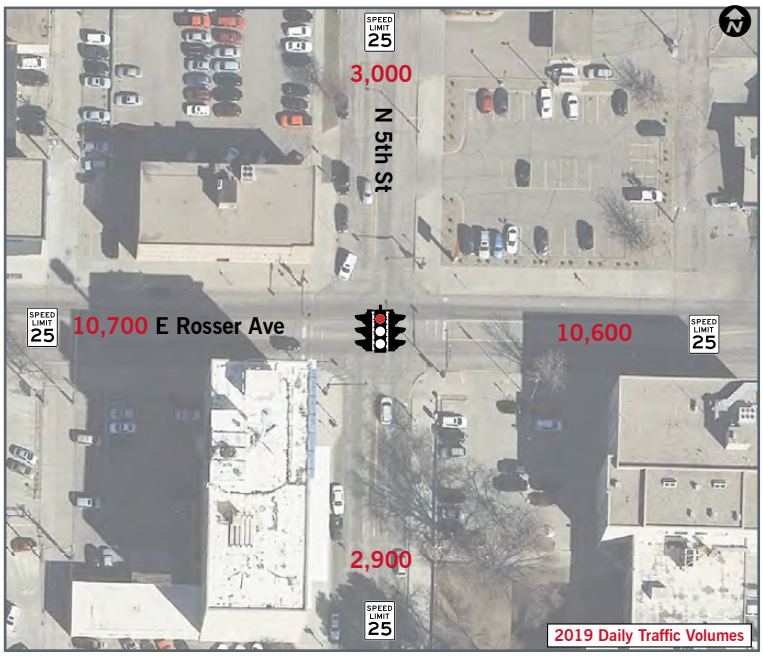
Traffic Operations
This alternative improves the southbound operations from LOS D to LOS C in the AM peak hour and operations remain the same for the PM peak hour. The northbound minor approach operations and overall intersection operations would remain similar to existing conditions.

Cost and Impacts
This alternative is a low cost improvement of approximately $10,000 to $20,000 for pavement marking revisions. Some on-street parking impacts are likely, with the extent varying based on the length of turn lanes. Normal turn-lanes in downtowns are often 80-100 feet in length, corresponding to 4-5 parallel parking stalls.

Other Notes
None

Summary: Through downtown Bismarck, every Rosser Avenue intersection studied had a pedestrian and/or bicycle crash indicating an institutional pedestrian/bicycle safety issue. In isolation, the leading pedestrian interval has the potential to reduce pedestrian and bicycle safety challenges. Improvement strategies will be discussed further in the cluster analysis summary for Rosser Avenue.

5th Street and Rosser Avenue
Bismarck

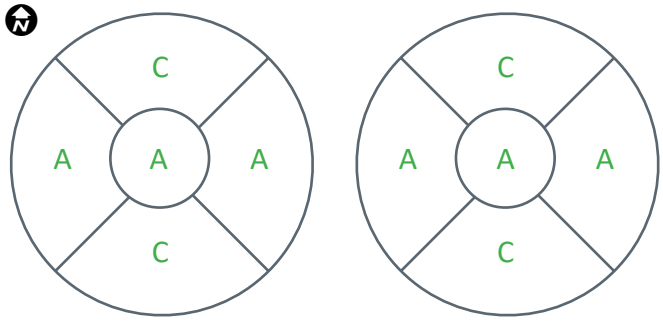


This signalized intersection is in downtown Bismarck. On-street parking is permitted on all intersection approaches.

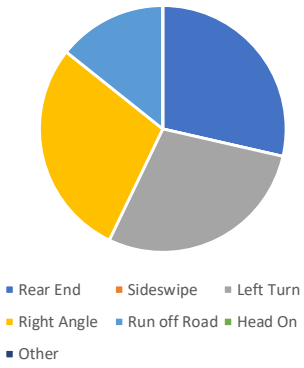
Operations and crash analysis do not reveal significant issues at this intersection, however a pedestrian crash was reported within the study period. There is also a common concern related to poor left turn operations on Rosser Avenue within downtown, resulting in queue spillback and corridor progression issues.

The existing signal is not warranted based on MUTCD guidelines. However, the intersection nearly meets warrants with six hours meeting the eight-hour warrant volume threshold.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



7 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks everywhere and marked crosswalks on the east and west approaches. Bus routes 1 (Black Route) and 4 (Red Route) run through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  6/8 Warrant 1: Eight Hour Traffic Volumes
  2/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☑ **Meets All-Way Stop Control Warrants?**
  8/8 Minimum Traffic Volumes

Existing signal is not warranted based on observed traffic volumes, but all-way stop control is warranted.

Alternative 1: Leading Pedestrian Interval and Signal Progression

Safety
A leading pedestrian interval has little impact on vehicle-to-vehicle crash potential. Coordinating signals on Rosser Avenue can lessen start and stop operations, reducing rear end crash potential.

Multimodal Conditions
Research shows leading pedestrian intervals reduce pedestrian crashes by 60 percent.

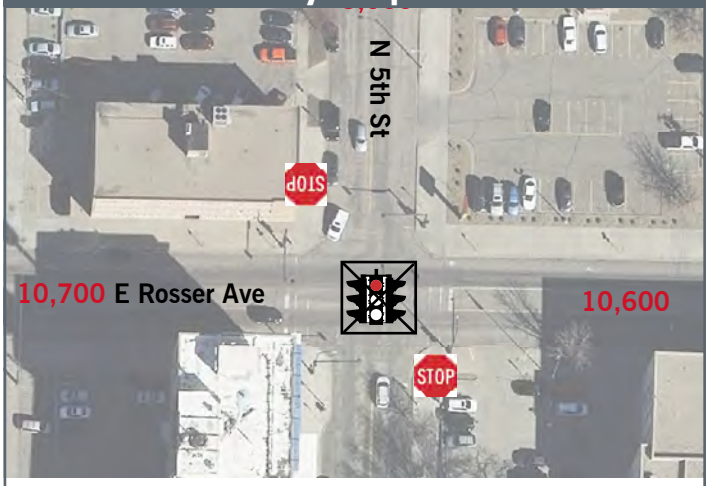
Note that pedestrian data was not available for this intersection.

Traffic Operations
Minimal change in operations specific to this intersection are expected, but coordination can improve progression along the corridor in general.

Cost and Impacts
Estimated cost of retiming signals is $3,000 per intersection.

Other Notes
Signal is not warranted, however six hours meet volume thresholds for the eight hour warrant. The traffic signal and the Rosser Avenue corridor at-large are currently pretimed, meaning it does not have pedestrian actuation to activate an LPI only when needed. To minimize operational impacts to traffic when pedestrians aren't present, pedestrian actuation could be installed in the future. In the short-term, an LPI can be implemented by time of day when pedestrian movements are heaviest.

Alternative 2: Two-Way Stop Control



Safety
Research shows removing unwarranted signals reduces overall crash frequency by 24 percent and injury crashes by 53 percent. Crash reduction could however be diminished by poor peak hour minor approach operations under two-way stop control.

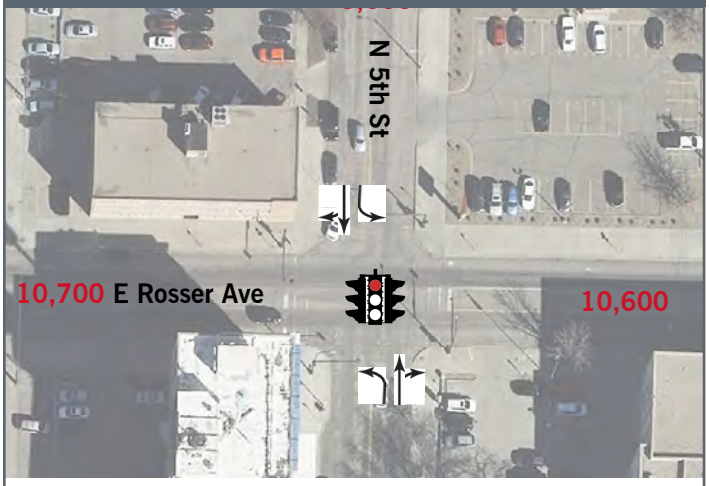
Multimodal Conditions
Removing the signal requires pedestrians crossing Rosser Avenue to wait for acceptable gaps on a high volume road. This alternative would reduce safety and comfort for pedestrians.

Traffic Operations
Minor approach LOS D is expected in the AM peak hour and LOS F is expected in the PM peak hour.

Cost and Impacts
The estimated up-front cost to remove signal is $30,000. There would be an estimated cost savings of $5,000 a year from eliminating signal maintenance requirements.

Other Notes
All-way stop control was studied since volumes meet MUTCD warrant thresholds. Operations with all-way stop control reduced the intersection to LOS C in the AM peak and LOS E in the PM peak. Poor peak hour operations, unbalanced approach volumes, and impacts to corridor progression all result in all-way stop control not being recommended for consideration.

Alternative 3: NB/ SB Left-Turn Lanes



Safety
Adding left turn lanes to a signalized intersection has been found to reduce overall crashes by 20 to 50 percent, and reduce rear-end crashes by around 50 percent.

Multimodal Conditions
The additional turn lanes would be provided by removing parking and would not impact pedestrian exposure.

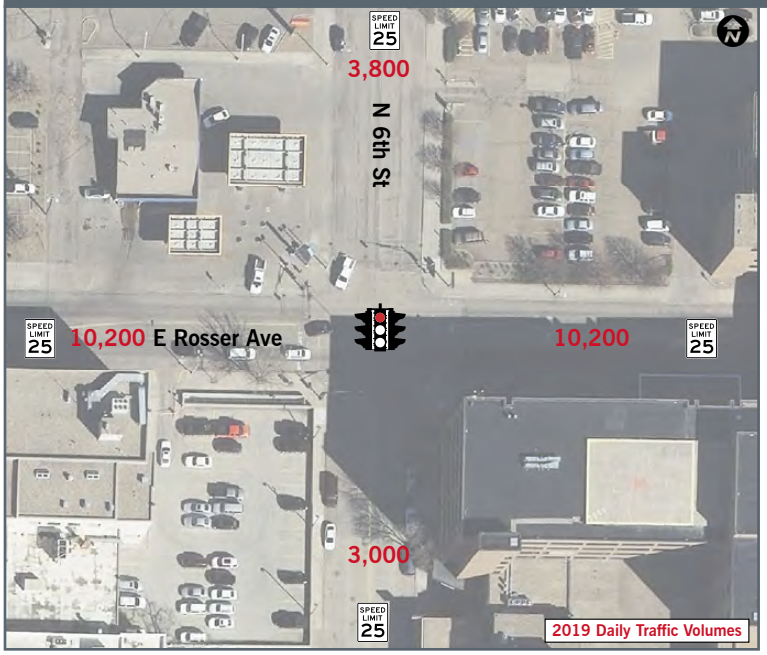
Traffic Operations
This alternative does not change operations in the AM peak hour, but improves northbound and southbound approach operations from LOS C to LOS B in the PM peak hour. Overall intersection LOS would remain similar to existing conditions.

Cost and Impacts
This alternative is a low cost improvement of approximately $10,000 to $20,000 for pavement marking revisions. Some on-street parking impacts are likely, with the extent varying based on the length of turn lanes. Normal turn-lanes in downtowns are often 80-100 feet in length, corresponding to 4-5 parallel parking stalls.

Other Notes
None

Summary: Through downtown Bismarck, every Rosser Avenue intersection studied had a pedestrian and/or bicycle crash indicating an institutional pedestrian/bicycle safety issue. In isolation, the leading pedestrian interval has the potential to improve pedestrian and bicycle safety. Signal removal would make crossings more challenging, along with other clear deficiencies. Two-way stop control would also cause sight distance concerns because there is no offset from the property line of the downtown buildings. Improvement strategies will be discussed further in the Rosser Avenue cluster analysis summary.

6th Street and Rosser Avenue
Bismarck

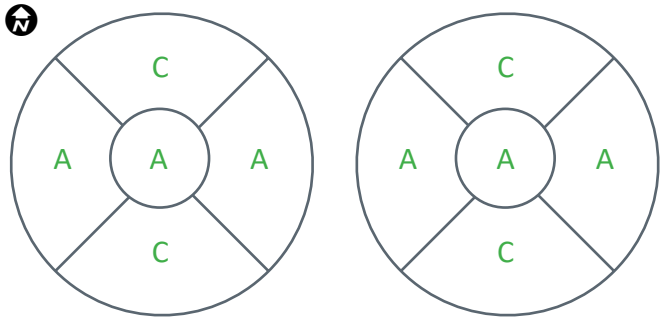


This signalized intersection is in downtown Bismarck. On-street parking is permitted on all intersection approaches.

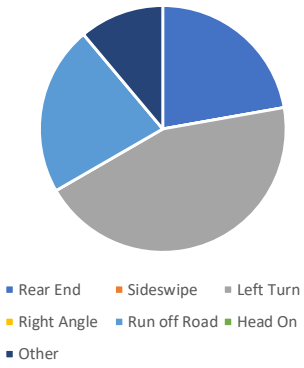
Operations and crash analysis do not reveal significant issues at this intersection, however a pedestrian crash was reported within the study period. There is also a common concern related to poor left turn operations on Rosser Avenue downtown, resulting in queue spillback and corridor progression issues.

The existing signal is not warranted based on MUTCD guidelines, however it is close, with three hours meeting the four-hour warrant volume threshold.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



9 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks and marked crosswalks on each approach. Bus route 4 (Red Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  5/8 Warrant 1: Eight Hour Traffic Volumes
  3/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☑ **Meets All-Way Stop Control Warrants?**

  11/8 Minimum Traffic Volumes

Existing signal is not warranted based on observed traffic volumes, but all-way stop control is warranted.

Alternative 1: Leading Pedestrian Interval and Signal Progression

Safety
A leading pedestrian interval has little impact on vehicle-to-vehicle crash potential. Coordinating signals on Rosser Avenue can lessen start and stop operations, reducing rear end crash potential.

Multimodal Conditions
Research shows leading pedestrian intervals reduce pedestrian crashes by 60 percent.

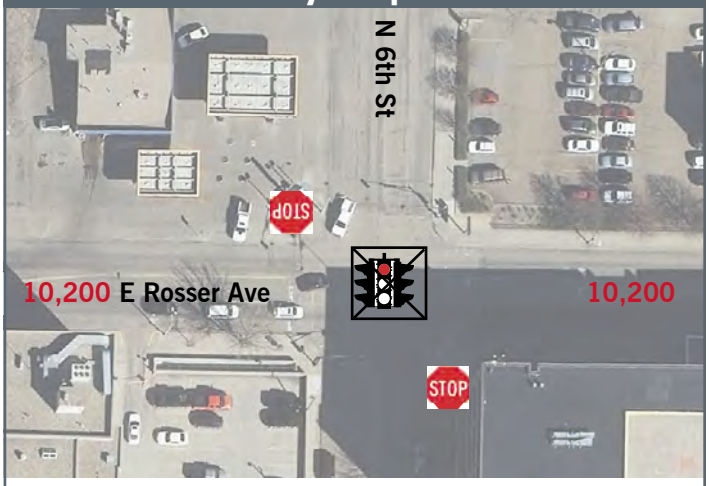
Note that pedestrian data was not available for this intersection.

Traffic Operations
The overall LOS decreases from LOS A to LOS B in both peak hours, however overall corridor progression is improved.

Cost and Impacts
Estimated cost of retiming signals is $3,000 per intersection.

Other Notes
The existing signal is not warranted. The traffic signal is currently pretimed, meaning it does not have pedestrian actuation to activate lead pedestrian interval when needed. To minimize operational impacts to traffic, when pedestrians aren't present, pedestrian actuation should be installed. In the short-term, this improvement can be implemented by time of day when pedestrian movements are heaviest. A pedestrian traffic study should be conducted to verify the most appropriate times.

Alternative 2: Two-Way Stop Control



Safety
Research shows removing unwarranted signals reduces overall crash frequency by 24 percent and injury crashes by 53 percent. Crash reduction could however be diminished by poor peak hour minor approach operations under two-way stop control.

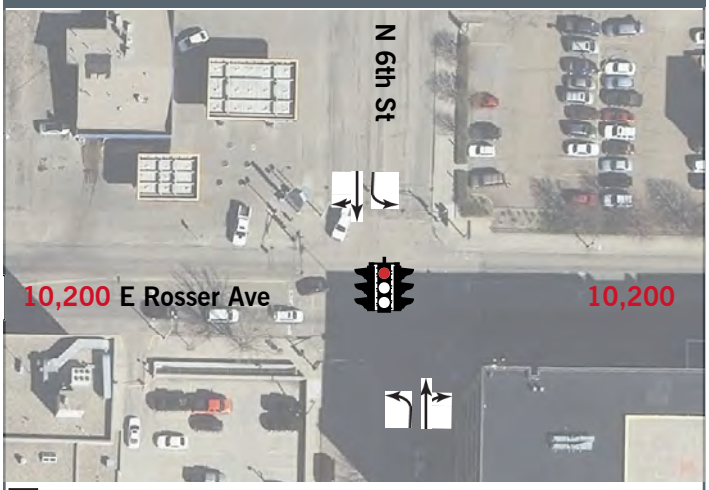
Multimodal Conditions
Removing the signal requires pedestrians crossing Rosser Avenue to wait for acceptable gaps on a high volume road. This alternative would reduce safety and comfort for pedestrians.

Traffic Operations
Minor approach LOS F is expected in both the AM and PM peak hours under two-way stop control.

Cost and Impacts
The estimated up-front cost to remove signal is $30,000. There would be an estimated cost savings of $5,000 a year from eliminating signal maintenance requirements.

Other Notes
All-way stop control was studied since volumes meet MUTCD warrant thresholds. Operations with all-way stop control reduce the intersection to LOS D in the AM peak and LOS F in the PM peak. Poor peak hour operations, unbalanced approach volumes, and impacts to corridor progression all result in all-way stop control not being recommended for consideration.

Alternative 3: NB/ SB Left-Turn Lanes



Safety
Adding left turn lanes to a signalized intersection has been found to reduce overall crashes by 20 to 50 percent, and reduce rear-end crashes by around 50 percent.

Multimodal Conditions
The additional turn lanes would be provided by removing parking and would not impact pedestrian exposure.

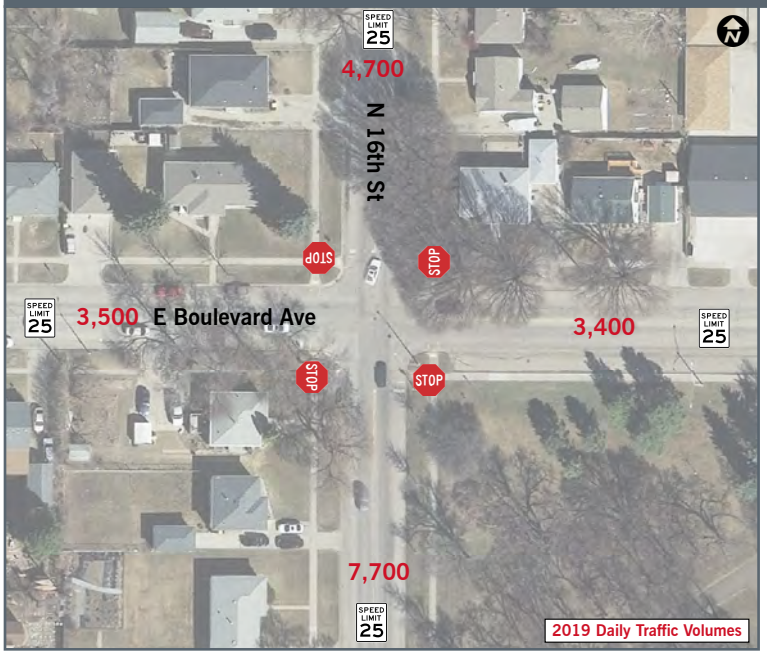
Traffic Operations
This alternative does change operations int the AM peak hour, but improves northbound and southbound approach operations from LOS C to LOS A in the PM peak hour. Overall intersection LOS would remain similar to existing conditions.

Cost and Impacts
This alternative is a low cost improvement of approximately $10,000 to $20,000 for pavement marking revisions. Some on-street parking impacts are likely, with the extent varying based on the length of turn lanes. Normal turn-lanes in downtowns are often 80-100 feet in length, corresponding to 4-5 parallel parking stalls.

Other Notes
None

Summary: Through downtown Bismarck, every Rosser Avenue intersection studied had a pedestrian and/or bicycle crash indicating an institutional pedestrian/bicycle safety issue. In isolation, the leading pedestrian interval has the potential to improve pedestrian and bicycle safety. Signal removal would make crossings more challenging, along with other clear deficiencies. Two-way stop control would also cause sight distance concerns because there is no offset from the property line of the downtown buildings. Improvement strategies will be discussed further in the Rosser Avenue cluster analysis summary.

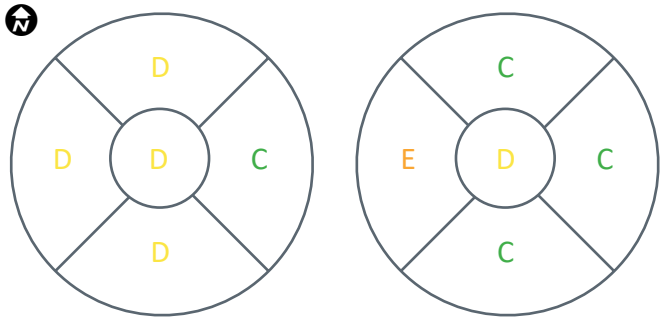
16th Street and Boulevard Avenue
Bismarck



16th Street and Boulevard Avenue is an all-way stop controlled intersection near Lion's Park in east Bismarck. Aside from the park, the land use around the intersection is primarily residential, and on street parking is allowed in all directions.

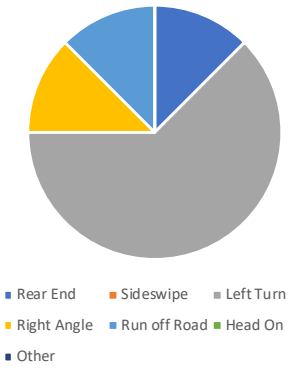
The all-way stop control operates at near deficient capacity levels. The intersection also has a higher than expected crash rate. Angled crashes were the most common crash type which all-way stop control is designed to prevent. This intersection also experienced a bicycle crash during the study period.

Traffic Operations
Level of Service



AM Peak Hour | PM Peak Hour

Crash History
01/01/2013 - 12/31/2017



8 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant. Bus Route 4 (Red Route) runs through the intersection. There is a park in the southeast qaudrant of this intersection.

Traffic Control Warrants

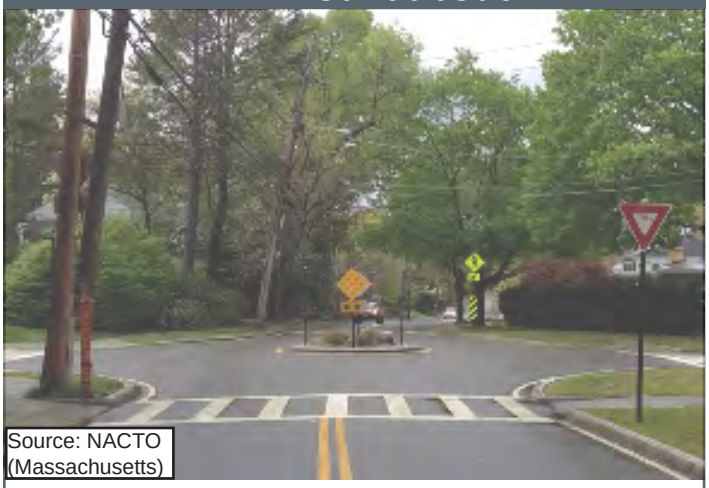
- ☐ **Meets Signal Warrants?**

3/8 Warrant 1: Eight Hour Traffic Volumes
0/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☑ **Meets All-Way Stop Control Warrants?**

9/8 Minimum Traffic Volumes

Alternative 1: Mini-Roundabout



Source: NACTO (Massachusetts)

Safety
Data shows a 45 reduction in injury crashes after converting all-way stop control to roundabout control.

Multimodal Conditions
This alternative will have minimal impacts to multi-modal operations. Vehicles will still be required to yield to pedestrians similar to existing conitions.

Traffic Operations
This alternative would improve all approaches to operate at LOS A during both peak hours. Trucks and over heavy vehicles would treat this intersection like an all-way stop control, deteriating operations, but only to the point of the current configuration.

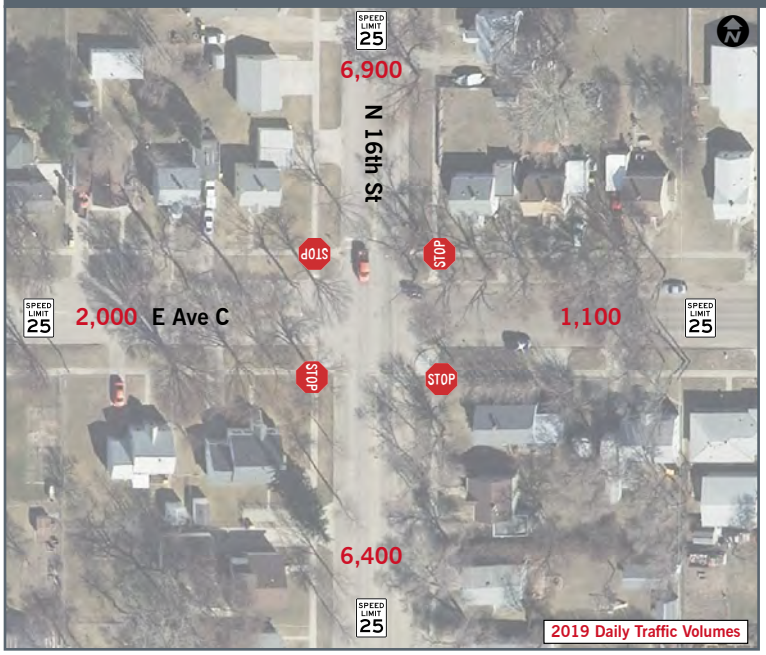
Cost and Impacts
If a mini-roundabout is implemented within the existing roadway footprint, impacts to curblines and adjacent property will be mimimal, with an estimated project cost of $75,000.

Other Notes
None

No other alternatives were considered at this location.

Summary: This intersection will be studied further as part of the 16th Street cluster. In isolation, the mini-round-about appears to provide clear operational, safety and potentially multimodal benefits compared to the current all-way stop control configuration.

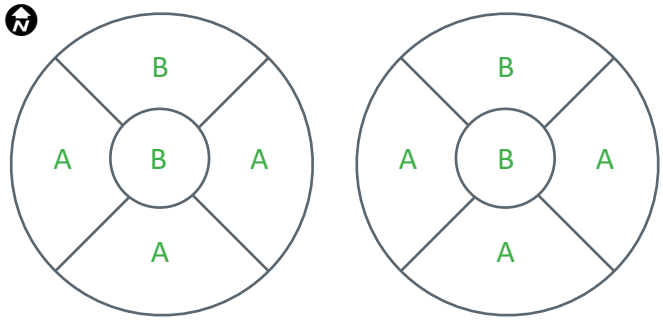
16th Street and E Avenue C
Bismarck



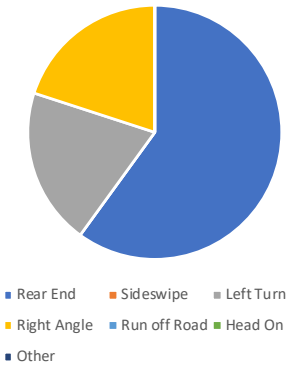
16th Street and E Avenue C is an all-way stop controlled intersection is in a residential neighborhood in east Bismarck. Street parking is allowed in all directions. The intersection operates efficiently, with few crashes or multimodal issues historically.

The traffic control at this intersection is not warranted based on traffic volumes. AWSC is traditionally most effective at intersections with even traffic distributions. Uneven distribution can often breed non-compliance which is a safety concern for vehicles and pedestrians alike. AWSC can also induce a feeling of unnecessary delay which has been proven to increase speeding downstream of an unwarranted AWSC.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



5 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☑ Yes - Rear End
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

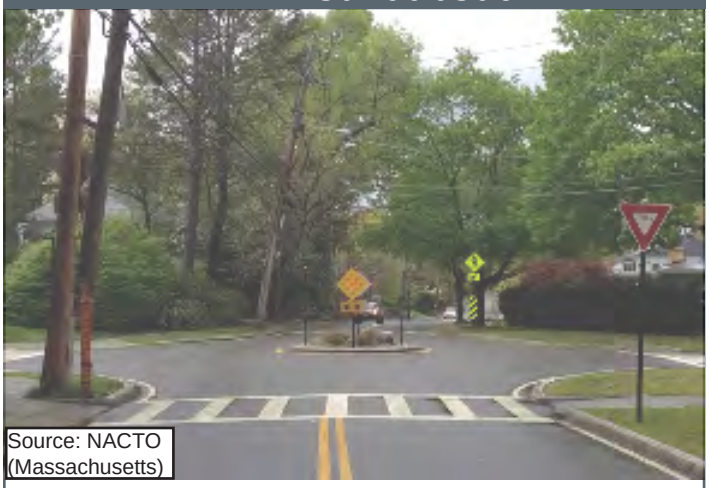
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  1/8 Minimum Traffic Volumes

Alternative 1: Mini-Roundabout



Source: NACTO (Massachusetts)

Safety
Data shows a 45 reduction in injury crashes after converting all-way stop control to roundabout control.

Multimodal Conditions
This alternative will have minimal impacts to multi-modal operations. Vehicles will still be required to yield to pedestrians similar to existing conitions.

Traffic Operations
This alternative would improve all approaches to operate at LOS A during both peak hours. Trucks and over heavy vehicles would treat this intersection like an all-way stop control, deteriating operations, but only to the point of the current configuration.

Cost and Impacts
If a mini-roundabout is implemented within the existing roadway footprint, impacts to curblines and adjacent property will be mimimal, with an estimated project cost of $75,000.

Other Notes
None

Alternative 2: Two-Way Stop Control + Bump Outs

Safety
The existing all-way stop control configuration is un-warranted, and research shows decreased compliance at unwarranted all-way stop control, which increases crash potential. As such, safety benefits are expected with a conversion to two-way stop control.

Multimodal Conditions
Removing northbound/southbound stop control cre-ates more vehicle/pedestrian conflicts since pedestri-ans crossing 16th Street will have to wait for accept-able gaps. Bump-outs have the potential to mitigate pedestrian crossing concerns by reducing exposure and traffic speeds.

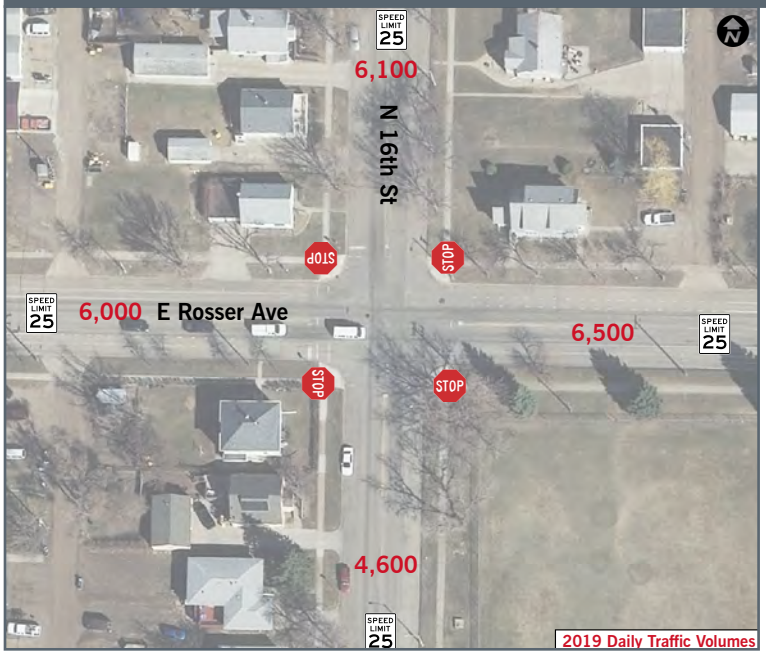
Traffic Operations
This alternative would decrease the eastbound approach to operate at LOS B and the westbound ap-proach to operate at LOS C during both peak hours.

Cost and Impacts
There would be minimal costs for removing stop signs, and an estimated cost of $100,000 for bump-outs.

Other Notes
None

Summary: This intersection will be studied further as part of the 16th Street cluster. In isolation, either the mini-roundabout or two-way stop control may exhibit long-term safety benefits comapred to an unwarranted all-way stop control. Under current conditions, the all-way stop control appears to be operating effectively with few crashes.

16th Street and Rosser Avenue
Bismarck

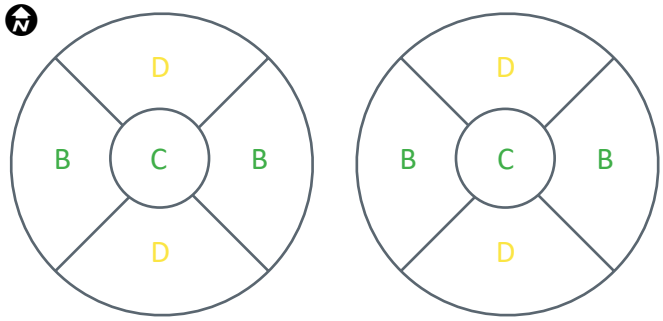


16th Street and Rosser Avenue is an all-way stop controlled intersection near 16th Street Park in east Bismarck. Aside from the park, the land use around the intersection is primarily residential, and on street parking is allowed in all directions.

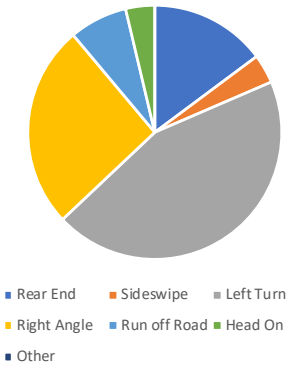
The all-way stop control operates with notable peak hour delays. The intersection also has a higher than expected crash rate. Angled crashes were the most common crash type which all-way stop control is designed to prevent. This intersection also experience a bicycle crash during the study period.

Traffic volumes at the intersection are high enough to warrant a traffic signal.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



27 Total Crashes

Critical Crash Rate?
- [x] Yes
- [ ] No

Above Average Crash Rate?
- [x] Yes
- [ ] No

Repeatable Crash Types?
- [ ] Yes
- [x] No

Multimodal Facilities

- [ ] **Recent Pedestrian Crash?**
- [x] **Recent Bicycle Crash?**
- [ ] **Within 1/4 Mile of School?**
- [x] **Along Transit Route?**
- [ ] **Crossing with 4 of More Lanes?**
- [ ] **Crossing with Speeds Higher than 35 MPH?**
- [x] **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant. There are on-street bike lanes on Rosser Avenue. Bus Route 4 (Red Route) runs through the intersection.

Traffic Control Warrants

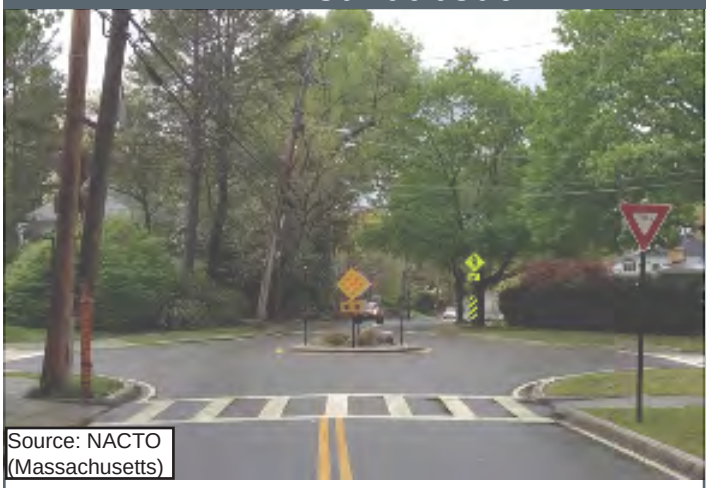
- [x] **Meets Signal Warrants?**

3/8 Warrant 1: Eight Hour Traffic Volumes
4/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

- [ ] **Meets Warrant for Dedicated Left-Turn Phasing?**
- [x] **Meets All-Way Stop Control Warrants?**

12/8 Minimum Traffic Volumes

Alternative 1: Mini-Roundabout



Source: NACTO (Massachusetts)

Safety
Data shows a 45 reduction in injury crashes after converting all-way stop control to roundabout control.

Multimodal Conditions
This alternative will have minimal impacts to multi-modal operations. Vehicles will still be required to yield to pedestrians similar to existing conitions.

Traffic Operations
This alternative would improve all approaches to operate at LOS A during both peak hours except for the southbound approach which would operate at LOS B in both peak hours. Trucks and over heavy vehicles would treat this intersection like an all-way stop control, deteriorating operations, but only to the point of the current configuration.

Cost and Impacts
If a mini-roundabout is implemented within the existing roadway footprint, impacts to curblines and adjacent property will be mimimal, with an estimated project cost of $75,000.

Other Notes
None

Alternative 2: Signal

Safety
Since a signal is warranted and there is safety history concern at this intersection with angle crashes, a signal would be expected to improved overall safety.

Multimodal Conditions
This alternative will have minimal impacts to multi-modal operations. Vehicles will still be required to yield to pedestrians similar to existing conitions.

Traffic Operations
This alternative would improve the northbound and southbound approach from LOS D in both peak hours to LOS C or better. The overall intersection operations improve from LOS C to LOS B in both peak hours as well.

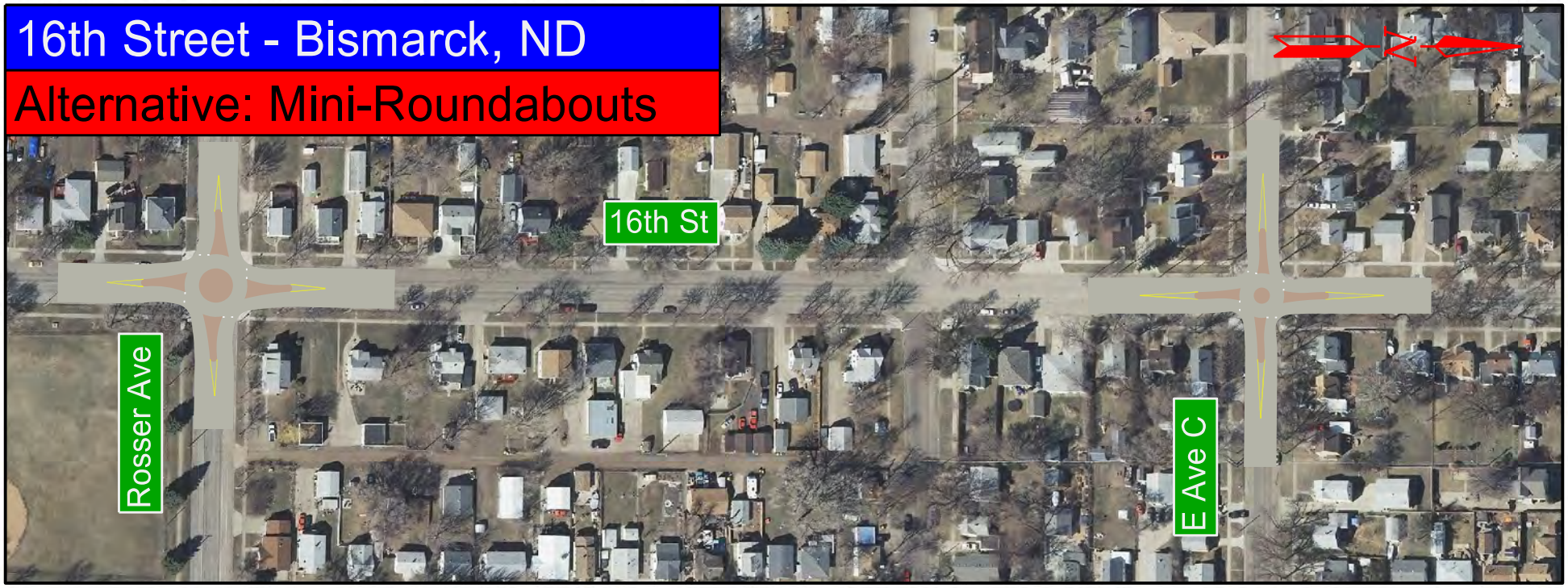
Cost and Impacts
Similar recent signal installations in the area have cost approximately $250,000. Signal maintenace requirements also average around $5,000 per year.

Other Notes
None

Summary: This intersection will be studied further as part of the 16th Street cluster. In isolation, either the mini-roundabout or signal control will operate more efficiently and may exhibit long-term safety benefits comapred to the existing all-way stop control.

16th Street - Bismarck, ND

Alternative: Mini-Roundabouts



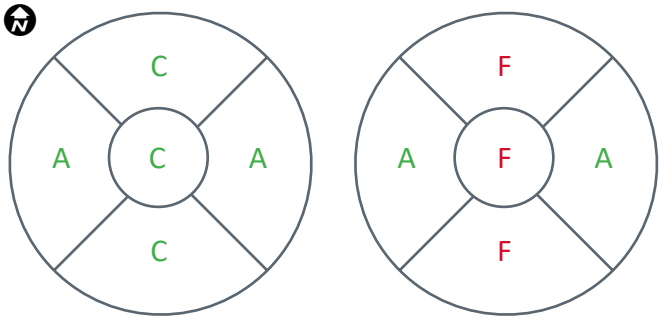
19th Street and 43rd Avenue NE
Bismarck

This two-way stop controlled intersection is in a primary growth area of northeast Bismarck. Adjacent land uses include single family residential and apartments.

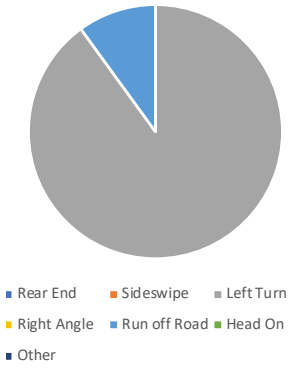
This intersection received over two dozen comments during public engagement, mostly related to poor peak hour operations (especially PM peak hour) and safety issues from poor gap availability. A signal is warranted at this location. Level of service and safety analysis match public concerns, with minor approach LOS F in the PM peak hour and a trend of left turn crashes. In addition to peak hour operations issues, the north and south approaches have poor alignment that may create sight distance issues and lead to driver confusion.

The City of Bismarck is in the process of completing a major 43rd Avenue corridor improvement project, which includes more detailed analysis of this intersection. Alternatives will be studied further through this process.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



14 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Left-Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☑ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There is a sidewalk on the east side of the north approach of the intersection. Bus Route 4 (Red Route) runs through the intersection.

Traffic Control Warrants

☑ **Meets Signal Warrants?**

9/8 Warrant 1: Eight Hour Traffic Volumes
7/4 Warrant 2: Four Hour Traffic Volumes
3/1 Warrant 3: Peak Hour Traffic Volumes

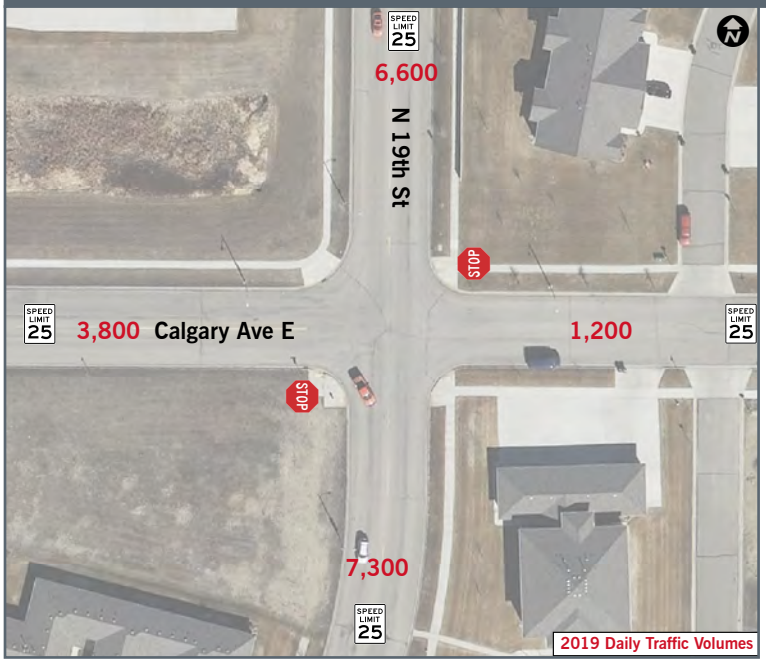
☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

☑ **Meets All-Way Stop Control Warrants?**

11/8 Minimum Traffic Volumes

This intersection meets all-way stop control and traffic signal warrants.

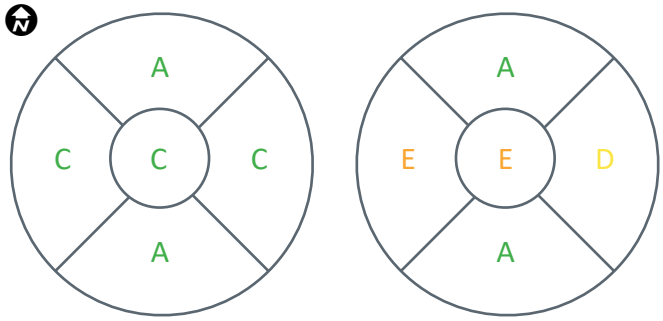
19th Street and Calgary Avenue E
Bismarck



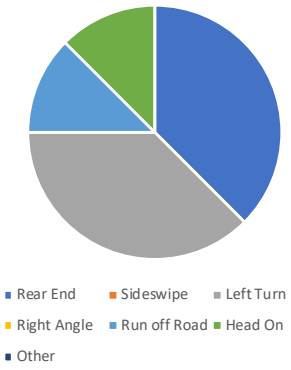
The 19th Street and Calgary Avenue intersection is a two-way stop controlled intersection located in northeast Bismarck. This intersection is surrounded by single family residential land uses. With recent development, sidewalks have been constructed on all quadrants of this intersection.

This intersection operates deficiently as a two-way stop controlled intersection during PM peak hour conditions, despite not warranting a traffic signal or all-way stop control. This intersection also experiences a higher than average crash rate with frequent angle and rear-end crash types coming from every direction.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



8 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on all approaches. Bus Route 4 (Red Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  2/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1:
Add Two-Way Left Turn Lane on 19th Street

Safety
Research shows a 20 percent reduction in total crashes after adding a two-way left turn lane to a two lane roadway.

Multimodal Conditions
Revising pavement markings provides an option to add bike lanes to 19th Street.

Traffic Operations *Vissim*
There would be minimal change in traffic operations, with no level of service changes expected in the AM or PM peak hours. Minor approach LOS E would remain in the PM peak hour.

Cost and Impacts
The cost depends on decisions made at other nearby intersections. If northbound and southbound left turn lanes are implemented in isolation here, costs will be low (estimated $15,000).

Other Notes
If a three-lane section is implemented between Shiloh Drive and 43rd Avenue, the estimated cost is $200,000. This can fit within the existing roadway width, but parking would need to be removed from at least one side of 19th Street.

Alternative 2:
Roundabout

Safety
Converting a two-way stop controlled intersection to a roundabout reduces all crashes up to 72 percent and serious injury crashes up to 88 percent.

Multimodal Conditions
Roundabouts reduce vehicle speeds and the splitter islands reduce pedestrian exposure creating safer crossings.

Traffic Operations *Vissim*
This alternative provides intersection operations of LOS A in both the AM and PM peak hours.

Cost and Impacts
The cost depends on decisions made at other nearby intersections. If a roundabout is implemented in isolation here, costs are estimated to be around $700,000.

Other Notes
A mini-roundabout is feasible at this location in the short-term. However, the area shows significant traffic growth in the MTP and a mini-roundabout may not be sufficient for long term conditions. Additionally a mini-roundabout limits U-turn capacity due to geometric constraints. There could be an increase in u-turn movements at this location from potential diverted left-turns at nearby intersections.

Summary: In isolation, a roundabout provides several clear benefits including reduction of prevalent angled crashes and improvement of operations. This intersection will be studied further as part of the 19th Street Cluster analysis.


19th Street - Bismarck, ND
Alternative: 3 Lane Conversion
19th St
Calgary Ave
19th St
Made with Streetmix
19th St
43rd Ave


19th Street - Bismarck, ND
Alternative: Roundabouts
19th St
Calgary Ave
19th St
Made with Streetmix
19th St
43rd Ave

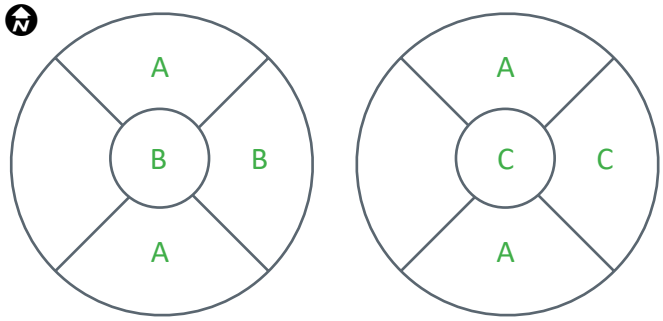
19th Street and Shiloh Drive
Bismarck

This intersection in Bismarck is just north of I-94 and serves as the access to Shiloh Christian School and the Bismarck Parks and Recreation baseball complex. The Basin Electric Access is only 150 feet to the south.

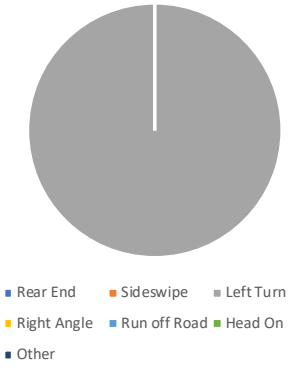
A common concern is that vehicles exiting Shiloh Drive before and after school have difficulties finding acceptable gaps on 19th Street.

Over a dozen public comments were received about this intersection, with the majority of comments related to difficulty turning onto 19th Street.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on both sides of Shiloh Drive and on the east edge of 19th Street. Bus route 10 passes through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

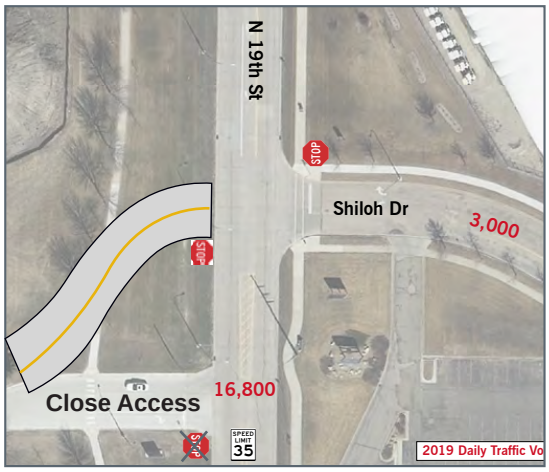
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Create a Single Intersection with Basin Electric Access Realigned



Safety
This alternative adds more conflict points the intersection. Two T intersections have a total of 18 conflict points, where a four-legged intersection has a total of 32 conflict points. Additionally, the existing offset intersection layout does not create overlapping left turns.

Multimodal Conditions
This alternative would have similar multimodal operations compared to exisitng conditions.

Traffic Operations *Vissim*
The westbound Shiloh Drive approach drops to LOS D in the after school peak hour, with the Basin Electric approach operating at LOS F. In the AM peak hour, Shiloh Drive drops to LOS C, with the Basin Electric approach also operating at LOS C.

Signal warrant analysis was performed with assumed volumes after including the Basin Electric approach, but a signal is not expected to be warranted.

Cost and Impacts
Detailed cost estimate was not prepared, however estimated realignment cost is around $200,000.

Other Notes
Analysis is based on assumed volumes for Basin Electric as field-collected data was not available.

Alternative 2: Roundabout with Basin Electric Realignment

Safety
Converting a two-way stop controlled intersection to a roundabout reduces all crashes up to 72 percent and serious injury crashes up to 88 percent.

Multimodal Conditions
Roundabout control slows down entering vehicles, offering benefits to non-motorized roadway users. Splitter islands can also serve as a pedestrian refuge.

Traffic Operations *Vissim*
This alternatives has an intersection LOS A throughout the day, including the after school period.

Cost and Impacts
The cost depends on decisions made at other nearby intersections. If a roundabout is implemented in isolation here, costs are estimated to be around $700,000.

Other Notes
Consideration must be given to decisions at adjacent intersections for design consistency.

Alternative 3: Interstate Avenue Roundabout With Turn Restrictions at Shiloh Drive and Basin Electric

Safety
Restricting minor approach left turn movements at both Shiloh Drive and Basin Electric will reduce left turn/angle crash potential. Left turns from Shiloh Drive would take a right turn then use the roundabout at Interstate Avenue to turn around and travel south. Research shows such a configuration is expected to reduce overall crashes by 20 percent.

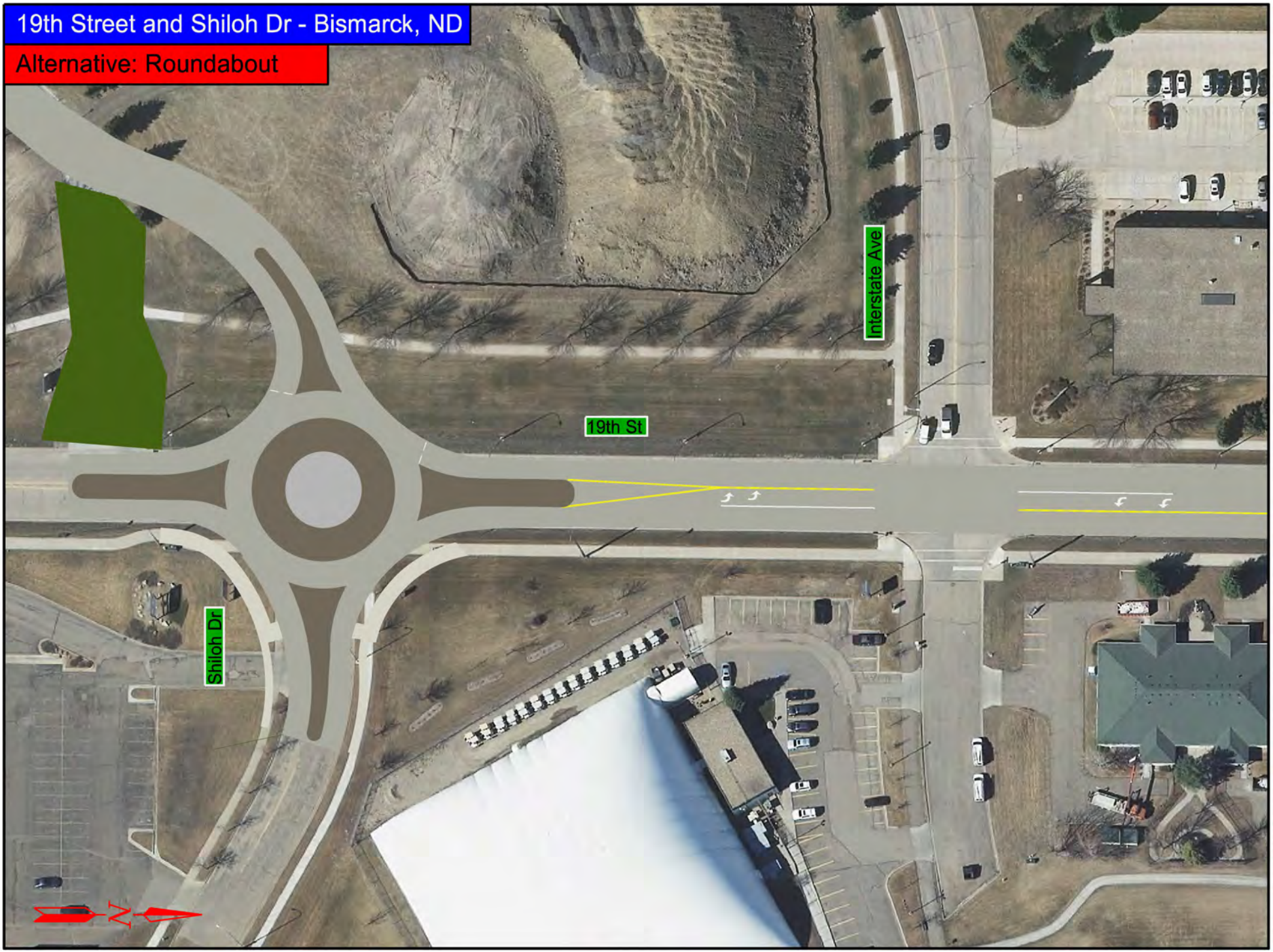
Multimodal Conditions
Median serves a dual-purpose to both restrict minor approach left turns and create a pedestrian refuge for crossing 19th Street.

Traffic Operations *Vissim*
LOS B is expected at Shiloh Drive (including the after school peak). The Basin Electric Access and Interstate Avenue are expected to operate at LOS A with this configuration.

Cost and Impacts
This alternative has an estimated cost of $700,000 for Interstate Avenue Roundabout.

Other Notes
Consideration must be given to decisions at adjacent intersections for design consistency.

Summary: A single lane roundabout at Interstate Ave with left-turn restrictions at Shiloh Dr and Basin Electric provides several clear benefits compared to the current configuration. This alternative improves peak hour operations to and from Shiloh Christian School and Basin Electric. It also reduces angle crashes and the median refuge island improves pedestrian safety.

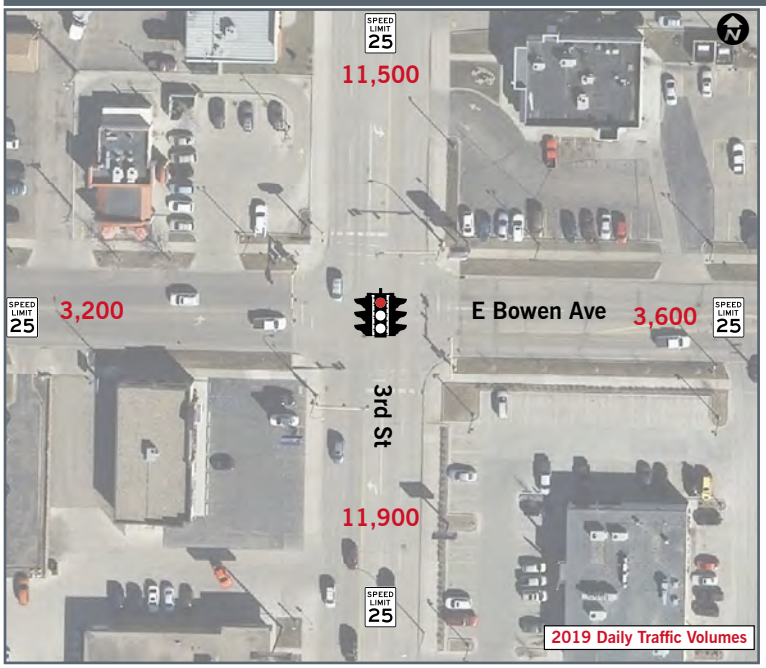

19th Street and Shiloh Dr - Bismarck, ND
Alternative: Roundabout
Interstate Ave
19th St
Shiloh Dr
N


19th Street and Shiloh Dr - Bismarck, ND
Alternative: Turn Restrictions
Interstate Ave
19th St
Shiloh Dr

Appendix C

Alternatives Analysis Worksheets for Individual Intersection Analysis Locations

3rd Street and Bowen Avenue
Bismarck

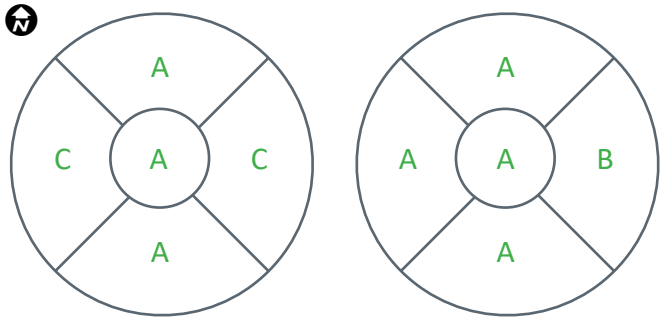


3rd Street and Bowen Avenue is a signalized intersection located between downtown Bismarck and the Kirkwood Mall. Surrounding land use is primarily commercial. This intersection is a key access point to the Bismarck Civic Center.

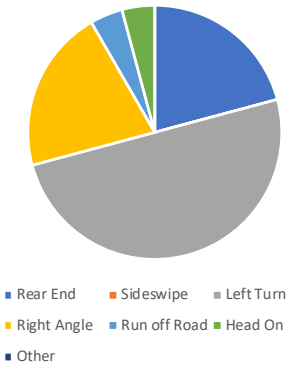
The intersection experiences multiple safety challenges, including a critical crash rate due to the frequency of left-turn crashes at this intersection, primarily in the north-south direction. This intersection also experienced a bicycle crash during the study period.

The intersection does not meet normal traffic signal warrants. However, given the proximity to the Bismarck Civic Center, traffic signal warrants are likely met on event days. The intersection also experiences large numbers of pedestrian crossings across 3rd Street during events to reach food service facilities.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



24 Total Crashes

Critical Crash Rate?
- [x] Yes
- [ ] No

Above Average Crash Rate?
- [x] Yes
- [ ] No

Repeatable Crash Types?
- [x] Yes - Left Turn
- [ ] No

Multimodal Facilities

- [ ] **Recent Pedestrian Crash?**
- [x] **Recent Bicycle Crash?**
- [ ] **Within 1/4 Mile of School?**
- [x] **Along Transit Route?**
- [x] **Crossing with 4 of More Lanes?**
- [ ] **Crossing with Speeds Higher than 35 MPH?**
- [x] **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant. Bus routes 2 (Blue), 3 (Green), and 5 (Brown) run through the intersection.

Traffic Control Warrants

- [ ] **Meets Signal Warrants?**

5/8 Warrant 1: Eight Hour Traffic Volumes
3/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

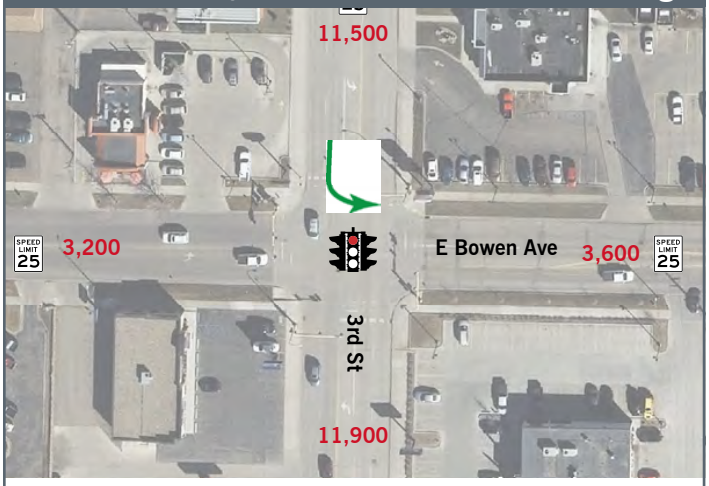
- [x] **Meets Warrant for Dedicated Left-Turn Phasing?**

- [x] **Meets All-Way Stop Control Warrants?**

9/8 Minimum Traffic Volumes

While daily volumes do not warrant a traffic signal, PM peak hour volumes do warrant southbound protected/permitted left turn phasing.

Alternative 1:
SB Protected/Permitted Left-Turn Phasing



Safety
Research shows that converting an approach to protected/permitted left turn phasing reduces overall crashes by seven percent and injury crashes by 35 percent.

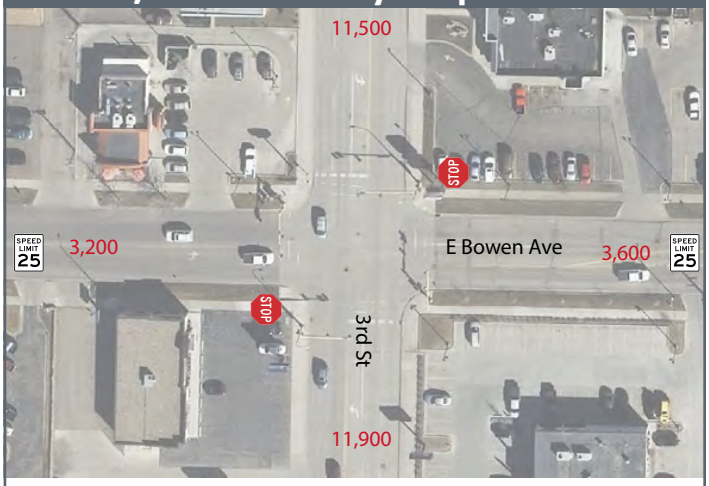
Multimodal Conditions
Minimal impacts to pedestrian crossing comfort and safety since permitted portion of southbound left turn operations would remain.

Traffic Operations
Improves AM peak hour intersection operations to intersection LOS B from LOS C. After cycle length optimization with the new phase, the increased cycle length lowers PM peak hour operations from intersection LOS A to LOS B.

Cost and Impacts
No roadway or property impacts. Project cost is dependent on need to replace signal equipment, with estimated costs ranging from $10,000 to $150,000.

Other Notes
Existing signal is not warranted, however three hours meet volume thresholds for the four hour warrant (Warrant 2). SB protected/permitted left turn phasing is however warranted based on PM peak hour volumes.

Alternative 2:
EB/WB Two-Way Stop Control



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal. Note that crash benefits could be reduced as a result of poor peak hour operations.

Multimodal Conditions
Removing signal control will make crossing 3rd Street more difficult for pedestrians.

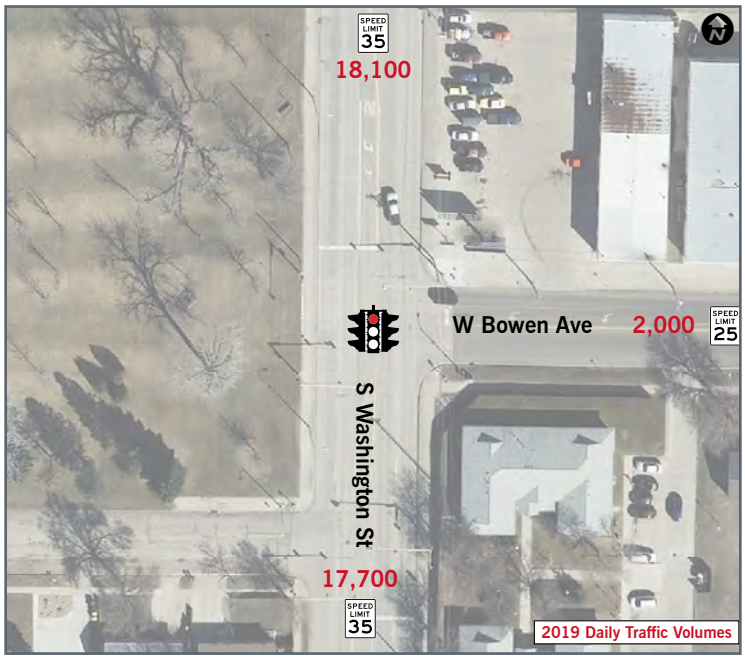
Traffic Operations
Minor approach LOS D is expected during the AM peak hour and minor approach LOS F is expected during the PM peak hour.

Cost and Impacts
Approximately $30,000 up front cost to remove signal, but with an estimated $5,000 a year cost savings from eliminating signal maintenance requirements.

Other Notes
Crossing safety for pedestrians could be improved with pedestrian beacons. However, beacons are typically implemented mid-block, which does not align with current pedestrian travel patterns.

Summary: The traffic signal at this location does not meet current traffic signal warrants under normal traffic conditions, but likely meets warrants during events at the Bismarck Civic Center. Existing pedestrian safety issues in combination with heavy traffic during events likely justifies retention of the traffic signal. If the signal is retained, the addition of southbound left-turn phasing should be considered. Flashing yellow arrow can be provided on both approaches to allow for future northbound left-turn phasing to be added when it becomes warranted or as engineering judgement dictates.

Washington Street and Bowen Avenue North
Bismarck

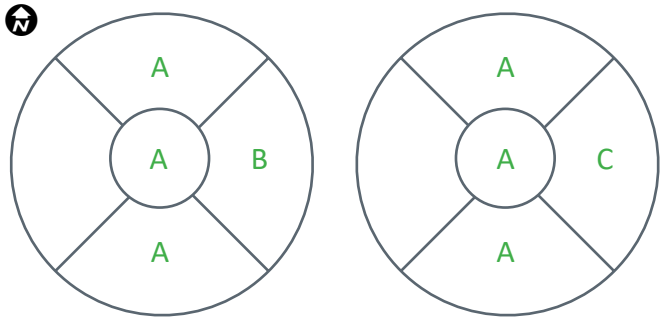


The Washington Street and Bowen Avenue North intersection is signalized. The west approach of Bowen Avenue is offset, forming another intersection with Washington Street 130 feet to the south. Immediately surrounding land use includes light industrial and residential, with Kiwanis Park on the northwest quadrant of the intersection.

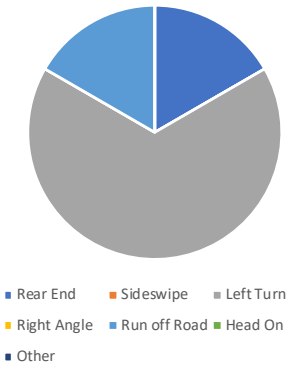
The traffic signal at this intersection does not meet traffic signal warrants during any hour of the day. Unwarranted traffic signals have been proven to increase overall crash potential, most notably a stark increase in rear-end crashes compared to warranted traffic signals or lesser control devices.

The intersection experiences a disproportionate number of rear-end crashes, a type of crash common at traffic signals. The intersection also experienced one bicycle crash within the study period.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



6 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant and a marked crosswalk on the east leg. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

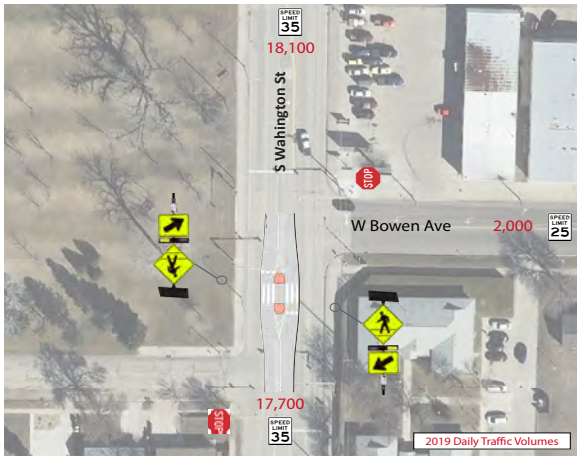
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

The intersection does not meet warrants for the existing signal based on observed traffic volumes.

Alternative 1: Remove Signal



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

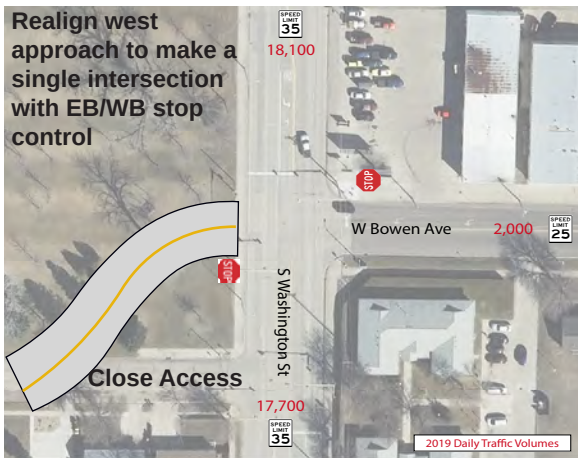
Multimodal Conditions
Removes traffic control on Washington Street, making pedestrian crossings more difficult. However, research shows refuge islands reduce pedestrian crashes by around 40 percent, and that rectangular rapid flashing beacons can increase driver compliance for yielding to pedestrians from 18 percent to 81 percent.

Traffic Operations
Maintains minor approach LOS C or better throughout the day for both Bowen Avenue approaches, while maintaining free-flow operations on Washington Street.

Cost and Impacts
Estimated cost of $70,000 for a pedestrian refuge island, and $20,000 for roadside beacons with higher costs if an overhead configuration is used. There would be minimal impacts to curb lines since there is already median space for the refuge island.

Other Notes
Requires consistency with design decisions at the south Bowen Avenue intersection.

Alternative 2: Remove Signal and Realignment



Safety
Creating a four-legged intersection introduces more conflict points (9 conflict points at a T intersection, 32 conflicts at a standard intersection).

Multimodal Conditions
Removes traffic control on Washington Street, making pedestrian crossings more difficult.

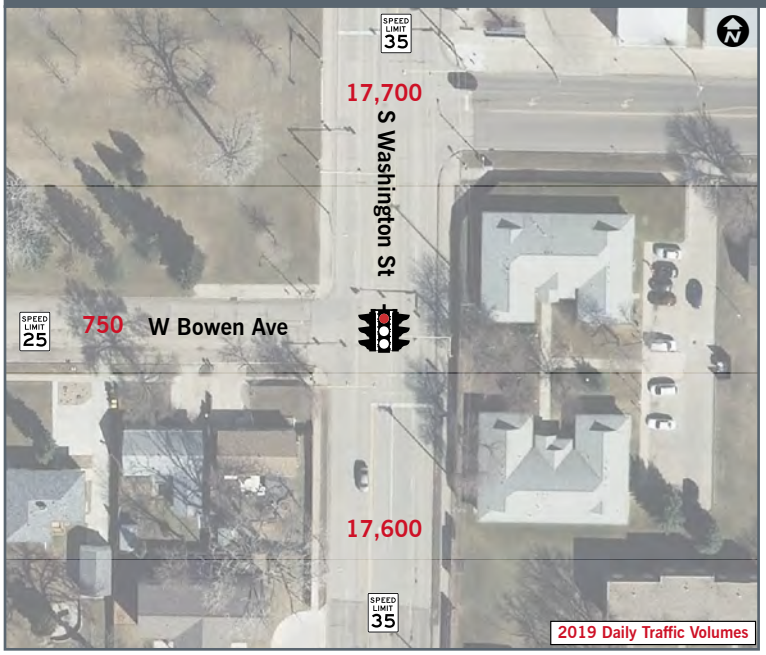
Traffic Operations
Minor approach LOS D is expected in the AM and PM peak hours.

Cost and Impacts
Estimated cost of $500,000. The park property is protected by the National Environmental Policy Act (NEPA) and serves as a stormwater detention area, which could render this concept infeasible.

Other Notes
Existing intersection offset does not introduce overlapping left turns, mitigating conflicts seen at intersections that are offset in the opposite direction.

Summary: Traffic signal removal and replacement with a pedestrian refuge island and flashing beacon has the potential to reduce crash potential, improve traffic flow along Washington Street and provide similar, if not improved, pedestrian crossing conditions.

Washington Street and Bowen Avenue South
Bismarck

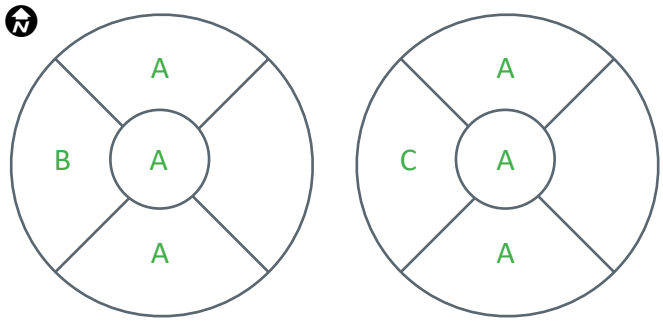


The Washington Street and Bowen Avenue South intersection is signalized. The east approach of Bowen Avenue is offset, forming another intersection with Washington Street 130 feet to the north. Immediately surrounding land use includes light industrial and residential, with Kiwanis Park on the northwest quadrant of the intersection.

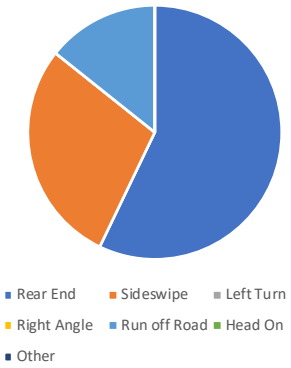
The traffic signal at this intersection does not meet traffic signal warrants during any hour of the day. Unwarranted traffic signals have been proven to increase overall crash potential, most notably a stark increase in rear-end crashes compared to warranted traffic signals or lesser control devices.

The intersection experiences a disproportionate number of rear-end crashes, a type of crash common at traffic signals. The intersection also experienced one bicycle crash within the study period.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



7 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☑ Yes - Rear End
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant and a marked crosswalk on the south leg. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

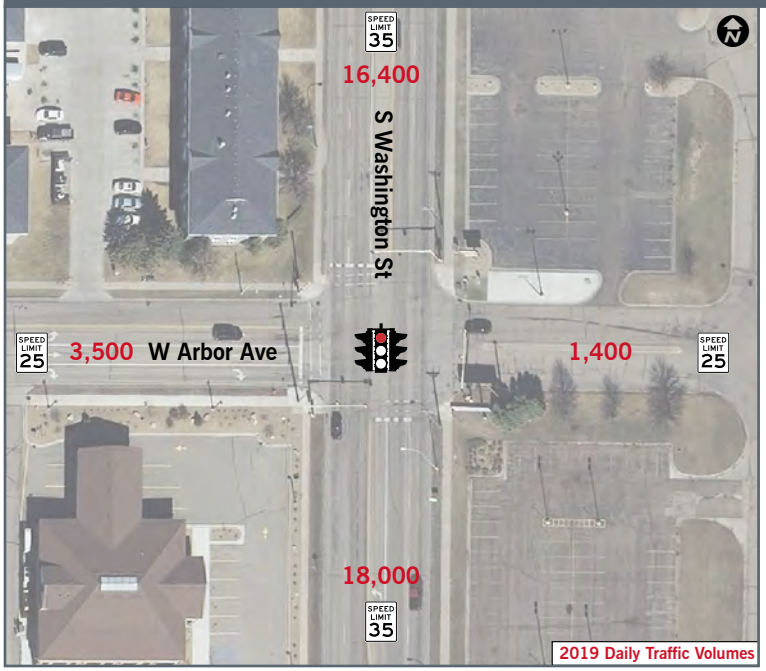
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

The intersection does not meet warrants for the existing signal based on observed traffic volumes.

Washington Street and Arbor Avenue
Bismarck

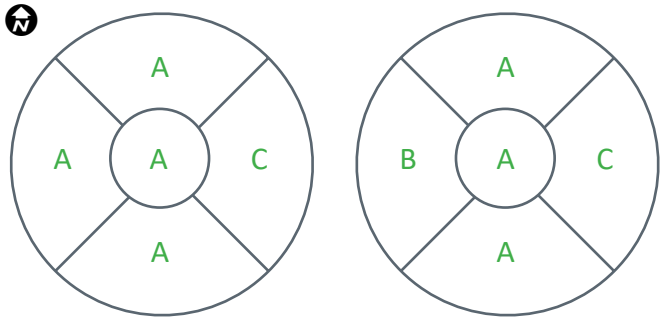


The Washington Street and Arbor Avenue intersection is signalized and sits on the northern edge of the Bismarck Expressway commercial area. The east intersection approach serves as an access to Runnings. West of the intersection is Kiwanis Park, a popular regional park.

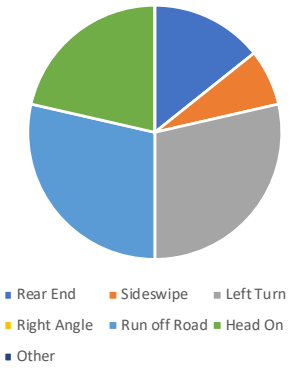
The intersection operates efficiently and has a crash history below what is expected for the current traffic volumes. This intersection has experienced three bicycle crashes and one pedestrian crash over the past five years. Three of the four crashes occurred when turning vehicles struck the pedestrian/bicyclist heading north/south during permitted phases.

Warrant analysis indicates that a traffic signal is not warranted based on current NDDOT standards, but if minor street right-turn movements were included, the traffic signal is warranted.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



14 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on the north, west, and south legs of the intersection. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

☐ **Meets Signal Warrants?**

0/8 Warrant 1: Eight Hour Traffic Volumes
0/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

☑ **Meets Warrant for Dedicated Left-Turn Phasing?**

☐ **Meets All-Way Stop Control Warrants?**

0/8 Minimum Traffic Volumes

Existing signal control is not warranted based on observed traffic volumes, nor is all-way stop control warranted. Signal warrants are met (8 and 4 hour warrants) if eastbound right turns are included in the analysis. If the signal was maintained, PM peak hour volumes warrant protected/permitted left turn phasing.

Alternative 1: Add Protected/Permitted NB Left-Turn Phasing + Leading Pedestrian Interval

Safety
Data shows converting from permissive only left-turn phasing to protected/permitted phasing reduces crashes by 7 percent on that approach, and reduces injury crashes by 35 percent.

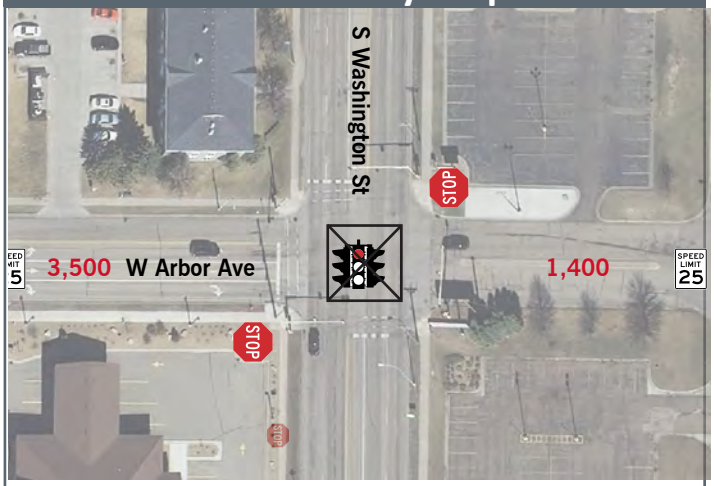
Multimodal Conditions
Research shows leading pedestrian intervals reduce pedestrian crashes by 60 percent. Adding a protected left-turn phase may better separate left-turn movements from pedestrian crossing movements and offer some minor safety benefits.

Traffic Operations
Intersection operations are very similar to existing conditions for this alternative.

Cost and Impacts
No roadway or property impacts. Project cost is dependent on need to replace signal equipment, with estimated costs ranging from $10,000 to $150,000.

Other Notes
The traffic signal is unwarranted using typical warrant analysis assumptions for the area.
An alternative or supplement to using an LPI is implementing a Protected Only Omit Flashing Yellow Arrow (POOFYA), which eliminates the permitted phase when a walk movement occurs. Given the POOFYA would only protect two phases and not sidestreet left turns or right turns, this improvement would be less beneficial than an LPI, but given the crash trends, still may be useful enough to significantly improve pedestrian/bicycle conditions.

Alternative 2: Convert to Two-Way Stop Control



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

Multimodal Conditions
Removes traffic control on Washington Street, making pedestrian crossings more difficult. This improvement is made more concerning provided the history of pedestrian and bicycle crashes at this intersection.

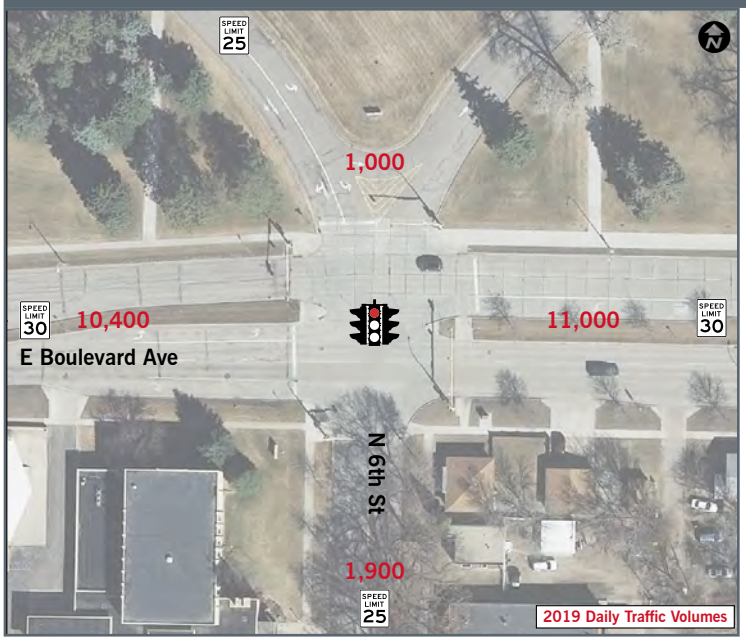
Traffic Operations
Minor approach LOS F is expected in the PM peak hour, with minor approach LOS D in the AM peak hour.

Cost and Impacts
Low cost improvement, with annual cost savings of around $5,000 a year from removing signal maintenance needs.

Other Notes
The pedestrian and bicycle crossing challenges may be mitigated by beacons. However, beacons are most effective when placed midblock, which does not match current ped/bike travel patterns.

Summary: Four pedestrian/bicycle crashes in five years is more than double the multimodal crashes at any other study intersection. The current traffic signal does not meet current NDDOT standards. However, the combination of recreational traffic not collected during the data collection period, ability to meet warrants if a right-turn lane was not present, and recent history of pedestrian and bicycle crashes illustrates how this signal provides value. To separate conflicts between pedestrians and turning vehicles, consideration should be given to maintaining the traffic signal and installing a NB protected/permitted left-turn phase and a leading pedestrian interval.

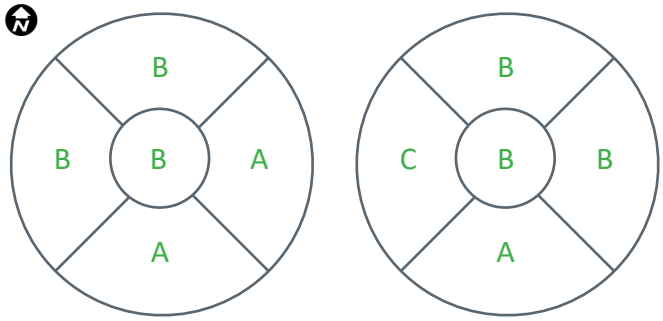
6th Street and Boulevard Avenue
Bismarck



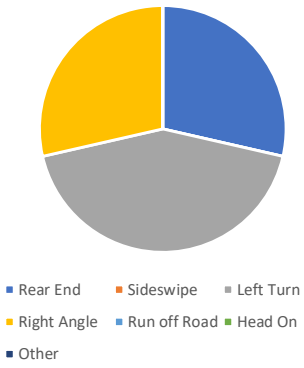
6th Street and Boulevard Avenue is a signal controlled intersection adjacent to the North Dakota State Capitol Building. It serves as one of the major access locations for many of the government offices on the Capitol Grounds north of Boulevard Avenue.

The traffic signal at this intersection is not warranted based on traffic volumes. Unwarranted traffic control devices have been shown to increase crash potential on a national scale. This intersection, however, is not exhibiting higher than expected crash trends. Given the proximity to the capitol building, it is likely that some events benefit from the traffic signal control.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



7 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks and crosswalks everythwere. Bus Route 1 (Black Route) passes through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  3/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

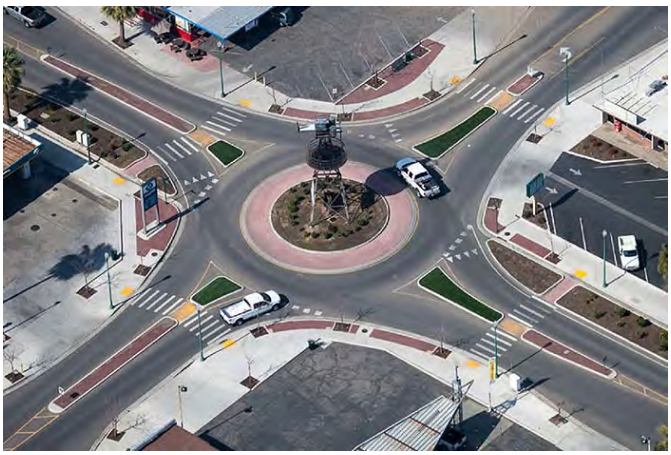
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  3/8 Minimum Traffic Volumes

The existing signal control is not warranted based on observed traffic volumes.

Alternative 1: Single Lane Roundabout



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal. Roundabouts have also been found to reduce injury crashes by 78 percent when converting from signal control.

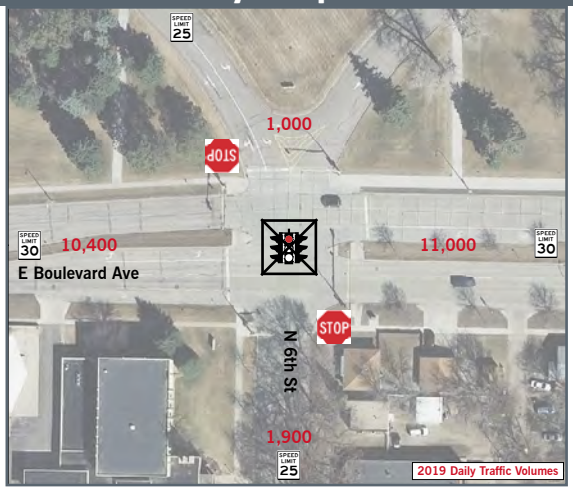
Multimodal Conditions
Removing the signal creates more vehicle/pedestrian conflicts, while a roundabout reduces vehicle speeds. There is also a signal one block to the west that can accomodate pedestrian crossings.

Traffic Operations
Highway Capacity Manual based analysis shows a single lane roundabout operating at LOS A in both the AM and PM peak hours. A roundabout may impact corridor progression, especially at the signal at 7th Street.

Cost and Impacts
Estimated cost of $700,000 for a typical single lane roundabout. Costs would likely be higher at this location given existing roadway width.

Other Notes
More design detail is required before fully understanding the impacts of this concept. Since Boulevard Avenue transitions to a two-lane road west of 4th Street, a single lane roundabout at this location could instead become the transition location. Another transition point could be created by removing a lane at 7th Street and adding a lane at 9th Street. A roundabout could also provide an opportunity for aesthetic improvements near the state capitol.

Alternative 2: Two-Way Stop Control



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal. Safety benefits from removing an unwarranted signal could be diminished due to poor peak hour operations on stop controlled approaches.

Multimodal Conditions
Removing the signal creates more vehicle/pedestrian conflicts by requiring pedestrians crossing Boulevard Avenue to wait for acceptable gaps. There is however a signal one block to the west that can accomodate pedestrian crossings.

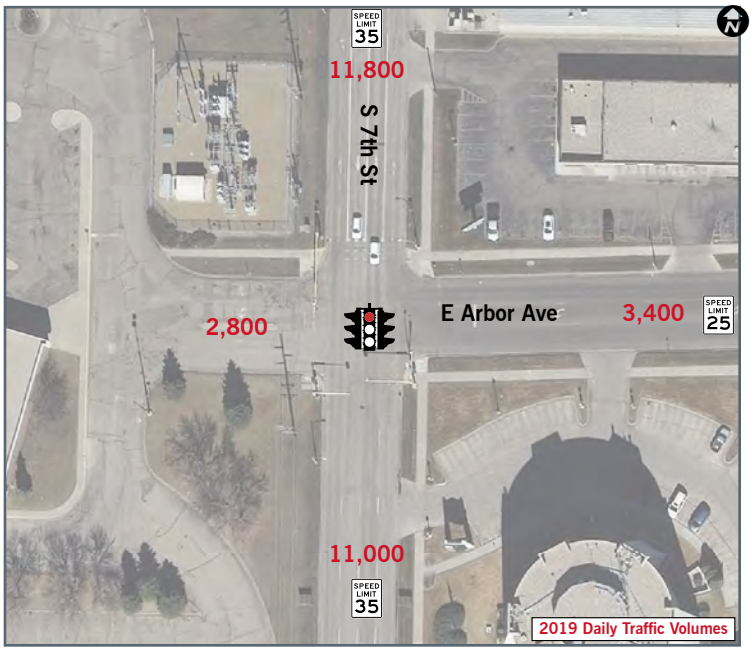
Traffic Operations
Under two-way stop control, southbound approach LOS D is expected in the AM peak hour and LOS F is expected in the PM peak hour. On the northbound approach, LOS C is expected in the AM peak hour and LOS D is expected in the PM peak hour.

Cost and Impacts
Approximately $30,000 up front cost to remove the signal, but an estimated $5,000 savings per year from eliminating signal maintenance requirements. No impacts to curblines or adjacent properties.

Other Notes
None

Summary: Overall, the existing traffic signal does not experience any critical safety, operational, or multimodal issues. Two-way stop control does not provide any safety or operational benefits, and a more detailed corridor-based analysis should be completed before considering roundabout control. In the short term, maintaining the existing signal may be the best option.

7th Street and Arbor Avenue
Bismarck

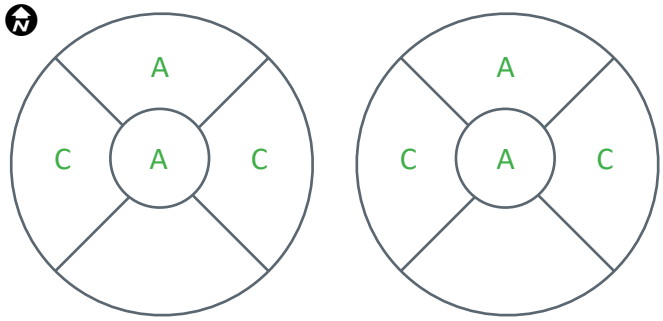


7th Street and Arbor Avenue is a signalized intersection located adjacent to the Kirkwood Mall, with the west approach serving a mall entrance. 7th Street is a one-way roadway in the northbound direction. It forms a one-way pair with 9th Street. NDDOT has scheduled reconstruction of 7th Street which will determine the future lane configuration.

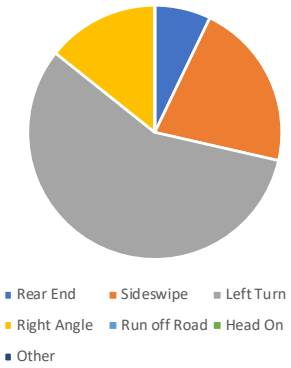
Traffic signal warrants are not met under the existing speed limit but would be warranted if speeds were above 40 miles per hour, which may be feasible given the excess capacity (four lanes) relative to the current traffic volumes (11,000 ADT). Traffic patterns also likely fluctuate based on demand at the mall (i.e. during holiday shopping season). Similarly, if an anchor tenant was removed or replaced at the mall, traffic patterns are expected to change.

This intersection has an over-representation of angled crashes and above average crash rate. Traffic signals are designed to minimize angled crashes. High driving speeds may be a contributing factor to crash rates as drivers frequently ran red lights at this intersection.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



14 Total Crashes

Critical Crash Rate?

- ☐ Yes
- ☑ No

Above Average Crash Rate?

- ☑ Yes
- ☐ No

Repeatable Crash Types?

- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant except for the south side of the west leg. There are marked crosswalks on the east and west legs. Bus routes 1 (Black route) and 3 (Green route) run through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  3/8 Warrant 1: Eight Hour Traffic Volumes
  2/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

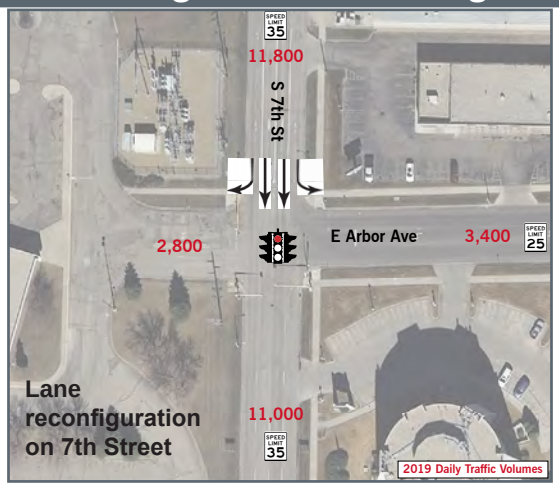
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  2/8 Minimum Traffic Volumes

The existing signal is not warranted based on observed traffic volumes. A signal is warranted if volume thresholds for a roadway with speeds over 40 miles per hour are used.

Alternative 1:
Traffic Calming via Lane Reconfiguration



Safety
Providing clearly delineated dedicated right and left turn lanes removes turning vehicles from through traffic streams, reducing rear end crash potential. Dedicated turn lanes also provide more predictable turning movements for traffic using each lane and can provide a traffic calming benefit by reducing the number of through lanes.

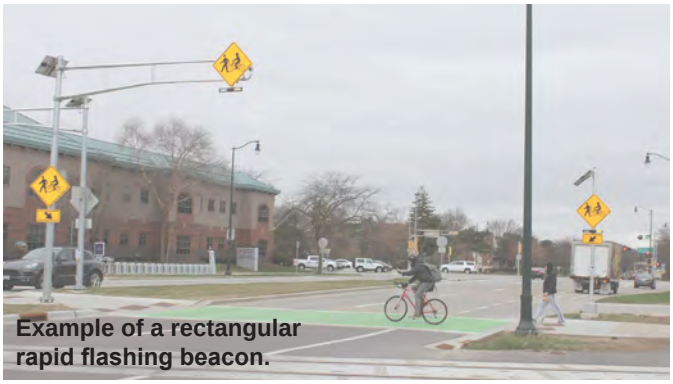
Multimodal Conditions
Minimal changes to pedestrian crossing exposure and associated pedestrian comfort or safety.

Traffic Operations
Maintains AM and PM peak hour intersection LOS A, which exists today.

Cost and Impacts
Estimated cost of $10,000 - $20,000 for pavement marking revisions.

Other Notes
None

Alternative 2: Remove Signal and Provide Pedestrian Beacon on 7th Street


Example of a rectangular rapid flashing beacon.

Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal. Note that crash benefits could however be reduced because of poor peak hour operations.

Multimodal Conditions
Rectangular rapid flashing beacons increase driver compliance for yielding to pedestrians, with data showing yielding percentages increasing from 18 percent with no devices to 81 percent after modern beacon installation.

Traffic Operations
Minor approach LOS C during the AM peak hour and LOS F during the PM peak hour.

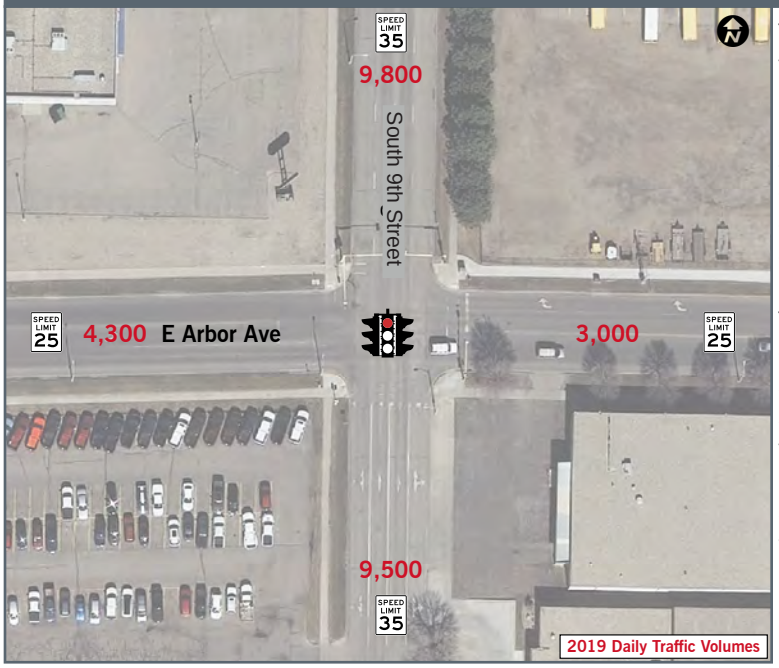
If eastbound and westbound through movements are prohibited, minor approach operations can be improved. If through movements re-route to other intersections, minor approach operations are expected to be improved to PM peak LOS D.

Cost and Impacts
Estimated cost of $20,000 for roadside beacons, with higher costs if overhead configuration is used.

Other Notes
Pedestrian data should be collected and evaluated prior to considering RRFB installation on 7th Street.

Summary: Given the frequency of angled crashes, often caused by red-light running, clearance intervals should be checked at this intersection. 7th Street has at least two lanes more than traffic volumes demand. The traffic calming concept would provide safety benefits by providing clear turn lanes, having minimal impacts to operations and potentially calm traffic speeds for crossing pedestrians and bicycles. This concept extends beyond the scale of an intersection improvement and would need to be studied on a larger scale.

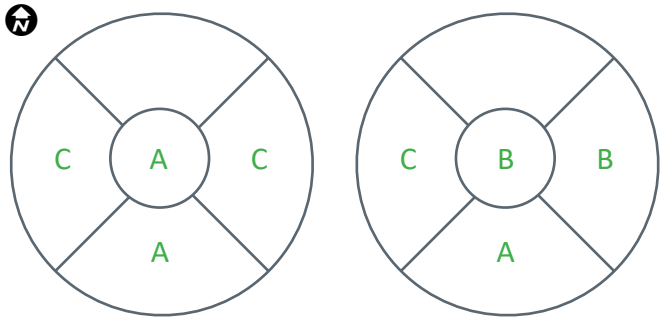
9th Street and Arbor Avenue
Bismarck



The 9th Street and Arbor Avenue signalized intersection is in the Bismarck Expressway business district. Most surrounding land uses are commercial, including the Kirkland Mall two blocks east of the intersection and the Bismarck Public Schools transportation facility on the northeast quadrant of the intersection. NDDOT has programmed a mill and overlay project which will likely determine the future lane configuration.

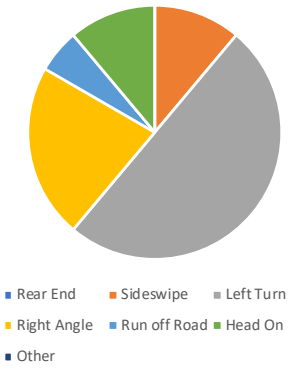
This intersection has an overrepresentation of angled crashes, leading to a higher than average crash rate. Traffic signals are designed to minimize angled crashes. The high speeds may be a contirbuting factor to crash rates as drivers frequently ran red lights at this intersection. Higher than posted speed limits can be expected given the the capacity along the corridor is four lanes while the demand only warrants one to two lanes. The intersection also experienced both a pedestrian and bicycle crash during the study period.

Traffic Operations
Level of Service



AM Peak Hour | PM Peak Hour

Crash History
01/01/2013 - 12/31/2017



18 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☑ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant and marked crosswalks on the east and west legs. Bus Route 1 (Black Route) runs through the intersection.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**

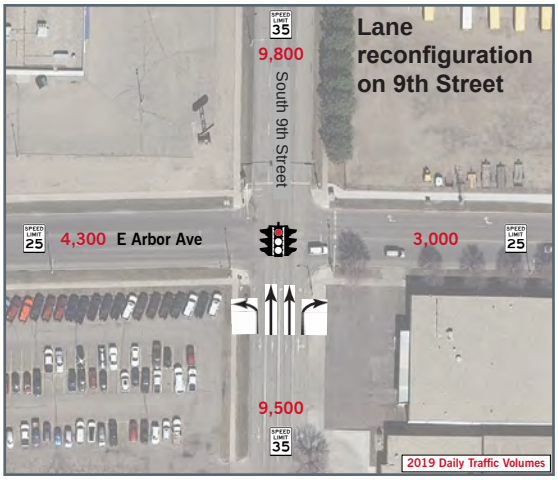
  9/8 Warrant 1: Eight Hour Traffic Volumes
  6/4 Warrant 2: Four Hour Traffic Volumes
  3/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☑ **Meets All-Way Stop Control Warrants?**

  10/8 Minimum Traffic Volumes

Alternative 1:
Traffic Calming via Lane Reconfiguration



Safety
Providing clearly delineated dedicated right and left turn lanes removes turning vehicles from through traffic streams, reducing rear end crash potential. Dedicated turn lanes also provide more predictable turning movements for traffic using each lane and can provide a traffic calming benefit by reducing the number of through lanes.

Multimodal Conditions
Minimal changes to pedestrian crossing exposure and associated pedestrian comfort or safety.

Traffic Operations
Maintains AM and PM peak hour intersection LOS A, which exists today.

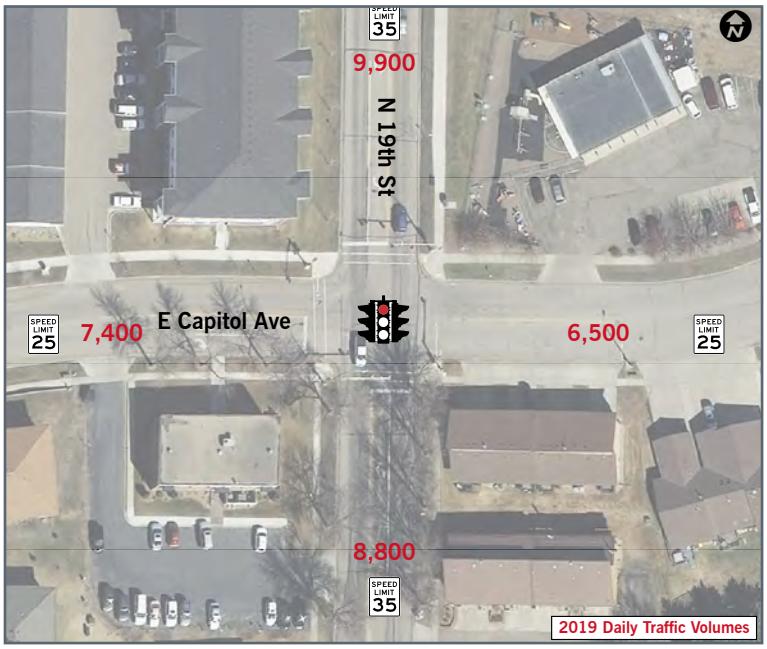
Cost and Impacts
Estimated cost of $10,000 to $20,000 for pavement marking revisions.

Other Notes
None

No other alternatives were studied at this location.

Summary: Given the frequency of angled crashes, often caused by red-light running, clearance intervals at minimum should be checked at this intersection. 9th Street has at least two lanes more than traffic volumes demand. The traffic calming concept would provide safety benefits by providing clear turn lanes, having minimal impacts to operations and potentially calm traffic speeds for crossing pedestrians and bicycles. This concept extends beyond the scale of an intersection improvement and would need to be studied on a larger scale.

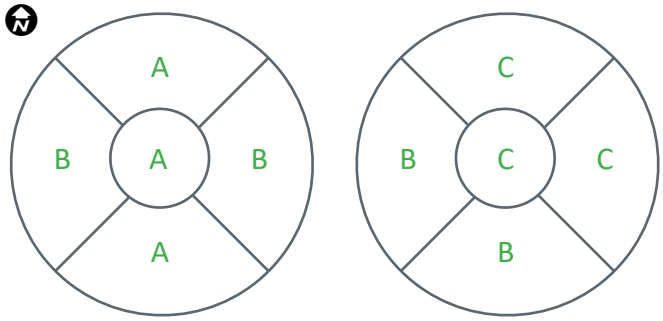
19th Street and Capitol Avenue
Bismarck



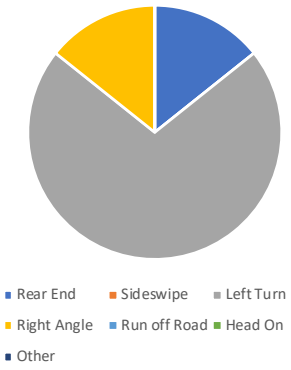
19th Street and Capitol Avenue is a signalized intersection surrounded by multi-family residential land uses. On-street parking is permitted on the north side of the west approach.

The intersection experiences a disproportionate number of left-turn crashes. Crash data indicates left-turn crash trends occur on multiple approaches and are not enough to explicitly meet left-turn phasing warrants. Public comments echo concern for left-turn safety and operations.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



7 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

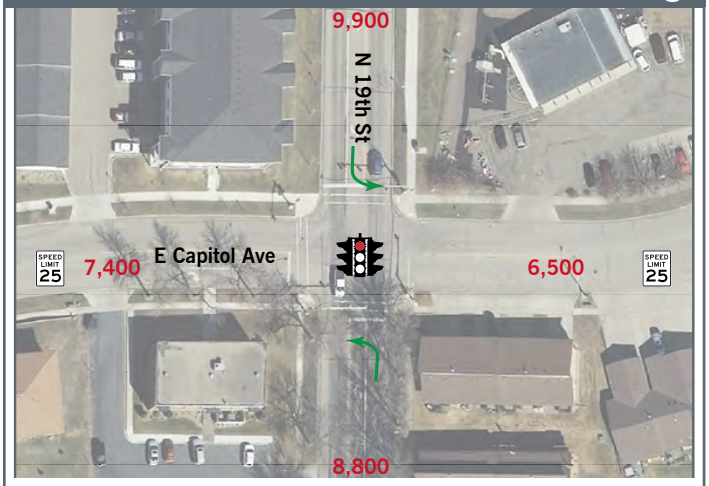
There are sidewalks and marked crosswalks on each quadrant. Bus route 4 (red route) runs through the intersection.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**
  - 5/8 Warrant 1: Eight Hour Traffic Volumes
  - 1/4 Warrant 2: Four Hour Traffic Volumes
  - 1/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**
  - 4/8 Minimum Traffic Volumes

The existing signal is warranted based on the peak hour warrant.

Alternative 1:
Protected/Permitted NB/SB Left Turn Phasing



Safety

Data shows converting from permissive only left turn phasing to protected/permitted phasing reduces crashes by 7 percent on that approach, and reduces injury crashes by 35 percent.

Multimodal Conditions

Minimal impact to pedestrian crossing comfort and safety since permitted portion of northbound left turn operations will remain.

Traffic Operations

There are minimal impacts to traffic operations with this alternative. Overall operations remain the same for both peak hours and the northbound and southbound left turn remains at the existing LOS C. Queuing on N 19th Avenue would also be similar to exisitng conditions. However, queueing for westbound traffic on Capitol Avenue could increase by nearly 300' (95% queue) in the PM peak hour. There are no significant queueing consequences for this alternative in the AM peak hour.

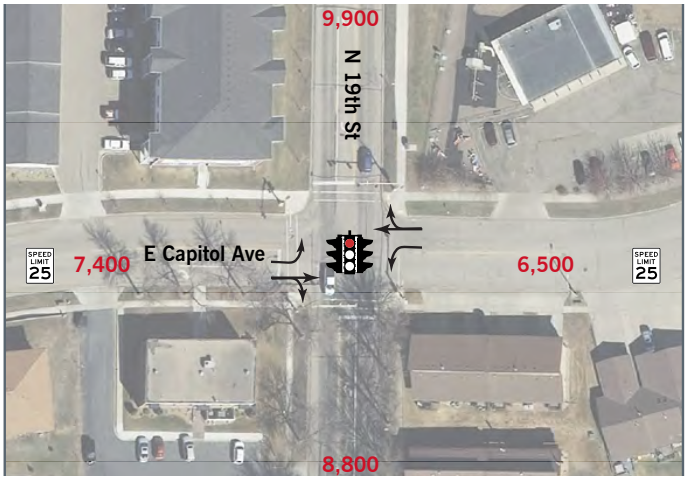
Cost and Impacts

No roadway or property impacts. Project cost is dependent on need to replace signal equipment, with estimated costs ranging from $10,000 to $150,000.

Other Notes

Based on observed turning movement volumes, protected/permitted left turn phasing is not warranted on any intersection approach but would mitigate crash trends and respond to public concerns.

Alternative 2:
EB/WB Left Turn Lanes



Safety

Research shows adding left turn lanes to signalized intersections reduces total crashes by 8 percent and injury crashes by 20 percent.

Multimodal Conditions

Minimal impact to pedestrian safety or comfort. Pedestrians would cross more travel lanes, but the same pavement width.

Traffic Operations

There are minimal impacts to traffic operations during the AM peak hour. During the PM peak hour the overall intersection improves to LOS B from LOS C. Additionally, queueing for the westbound traffic on Capitol Avenue could decrease by nearly 100' (95% queue) in the PM peak hour. This alternative supports the high volume side street turning movements, and would provide a balanced level of service and delay for all vehicles.

Cost and Impacts

Low cost improvement that can fit within existing pavement width. Estimated cost of $15,000.

Other Notes

Currently, the EB approach has a dedicated right turn lane and there are no lane markings on the WB approach. Removing on-street parking on the EB approach would allow for a better alignment with the opposing WB left turn lane.

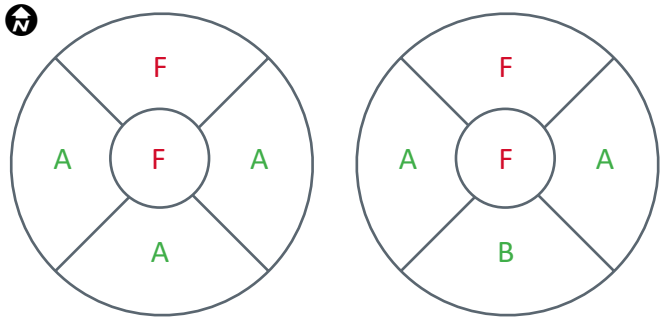
Summary: The NB/SB left-turn phasing and EB/WB left-turn lanes can be utilized in concert or independently. Both can help mitigate the left-turn crash trend and calm public concerns over left-turn movements at this intersection. Given the future importance of the 19th Street corridor as an I-94 crossing, consideration should be given to eventual conversion to flashing yellow arrow left turn operations on all intersection approaches.

Tyler Parkway and Century Avenue
Bismarck

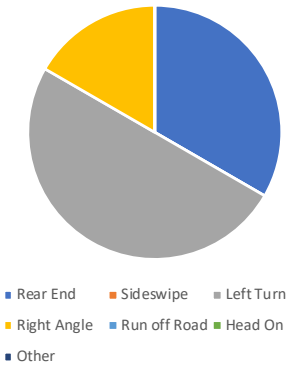
The Tyler Parkway and Century Avenue intersection is adjacent to the Century Avenue business district in west Bismarck. The stop sign configuration is atypical, with stop signs on Tyler Parkway rather than Century Avenue.

Existing traffic volumes and poor operations warrant the consideration of improved traffic control, especially given the atypical stop configuration on Tyler Parkway rather than Century Avenue. Specifically, the intersection operations are deficient in both AM and PM peak hours as ten hours meet the four hour volume traffic signal warrant.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



6 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant except the north side of Century Avenue. There are marked crosswalks on the north and east leg.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**

9/8 Warrant 1: Eight Hour Traffic Volumes
10/4 Warrant 2: Four Hour Traffic Volumes
5/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☑ **Meets All-Way Stop Control Warrants?**

14/8Minimum Traffic Volumes

A traffic signal is warranted, though one does not exist today.

Alternative 1: Traffic Signal

Safety
Limited data for safety improvements given the unique stop configuration, but a traffic signal will provide a more standard configuration, better meeting driver expectations. Traffic signals at locations where they are warranted have been proven to reduce the potential for high-severity angle crashes compared to two-way stop control.

Multimodal Conditions
Increased traffic control for pedestrian crossings, especially those crossing Century Avenue.

Traffic Operations
Provides AM and PM intersection LOS B, compared to minor approach LOS F that exists today with two-way stop control.

Cost and Impacts
Estimated cost of $400,000 for new traffic signal.

Other Notes
Signal is warranted based on MUTCD eight hour, four hour, and peak hour warrants.

Alternative 2: Roundabout

Safety
Limited data for safety improvements given the unique stop configuration, but a roundabout will provide a more standard traffic control configuration. Roundabouts are proven to reduce angle crashes, which typically are the highest severity crash type at intersections.

Multimodal Conditions
Reduced entering speeds at a roundabout create improved crossing conditions, and splitter islands serve as a pedestrian refuge.

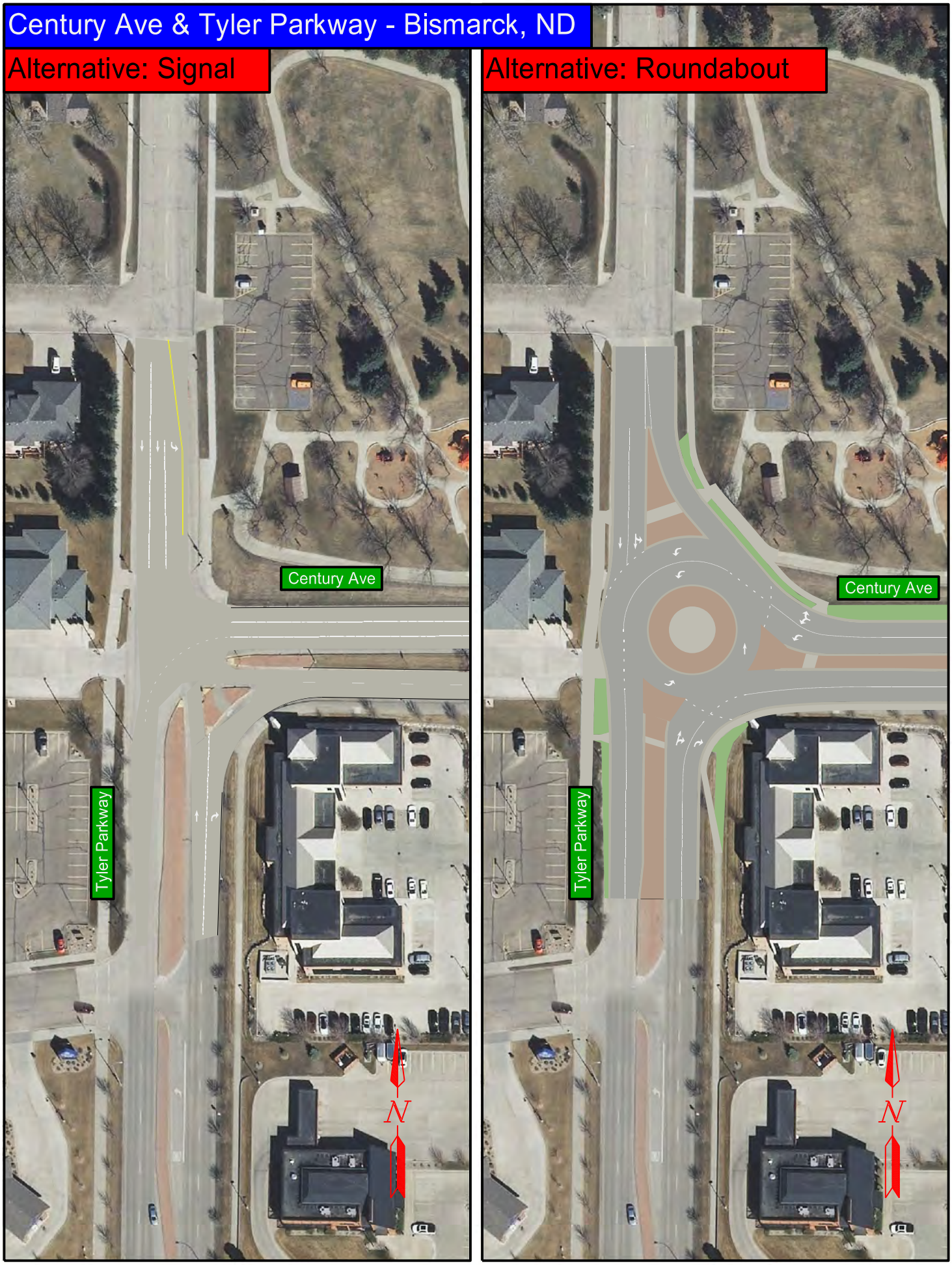
Traffic Operations
Provides AM and PM intersection LOS A, compared to minor approach LOS F that exists today with two-way stop control.

Cost and Impacts
Estimated cost of $2,400,000.

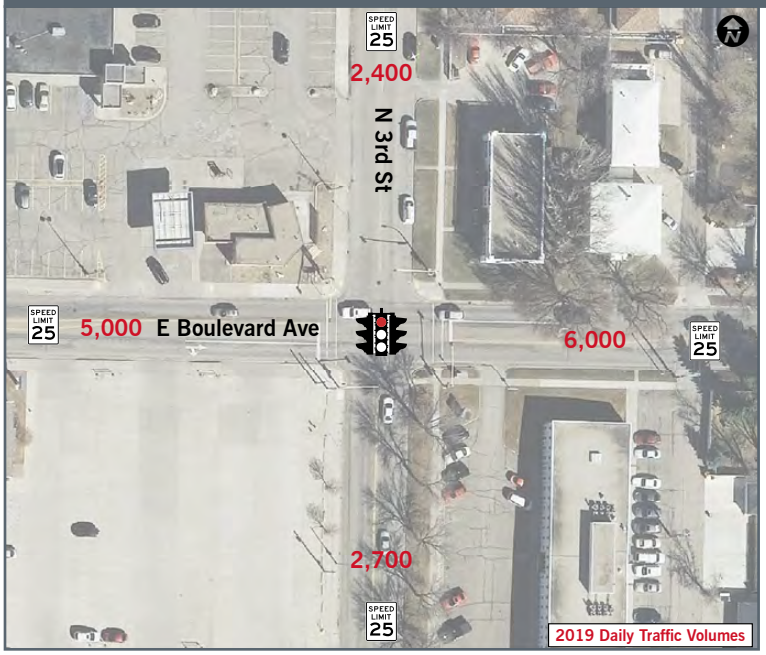
Other Notes
Surrounding terrain could make accomodating fire station access difficult.

Summary: Constructing a standard traffic signal is the lowest cost/lowest impact improvement under consideration. A traffic signal would mitigate operational issues while providing increased control for pedestrian activity.

Century Ave & Tyler Parkway - Bismarck, ND



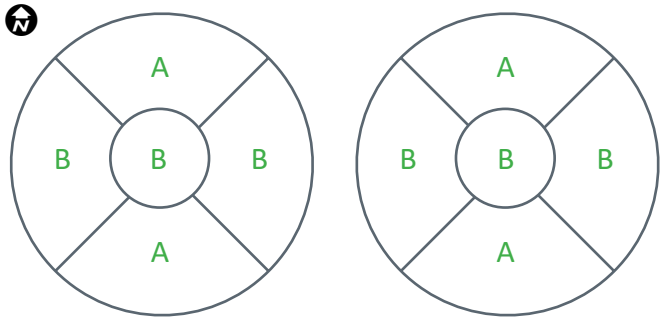
3rd Street and Boulevard Avenue
Bismarck



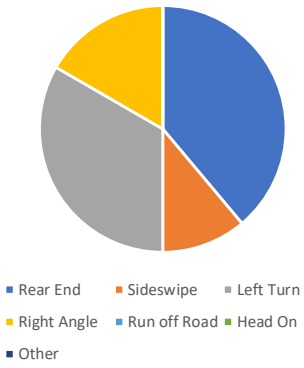
3rd Street and Bouelvard Avenue is a signal controlled intersection located west of the State Capitol. In the southwest corner of the intersection there is a private high school that has been converted into a middle school.

The intersection experiences a critical crash rate with a high percentage of rear-ends (common at traffic signals) and angled crashes (not as common at traffic signals). The intersection is not close to meeting traffic signal warrants, meeting volume criteria for zero hours of the day. These types of crash patterns and rates are common at signals that are definitively unwarranted.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



18 Total Crashes

Critical Crash Rate?
- ☑ Yes
- ☐ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks and crosswalks on each quadrant. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

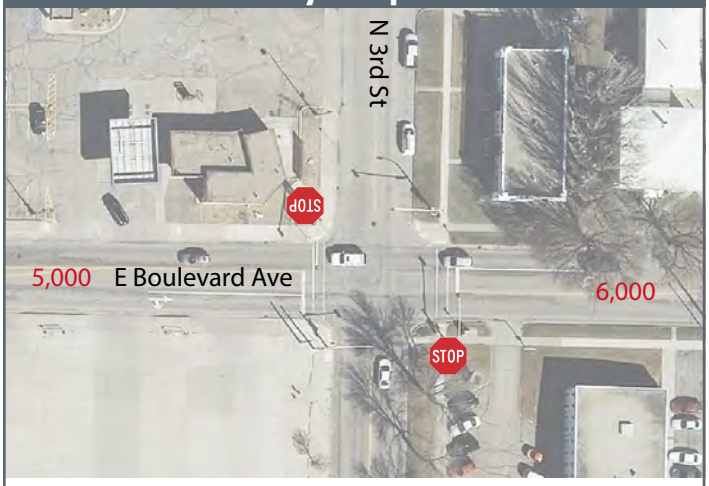
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  6/8 Minimum Traffic Volumes

The existing signal is not warranted and non-signalized alternatives were analyzed.

Alternative 1: Two-Way Stop Control



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

Multimodal Conditions
Removing the signal will create more vehicle/pedestrian conflicts. Given the low volumes at this intersection and short crossing distances, the pedestrian crossing may be suitable for middle aged school students, who are often unlikely to wait for signals.

Traffic Operations
The northbound and southbound stop controlled approaches would operate at LOS B in the AM peak hour and LOS C in the PM peak hour.

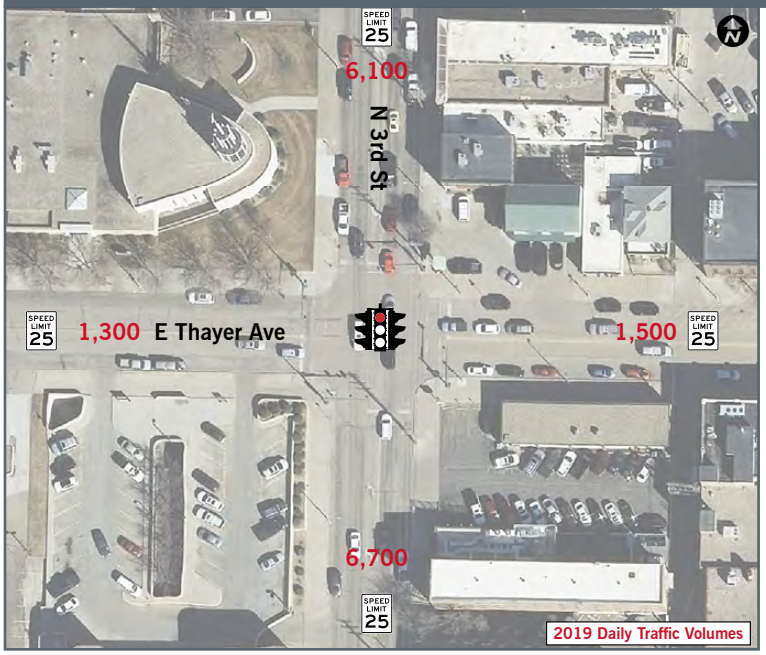
Cost and Impacts
Approximately $30,000 up front cost to remove signal, but with an estimated $5,000 a year cost savings from eliminating signal maintenance requirements. No impacts to curblines or adjacent properties.

Other Notes
If pedestrian crossing is a concern to the middle school, consideration of a pedestrian beacon mid-block (west of 3rd Street) or in-roadway crossing signs may mitigate safety concerns across the narrow road.

No other alternatives were considered at this location.

Summary: The current traffic signal appears to contribute to a critical crash rate. Removal of the traffic signal has the potential to improve safety. Given the proximity to the middle school, a more detailed study of pedestrian crossing data and demand should be considered once the school is operational. There are school specific traffic signal warrants that are far more lenient than the traffic volume warrants that may apply. If pedestrian crossing is a concern to the middle school, consideration of a mid-block pedestrian beacon (west of 3rd Street) or in-roadway crossing signs may mitigate safety concerns across the narrow road.

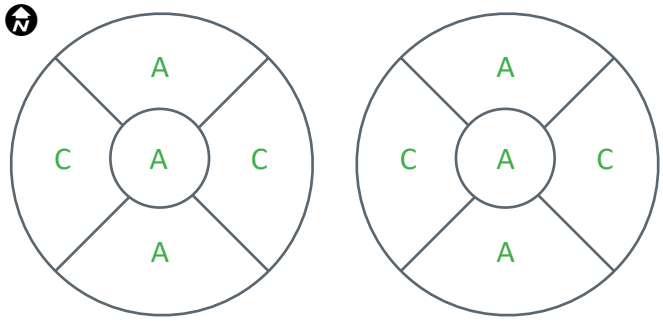
3rd Street and Thayer Avenue
Bismarck



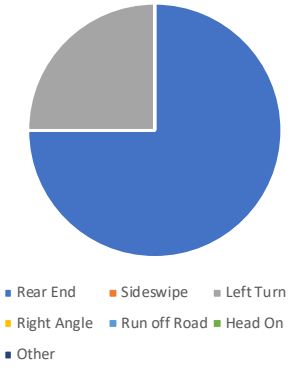
3rd Street and Thayer Avenue is a signalized intersection in downtown Bismarck. On-street parking is permitted on all approaches. This intersection experiences exceptional operations and few crashes.

The intersection does not meet traffic signal warrants. Unwarranted signals have been found to increase crash potential and imposing a right-of-way stop when traffic does not need assistance finding gaps in traffic.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

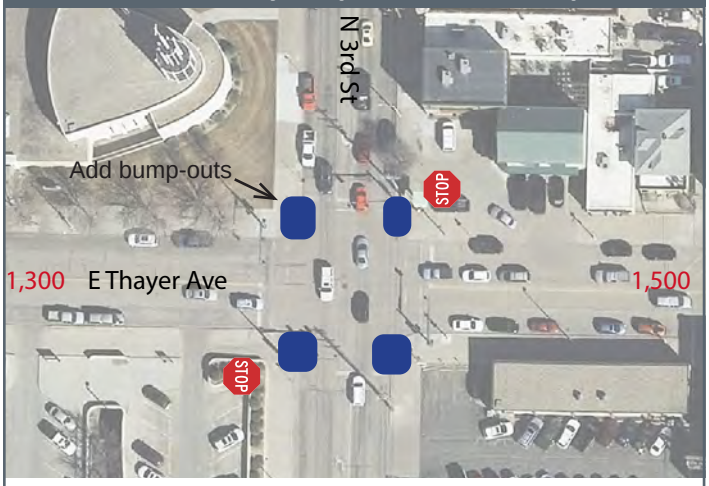
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  3/8 Minimum Traffic Volumes

The existing signal is not warranted based on observed traffic volumes.

Alternative 1:
EB/WB Two Way Stop Control + Bump-Outs



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal. Curb bump-outs will add traffic calming benefits, reducing traffic speeds and crash potential associated with speeding.

Multimodal Conditions
Removing signal control will make crossing 3rd Street more difficult for pedestrians. Curb bump-outs will help minimize conflicts by increasing visibility and reducing exposure for pedestrians. Research shows an approximate 40 percent reduction in pedestrian crashes after bump-out installation.

Traffic Operations
Minor approach LOS B is expected during the peak hours, which is an improvement over the existing LOS C.

Cost and Impacts
Approximately $30,000 up front cost to remove signal, but with an estimated $5,000 a year cost savings from eliminating signal maintenance requirements. The total estimated cost of four bump-outs is $100,000.

Other Notes
None.

Alternative 2: EB/WB Two Way Stop Control and Install Pedestrian Beacon

Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

Multimodal Conditions
Rectangular rapid flashing beacons increase driver compliance for yielding to pedestrians. Data shows that yielding percentages improve from 18 percent with no devices to 81 percent after modern beacon are installed.

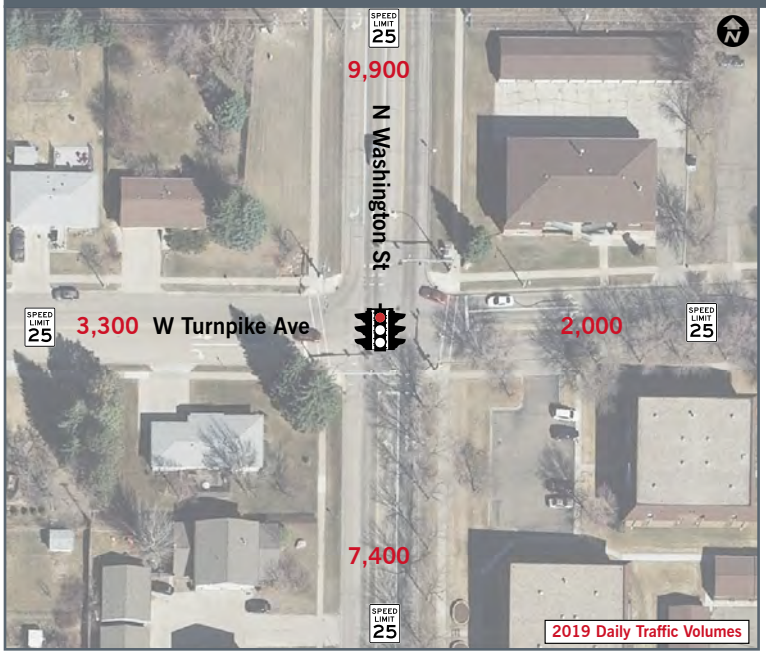
Traffic Operations
Minor approach LOS B is expected during the peak hours, which is an improvement over the existing LOS C.

Cost and Impacts
Beyond the cost for signal removal, this has an estimated cost of $20,000 for roadside beacons, with higher costs if overhead configuration is used.

Other Notes
Parking should be prohibited within 30 feet of the intersection to improve sight lines.

Summary: The traffic signal at 3rd Street and Thayer is not close to meeting traffic signal warrants and based on a review of projected traffic volumes, is not anticipated to meet warrants in the near future. Although crash data has not indicated high crash potential, unwarranted traffic signals have a proven track record of inducing higher crash rates than other forms of traffic control. The option to include a pedestrian beacon versus bump-outs (if the traffic signal is removed) should consider pedestrian movements on a regional level, given the presence of traffic signals both one block north and south.

Washington Street and Turnpike Avenue
Bismarck

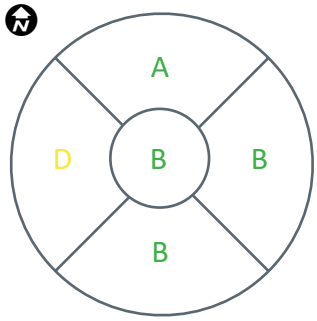


The Washington Street and Turnpike Avenue intersection is signalized and located just south of I-94. On-street parking is permitted on the east, west, and south approaches, but not immediately adjacent to the intersection.

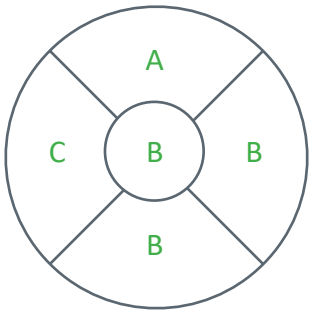
No significant issues have been identified at this intersection. There are opportunities for low impact improvements to reduce minor approach delays.

Mutliple public comments were received related to the existing eastbound lane configuration, which suggested conversion to a dedicated left turn lane.

Traffic Operations
Level of Service

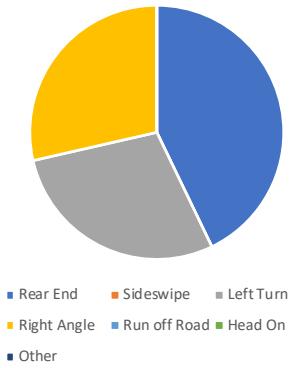


AM Peak Hour



PM Peak Hour

Crash History
01/01/2013 - 12/31/2017



7 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

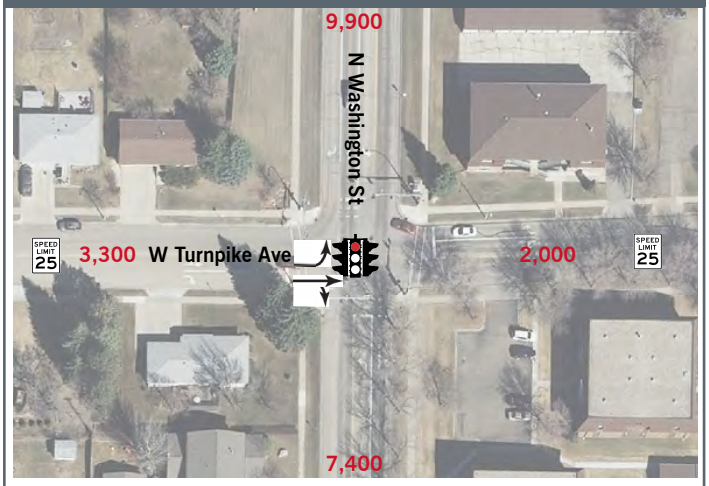
There are sidewalks and marked crosswalks on each quadrant.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**
  - 9/8 Warrant 1: Eight Hour Traffic Volumes
  - 5/4 Warrant 2: Four Hour Traffic Volumes
  - 2/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**
  - 3/8 Minimum Traffic Volumes

The existing signal is warranted based on the eight hour and four hour warrants. No dedicated left turn phasing is warranted based on observed traffic volumes.

Alternative 1:
Provide Dedicated Eastbound Left Turn Lane



Safety
This alternative would not have a significant impact on safety.

Multimodal Conditions
Minimal impact to pedestrian crossing safety or comfort.

Traffic Operations
Maintains intersection LOS B in the AM and PM peak hours, also approach LOS B on all approaches. The EBL turning movement volume (>100 vph in both peak hours) is greater than the other approach movements. A dedicated EBL turn lane at this location would better fit the existing volume patterns and traffic flow.

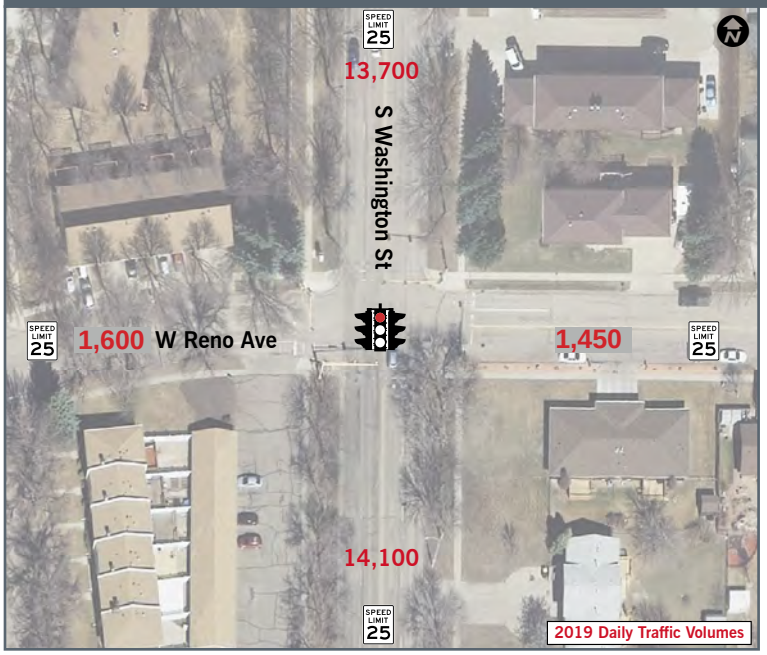
Cost and Impacts
Low cost improvement, with an estimated cost of $10,000 for pavement marking revisions on the eastbound approach. This can be accommodated within the existing roadway section.

Other Notes
Consider extending turn lane length compared to existing shared through/left turn lanes.

No other alternatives were considered at this location.

Summary: Consider converting the eastbound approach to have a dedicated left turn lane and a shared through/right turn lane. This would benefit traffic operations most notably for the eastbound approach during the AM peak hour which would improve from LOS D to LOS B. This alternative would also be a better fit for the turning movement volumes.

Washington Street and Reno Avenue
Bismarck

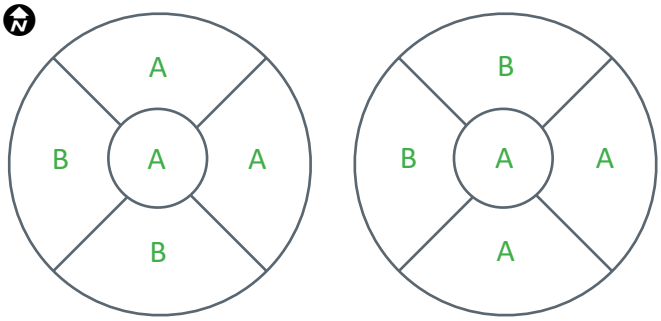


The Washington Street and Reno Avenue signalized intersection is located in west Bismarck, and is abutted by single and multi-family residential land uses.

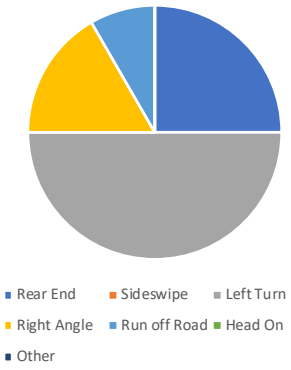
This intersection experiences efficient operations and does not experience higher than expected crash rates. It does experience disproportionate left-turn crash trends, which is common at intersections with four lane sections and no left-turn lanes.

The intersection does not meet traffic signal warrants under the current configuration, but would meet traffic signal warrants if the corridor was reconfigured to a two/three roadway section, similar to other parts of Washington Street.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



12 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks and crosswalks on each quadrant.
Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

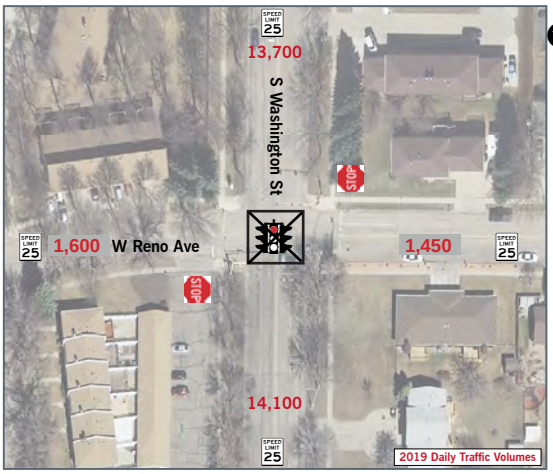
  5/8 Warrant 1: Eight Hour Traffic Volumes
  2/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**
  4/8 Minimum Traffic Volumes

The existing signal is not warranted based on observed traffic volumes.

Alternative 1: EB/WB Stop Control



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

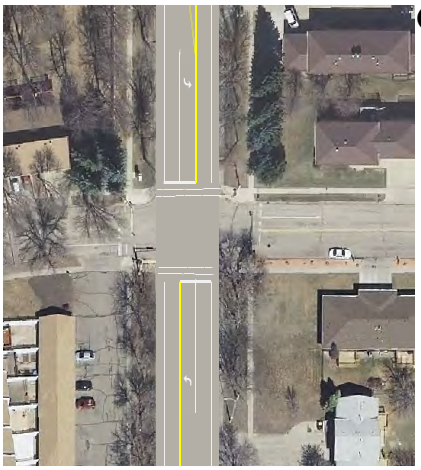
Multimodal Conditions
Removes traffic control on Washington Street, making pedestrian crossings more difficult.

Traffic Operations
Minor approach LOS F is expected in both the AM and PM peak hours.

Cost and Impacts
This would be a low cost improvement

Other Notes
Existing signal is not warranted with current lane configuration.

Alternative 2: Three-Lane Roadway



Safety
A two-way left turn lane reduces rear end crash potential, with data showing a 20 percent reduction in overall intersection crashes after converting to a three-lane section. The two-way left turn lanes would help reduce the left turn crash trend that has been observed at this location over the past five years.

Multimodal Conditions
Pedestrians will have fewer lanes of moving traffic to cross which will reduce exposure. The three lane section may naturally constrict the driving lanes and lead to slower driving speeds.

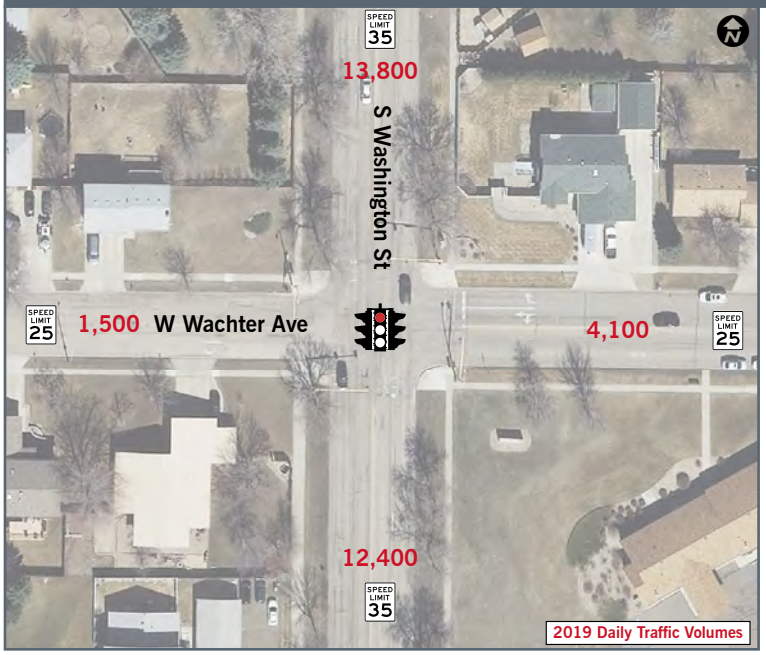
Traffic Operations
Intersection operations are expected to operate at LOS B in the AM peak hour and LOS A in the PM peak hour. The major approaches (NB/SB) will operate similar to existing conditions. The minor approaches may be expected to operate as low as LOS D depending on the time of day and direction.

Cost and Impacts
The entire cost of converting Washington Avenue to a three lane section between Reno Avenue and Wachter Avenue is anticipated to be around $375,000.

Other Notes
Reducing the cross section to 3 lanes would make the existing signal warranted by Warrant 3 (Peak Hour Volumes) conditions.

Summary: Reconfiguring the roadway to three lanes provides several safety benefits, including reducing left-turn and rear-end crash potential by adding a left-turn lane and allowing warrants to be met at the intersection. This concept also provides space for bicycles. Concept improvements at this intersection should be coordinated with improvements at the intersection of Washington Street and Wachter Avenue.

Washington Street and Watcher Avenue
Bismarck

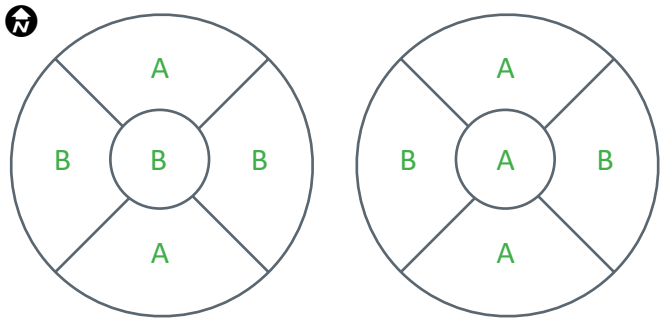


The Washington Street and Wachter Avenue signalized intersection is located in west Bismarck, and is abutted by single and multi-family residential land uses with Cornerstone Community Church in the southeast quadrant.

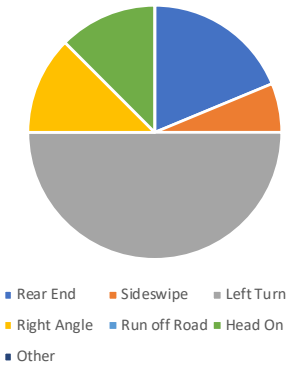
This intersection experiences efficient operations but higher than expected crash rates. The intersection experiences disproportionate left-turn crash trends, which is common at intersections with four lane sections and no left-turn lanes. There has also been a recent pedestrian crash.

The intersection does not meet traffic signal warrants under the current configuration, but would meet traffic signal warrants if the 85th percentile speeds were to be above 40 miles per hour. Evidence suggests that 85th percentile speeds are commonly five to seven miles per hour above the speed limit for roadways that are four lanes but have an ADT less than 15,000 vpd. Reducing the cross section of Washington Street nearly meets signal warrants as well.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



16 Total Crashes

Critical Crash Rate?

- ☐ Yes
- ☑ No

Above Average Crash Rate?

- ☑ Yes
- ☐ No

Repeatable Crash Types?

- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks and crosswalks on the east and west legs.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  4/8 Warrant 1: Eight Hour Traffic Volumes
  2/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

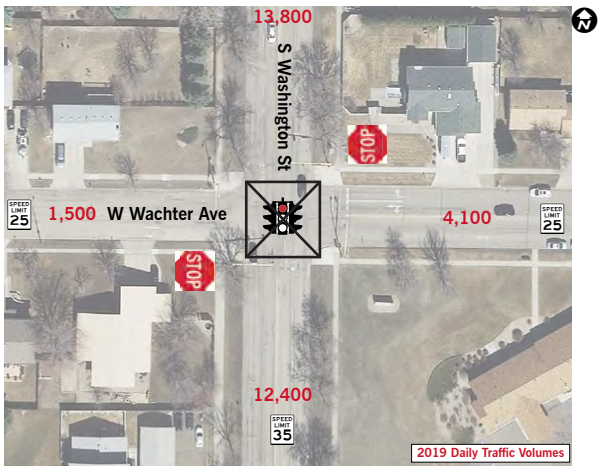
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  4/8 Minimum Traffic Volumes

The existing signal is not warranted based on observed traffic volumes. However, this intersection would warrant a signal if the 85th percentile speed on Washington Street is above 40 miles per hour.

Alternative 1:
Convert to EB/WB Two-Way Stop Control



Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

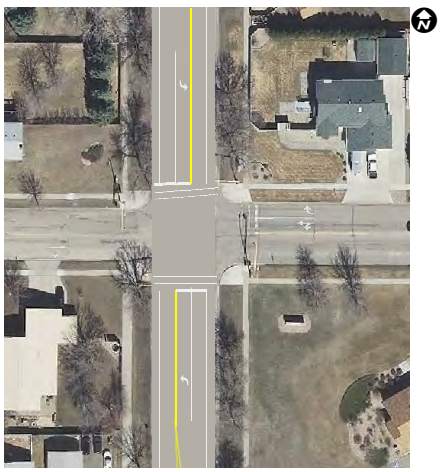
Multimodal Conditions
Removes traffic control on Washington Street making pedestrian crossings more difficult.

Traffic Operations
Minor approach LOS F is expected during the AM and PM peak hours.

Cost and Impacts
This would be a low cost improvement.

Other Notes
Existing signal is not warranted. However, this intersection would warrant a signal if the 85th percentile speed on Washington Street is above 40 miles per hour.

Alternative 2: Three-Lane Roadway



Safety
A two-way left turn lane reduces rear end crash potential, with data showing a 20 percent reduction in overall intersection crashes after converting to a three-lane section. The two-way left turn lanes would help reduce the left turn crash trend that has been observed at this location in the past five years.

Multimodal Conditions
Pedestrians will have fewer lanes of moving traffic to cross which will reduce exposure. The three lane section may naturally constrict the driving lanes and lead to slower driving speeds.

Traffic Operations
Intersection operations are expected to operate at LOS B during both peak hours. The major approaches (NB/SB will operate similar to existing conditions. The minor approaches may be expected to operate as low as LOS D depending on the time of day and direction.

Cost and Impacts
The entire cost of converting Washington Avenue to a three lane section between Reno Avenue and Wachter Avenue is anticipated to be around $375,000.

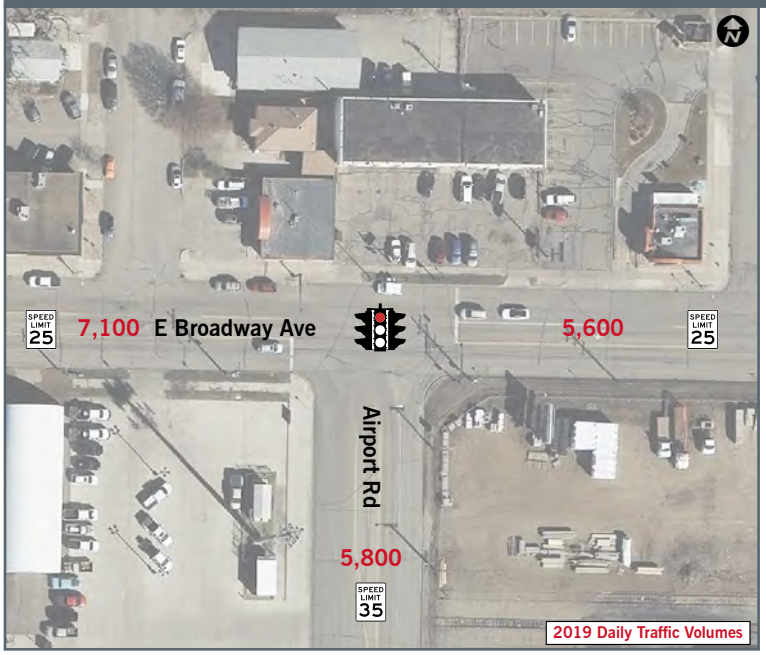
Other Notes
Reducing the cross section to 3 lanes would nearly warrant a signal for Warrant 2 (Four Hour Volumes conditions.

Summary: Reconfiguring the roadway to three lanes provides several safety benefits, including reducing left-turn and rear-end crash potential by adding a left-turn lane and reducing speeds to make pedestrian crossings safer. This concept also provides space for bicycles. Concept improvements at this intersection should be coordinated with improvements at the intersection of Washington Street and Reno Avenue.

Washington St - Bismarck, ND

Alternative: Road Reconfiguration

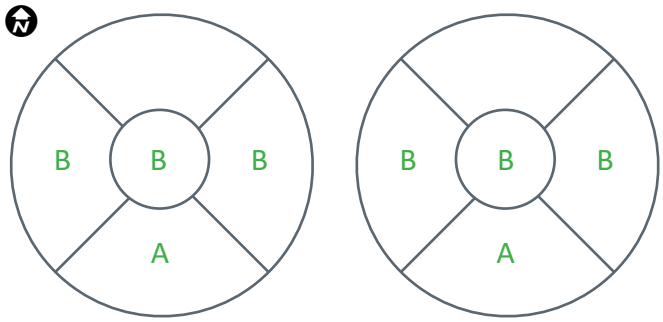
Airport Road and Broadway Avenue
Bismarck



Airport Road and Broadway Avenue is a signal controlled intersection surrounded primarily by commercial retail land uses. The intersection operates efficiently, no crashes were recorded during the past five years, and pedestrian and bicycle volumes are very low.

The traffic signal at this intersection is not warranted based on traffic volumes. Unwarranted traffic control devices have been shown to increase crash potential on a national scale. This intersection, however, is exhibiting lower than expected crash trends.

Traffic Operations
Level of Service



AM Peak Hour

PM Peak Hour

Crash History
01/01/2013 - 12/31/2017

0 Total Crashes

Critical Crash Rate?

- ☐ Yes
- ☑ No

Above Average Crash Rate?

- ☐ Yes
- ☑ No

Repeatable Crash Types?

- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on each quadrant.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  3/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  3/8 Minimum Traffic Volumes

The existing signal control is not warranted. All-way stop control warrants are not met.

Alternative 1: Two-Way Stop Control + Bump-Outs

Safety
Research shows a 24 percent decrease in total crashes and a 53 percent decrease in injury crashes after removing an unwarranted signal.

Multimodal Conditions
Removing the signal creates more vehicle/pedestrian conflicts due to requiring pedestrians crossing Broadway Avenue to wait for acceptable gaps. Curb bulb-outs offer the potential to reduce exposure while helping to control and constrict speeds.

Traffic Operations
The northbound approach would operate at LOS C during both peak hours for this alternative which is worse than the traffic signal but still efficient.

Cost and Impacts
Estimated cost of $100,000 for bump-outs and approximately $30,000 up front cost to remove signal, but with an estimated $5,000 a year cost savings from eliminating signal maintenance requirements.

Other Notes
This alternative does not favor multimodal conditions but pedestrian volumes are low. If the signal is removed, on-street parking should be prohibited on Broadway Avenue to improve sight lines.

Alternative 2: Pedestrian Refuge Island

Safety
Pedestrian refuge islands can serve as a traffic calming device, reducing vehicle speeds.

Multimodal Conditions
Data shows refuge islands reduce pedestrian crashes by around 40 percent.

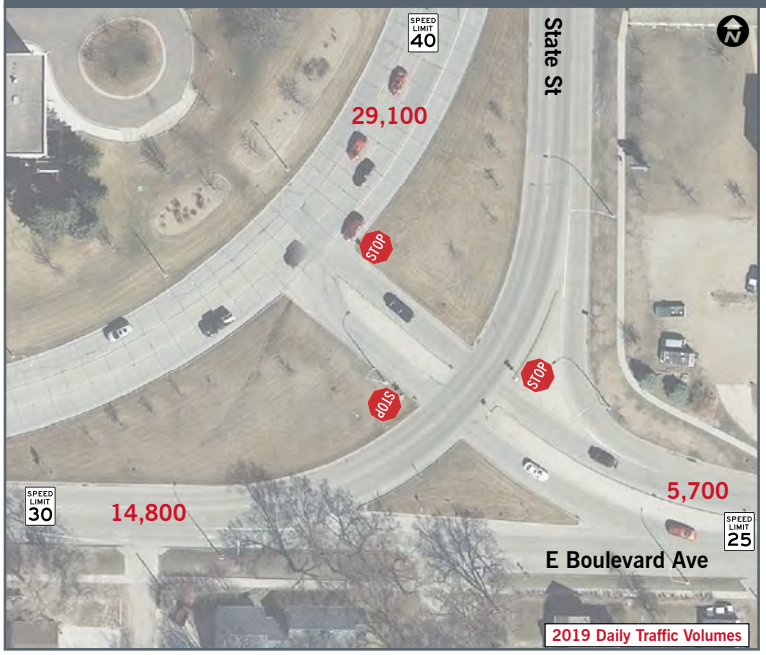
Traffic Operations
Little impact to traffic operations compared to existing conditions.

Cost and Impacts
Estimated cost of $70,000. There would be minimal impacts to curb lines since there is already median space for the refuge island in the existing two-way left turn lane.

Other Notes
If a refuge island is provided, the west approach is the most logical location to minimize conflicts.

Summary: The current traffic signal does not exhibit any notable deficiencies, making any type of improvements a low priority at this intersection. However, removal of unwarranted traffic signals has been proven to reduce crash potential long-term, and two-way stop control operates effectively. Pedestrian crossing concerns can be partly mitigated by curb bump outs or a refuge island, however pedestrian data was not available at this location, and adjacent land uses are not expected to generate significant pedestrian activity. A lower cost/lower impact trial improvement could be placing in-roadway pedestrian crossing signs on Broadway Avenue to help mitigate potential pedestrian impacts from removing the signal.

State Street and Boulevard Avenue
Bismarck

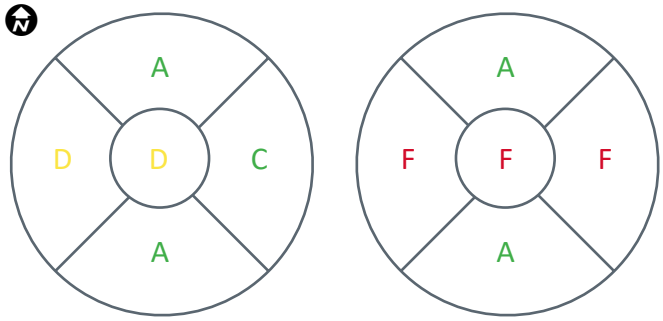


The intersection of State Street and Boulevard Avenue is located near the state capitol. This intersection has a unique geometry that operates similarly to two closely spaced two-way stop controlled intersections.

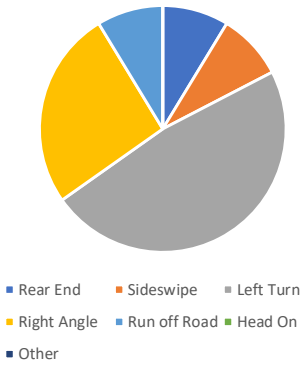
Traffic volumes are exceedingly high at this intersection during peak hours but given the unique travel patterns, does not quite meet traffic signal warrants, despite being one hour away. Minor approach operations are poor in the peak hours (especially the PM peak hour), and the observed crash rate is above the area-wide average (but not above the critical crash rate). The majority of crashes are angle and left turn crashes.

Multiple public comments were received for this intersection, most being concerns related to the intersection geometry, including poor sight lines for southbound left turns.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



23 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☑ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on the south side of Boulevard Avenue and the north and the east side of State Street. Bus route 1 runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  7/8 Warrant 1: Eight Hour Traffic Volumes
  2/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

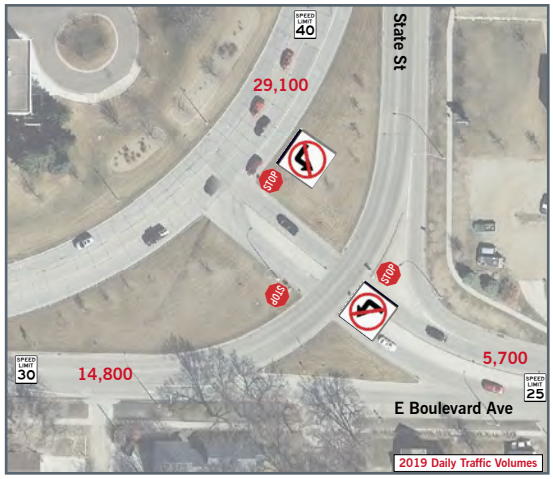
- ☑ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

A signal is nearly warranted using the eight hour warrant on the basis of major approach left turns (SBL) conflicting with the opposing through traffic. Volumes also justify a left turn phase for southbound left turns if a signal was in place.

Alternative 1: Reduced Conflict Intersection



Safety
Prohibiting westbound left turns at the intersection will reduce angled crash potential at the intersection. Similar designs have been found to reduce serious crashes by more than 40 percent.

Multimodal Conditions
Pedestrians face similar crossing challenges with a reduced conflict intersection.

Traffic Operations
If only westbound left turns from Boulevard Avenue are prohibited, southbound lefts from State Street are expected to operate at LOS C in the AM peak hour and LOS F in the PM peak hour.

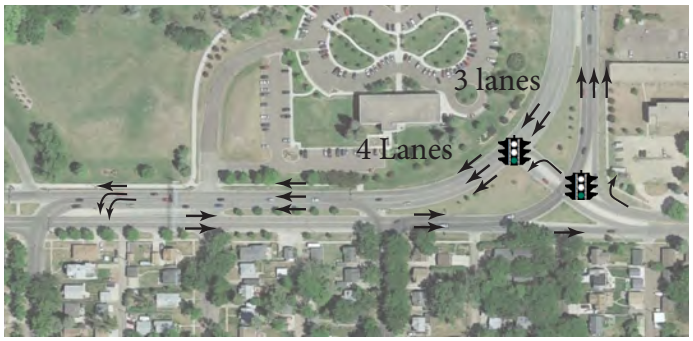
Westbound left turns could instead make right turns and then a downstream U-turn, however a lack of data at adjacent intersections makes evaluating operations under this configuration difficult.

If southbound left turns from State Street are also prohibited, operations will be significantly improved by removing the need for control on any movements.

Cost and Impacts
Detailed cost estimates were not completed, however medians required for turning movement restrictions are estimated to cost between $50,000 and $200,000, depending on the preferred configuration.

Other Notes
Prohibited turning movements would shift to other locations, which would need to be studied further prior to implementation. The extra volumes may be enough to warrant traffic signals at the Capitol Drive to the north.

Alternative 2: Continuous Green-T Intersection



Safety
Research shows a 15 percent reduction in injury crashes after converting a stop controlled T intersection to a continuous green T intersection.

Multimodal Conditions
Small pedestrian improvement from adding signal control to some movements, however other movements remain uncontrolled, meaning some pedestrian conflicts would remain.

Traffic Operations
With a continuous green T intersection, southbound traffic would never be stopped, however the northbound and westbound approaches would be signal controlled. Westbound left turning traffic would be provided a receiving lane to merge into southbound through traffic.

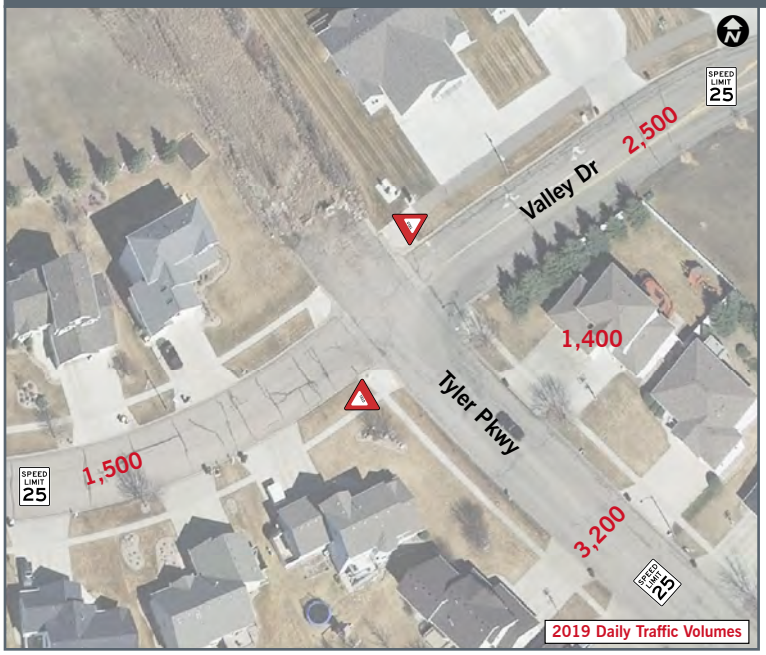
AM peak operations are expected to be good with a green T, with intersection LOS A, and no approaches operating worse than LOS B. PM peak operations are expected to be at overall intersection B, however significant queueing is expected on the northbound State Street approach without capacity expansion, with average queues of 350 feet per cycle. Similar PM peak hour operations and queuing issues are expected with a standard traffic signal.

Cost and Impacts
Estimated cost of $400,000 for traffic signal and roadway reconfiguration to accommodate green T operations.

Other Notes
Traffic operations in conjunction with major intersections at 9th Street and 7th Street need to be better understood prior to moving this alternative forward. Key factors include where westbound left turns will merge into the traffic stream and associated traffic operations.

Summary: Analysis here shows a Continuous Green T could be a viable option that is expected to substantially improve minor approach operations and reduce crash potential without requiring a complete overhaul of the intersection design. Despite the minor approach operations deficiencies, State Street effectively carries 5x more traffic than Boulevard Avenue, so any decision made at this intersection should consider the State Street corridor as a whole beyond what was completed in this study. More detailed simulation based analysis that includes adjacent intersections is recommended to better understand operations and impacts.

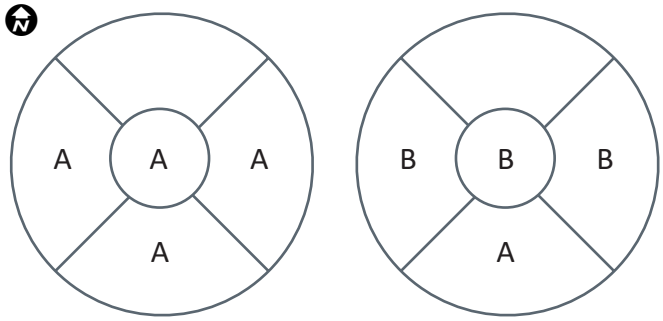
Tyler Parkway and Valley Drive
Bismarck



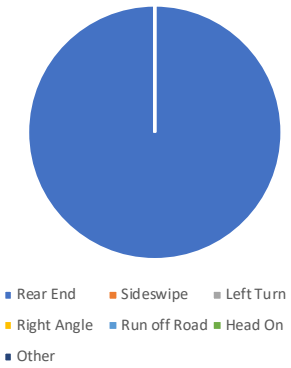
The Tyler Parkway and Valley Drive intersection is in north Bismarck, surrounded by single family homes. Tyler Parkway provides connectivity to I-94 and the Century Avenue business district, and Valley Drive provides connectivity to other residential areas north of the intersection.

There are no crash trends, pedestrian needs, or delay issues at the intersection, however the existing yield control on Valley Drive instead of Tyler Parkway has caused confusion for some drivers.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant except the south side of the east leg.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

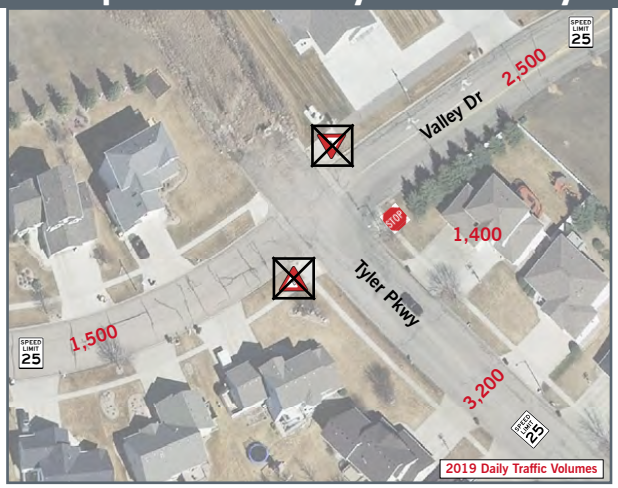
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  4/8 Minimum Traffic Volumes

Traffic volumes at the intersection warrant the consideration of two-way stop control or yield control per MUTCD guidance.

Alternative 1: Stop Control on Tyler Parkway



Safety
Limited safety data is available for this conversion, but safety may improve if the stop control on the T intersection approach is more intuitive than the existing yield control on Valley Drive. It is uncommon to have no traffic control on a roadway that terminates at an intersection.

Multimodal Conditions
Fewer controlled approaches with pedestrian crossings in the short-term, but a crossing would be added once Tyler Parkway is extended to the northwest.

Traffic Operations
LOS A is expected on the stop-controlled Tyler Parkway approach in both the AM and PM peak hours.

Cost and Impacts
Low cost improvement, estimated cost of around $750 for a new stop sign.

Other Notes
None

Alternative 2: Mini-Roundabout

Source: NACTO (Massachusetts)

Safety
Limited safety data related to this conversion. Assuming yield control operates similar to two-way stop control, research shows a 28 percent total crash reduction and a 42 percent injury crash reduction after roundabout implementation.

Multimodal Conditions
Roundabout control places traffic control on all approaches, slowing down entering vehicles, offering benefits to non-motorized roadway users.

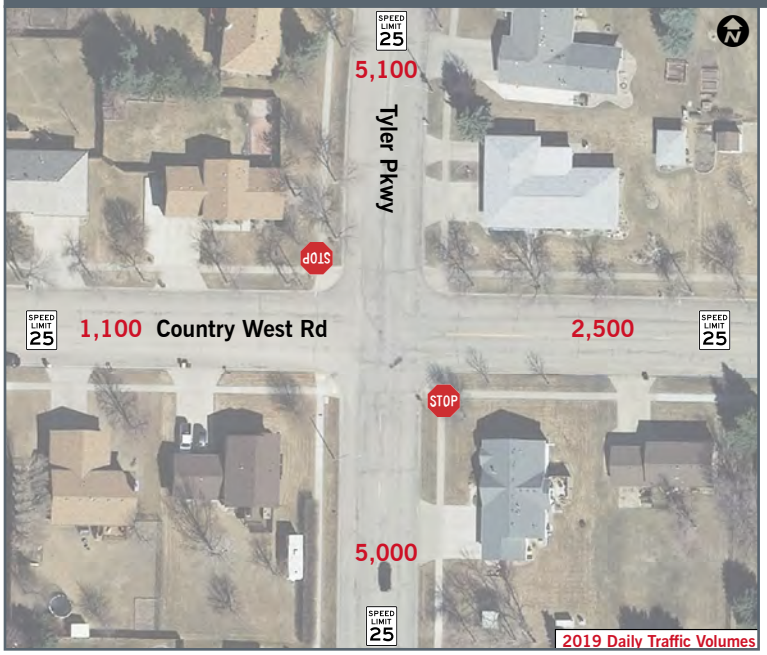
Traffic Operations
Intersection LOS A is expected in the AM and PM peak hours.

Cost and Impacts
Estimated cost of $60,000.

Other Notes
Roundabout control could have added benefits once the fourth intersection approach is constructed.

Summary: Intersection analysis does not reveal a need for revisions at this time. Converting to northbound stop control on Tyler Parkway could have some longer-term motorist expectancy benefits at a low cost.

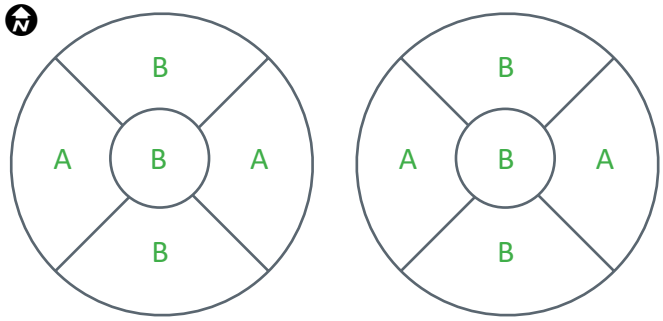
Tyler Parkway and County West Road
Bismarck



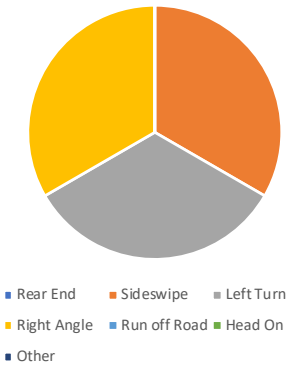
The intersection of Tyler Parkway and County West Road in north Bismarck is surrounded by single family homes. Tyler Parkway provides connectivity to I-94, the Century Avenue business district, and to other residential areas north of the intersection.

Existing operations are good, and crash history does not suggest safety issues exist. However, the stop configuration is atypical, with stop control on the higher volume roadway (Tyler Parkway).

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



3 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Based on MUTCD guidance, consideration of two-way stop control or yield control is warranted.

Alternative 1: EB/WB Stop Control

Safety
While limited safety data exists for this improvement, it is a more logical configuration for drivers.

Multimodal Conditions
Improves ease of crossing Country West Road, but makes Tyler Parkway more difficult to cross.

Traffic Operations
Minor approach LOS B is expected in both the AM and PM peak hours, with the higher volume approaches on Tyler Parkway no longer under stop control. Around three times more traffic is present on Tyler Parkway than Country West Road.

Cost and Impacts
Low cost improvement - estimated cost of $1,500 for new stop signs.

Other Notes
Stop control is recommended over yield control due to the presence of trees, especially on the west approach.

Alternative 2: Mini-Roundabout

Safety
Research shows a 28 percent total crash reduction and a 42 percent injury crash reduction after roundabout implementation.

Multimodal Conditions
Roundabout control slows down entering vehicles, offering benefits to non-motorized roadway users.

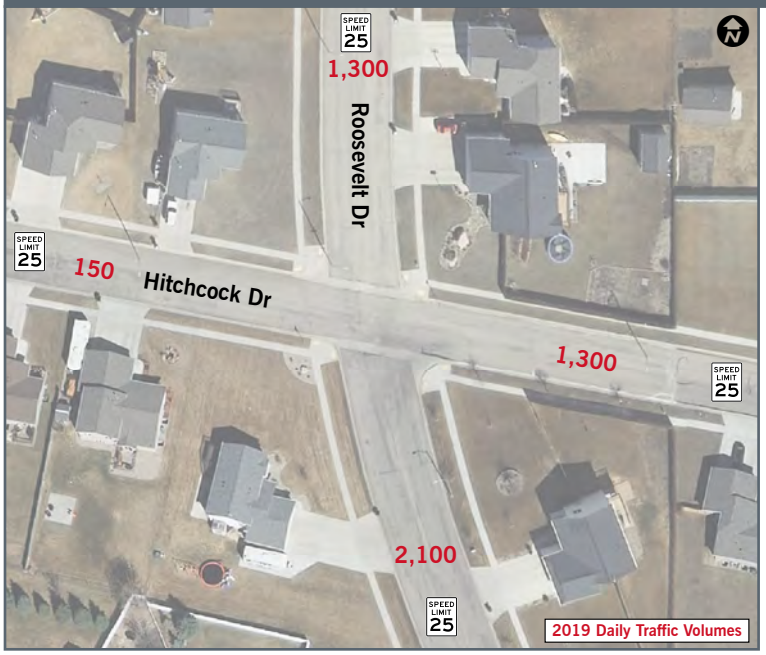
Traffic Operations
All approaches would operate at LOS A in both peak hours for this alternative.

Cost and Impacts
Estimated cost of $60,000.

Other Notes
None

Summary: Converting to eastbound/westbound stop control will provide future operational and safety benefits by prioritizing the roadway approaches with higher traffic volumes. Roundabout control is better suited to locations where more traffic control warrants are met or a safety issue requires mitigation.

Roosevelt Drive and Hitchcock Drive
Bismarck



The Roosevelt Drive and Hitchcock Drive intersection in northeast Bismarck is currently uncontrolled, and primarily surrounded by single family homes. Sunrise Elementary School is a half mile to the north of the intersection.

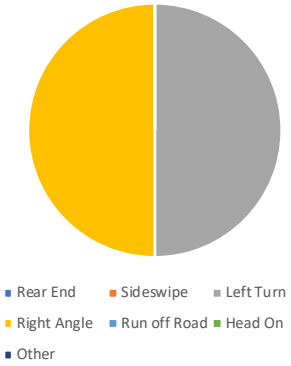
The existing valley gutters along Hitchcock Drive provide somewhat of a traffic calming benefit along Roosevelt Drive.

Two crashes were reported at this low volume intersection, however the sample size is too small to draw meaningful conclusions related to crash potential.

Traffic Operations
Level of Service

No existing traffic control

Crash History
01/01/2013 - 12/31/2017



2 Total Crashes

Critical Crash Rate?

- ☐ Yes
- ☑ No

Above Average Crash Rate?

- ☑ Yes
- ☐ No

Repeatable Crash Types?

- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on both sides of all appraoches.

Traffic Control Warrants

☐ **Meets Signal Warrants?**

0/8 Warrant 1: Eight Hour Traffic Volumes
0/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

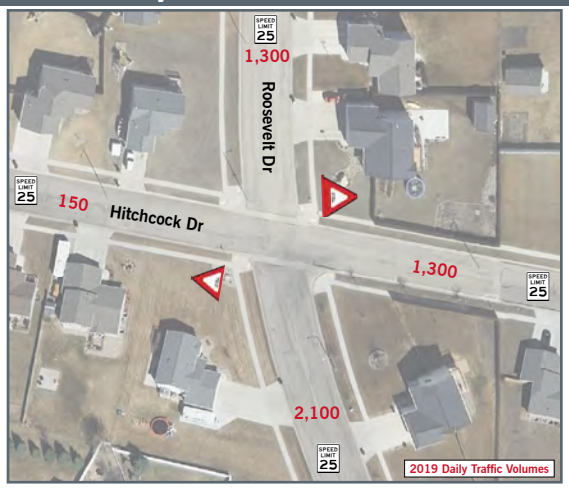
☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

☐ **Meets All-Way Stop Control Warrants?**

0/8 Minimum Traffic Volumes

Intersection volumes meet volume thresholds prescribed in the MUTCD for yield control but not for two-way stop control.

Alternative 1: EB/WB Yield Contol



Safety
Limited crash data associated with adding yield control exists, however added control will reduce driver confusion, likely reducing crash potential.

Multimodal Conditions
Yield control on Hitchcock Drive provides increased traffic control, benefitting crossing pedestrians.

Traffic Operations
Assuming yield control provides similar traffic operations to stop control, minor approach LOS B is expected on the yield-controlled approaches during both the AM and PM peak hours.

Cost and Impacts
Low cost improvement - estimated cost of $1,500.

Other Notes
The proximity to Sunrise Elementary School adds extra benefit to improved traffic control.

Alternative 2: Mini-Roundabout

Safety
Limited safety data related to this conversion. Assuming no control operates similar to two-way stop control, research shows a 28 percent total crash reduction and a 42 percent injury crash reduction after roundabout implementation.

Multimodal Conditions
Roundabout control slows down entering vehicles, offering benefits to non-motorized roadway users.

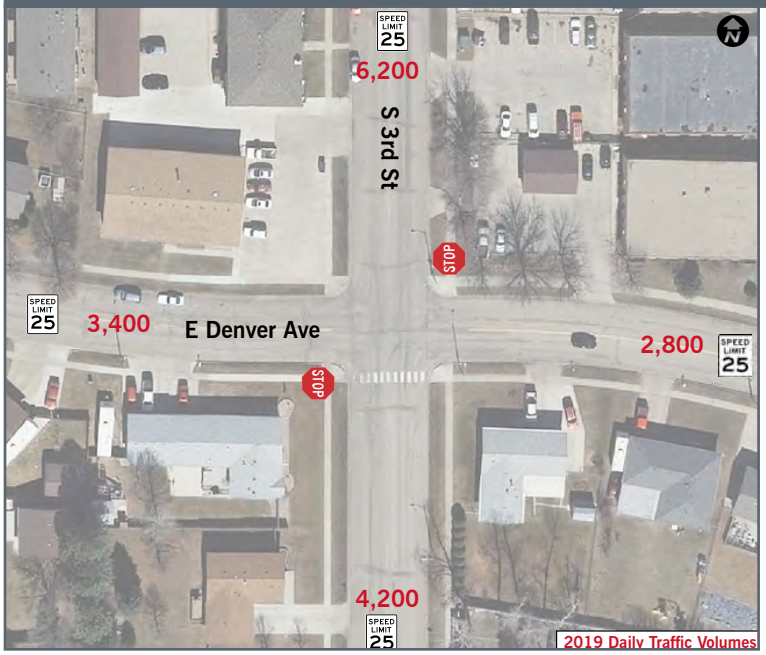
Traffic Operations
Intersection LOS A is expected in both the AM and PM peak hours.

Cost and Impacts
Estimated cost of $60,000.

Other Notes
Consideration should be given to bike facilities that do not travel within the circulating roadway given the age of students at the elementary school.

Summary: Providing yield control to Hitchcock Drive is a low-cost solution that will better assign right-of-way and potentially reduce crash potential.

3rd Street and Denver Avenue
Bismarck

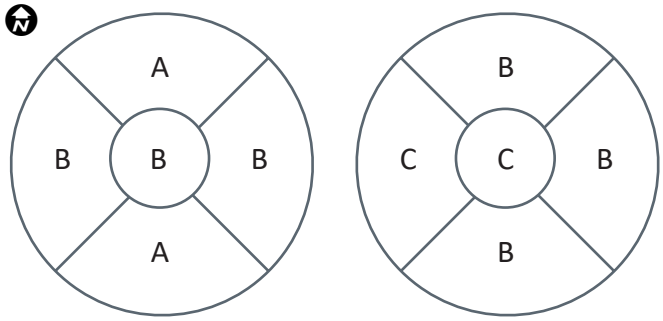


3rd Street and Denver Avenue is a two-way stop controlled intersection surrounded by single and multi-family homes. On-street parking is permitted on all intersection approaches.

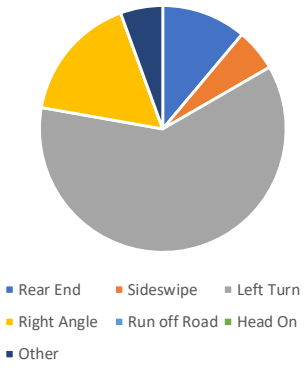
The intersection experiences a critical crash rate, with an over-representation of angled crashes. The vast majority of these angled crashes involved a northbound driver impacting a vehicle from the sidestreet. The combination of the curve to the south blocking sight distance and the wide roadway facilitating high traffic speeds may contribute to this trend.

This intersection is forecasted to meet all-way stop control warrants, which has the potential to help assign right-of-way.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



18 Total Crashes

Critical Crash Rate?
- ☑ Yes
- ☐ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant. Bus Route 2 (Blue Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☑ **Meets All-Way Stop Control Warrants?**

  9/8 Minimum Traffic Volumes

Meets warrants for all-way stop control based on estimated hourly volumes. Note that hourly turning movement data is not available.

Alternative 1: Mini-Roundabout

Source: NACTO (Massachusetts)

Safety
Research shows a 72 percent reduction in total crashes and a 88 percent reduction in injury crashes after converting a two-way stop controlled intersection to a single-lane roundabout.

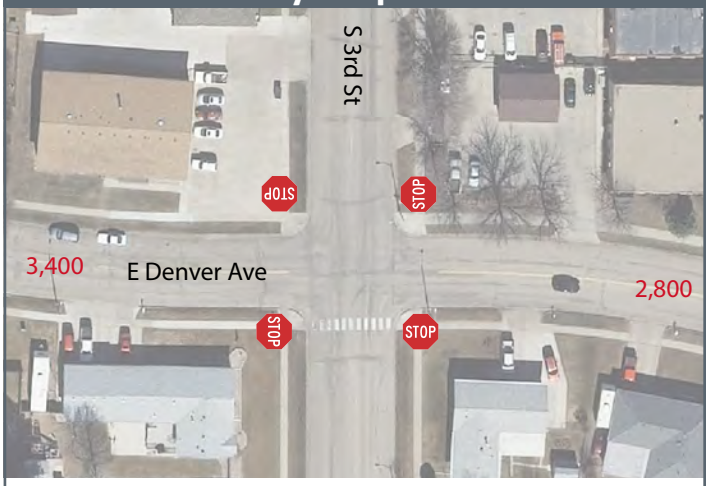
Multimodal Conditions
A roundabout improves pedestrian crossing opportunities across 3rd Street by reducing vehicle entering speeds for roundabout operations.

Traffic Operations
Intersection LOS A is expected during both the AM and PM peak hours with a single lane roundabout.

Cost and Impacts
Estimated cost of $70,000 if curbs do not need to be adjusted to accommodate the mini-roundabout.

Other Notes
None

Alternative 2: All-Way Stop Control



Safety
When converting from two-way stop control to all-way stop control at locations where warrants are met, research shows a 71 percent overall crash reduction, including a 20 percent reduction in left turn crashes and a 72 percent reduction in right angle crashes.

Multimodal Conditions
Placing stop control on 3rd Street improves pedestrian crossing opportunities.

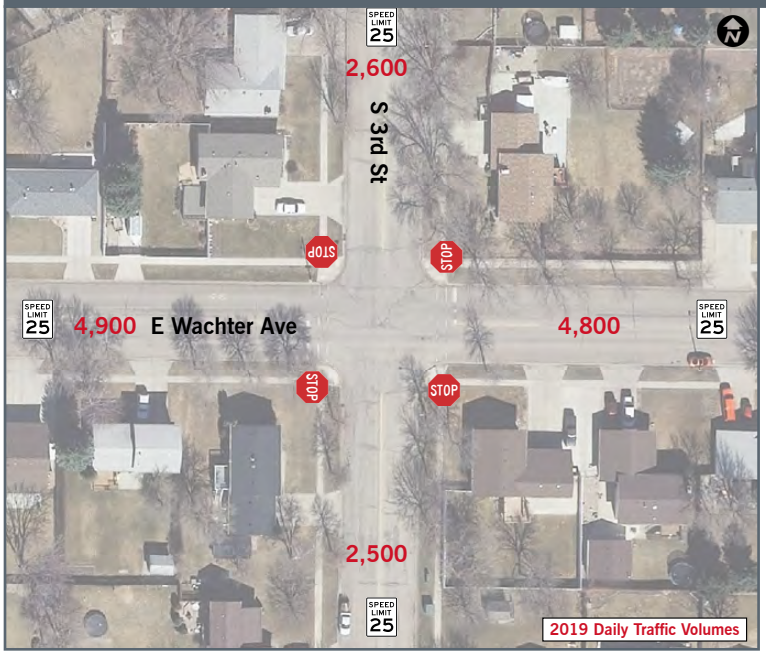
Traffic Operations
Intersection LOS A is expected during both the AM and PM peak hours with all-way stop control.

Cost and Impacts
Low cost improvement - estimated cost of $1,000 for two new stop signs.

Other Notes
All-way stop control is warranted based on estimated hourly traffic volumes.

Summary: Before any decisions are made at this intersection, more refined data collection is required. Based on estimates using daily traffic volumes, it appears that both an All-Way Stop Control and mini-roundabout would provide superior safety, operations, and multimodal conditions relative to the current roadway configuration. Traditionally, the mainline to sidestreet imbalance of the two roadways would make the mini-roundabout a better candidate for this intersection. However, given the recent roadway improvements at this intersection, an AWSC may provide the best balance of benefits and costs.

3rd Street and Wachter Avenue
Bismarck

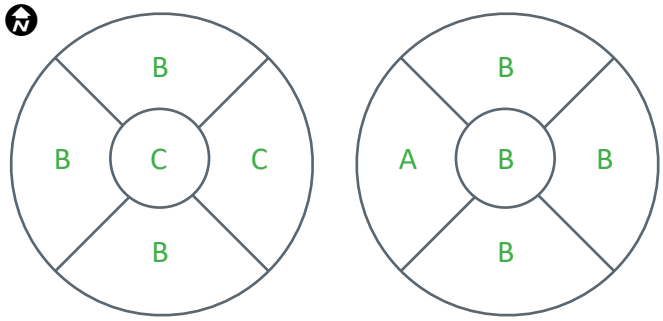


3rd Street and Wachter Avenue is an all-way stop controlled intersection in south Bismarck and is surrounded by single family homes. On-street parking is permitted on all intersection approaches.

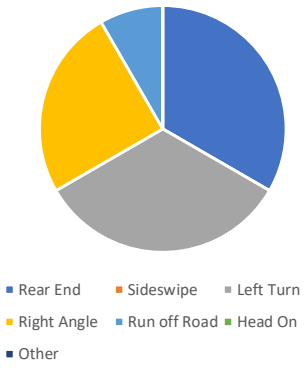
This intersection experiences crash volumes above the critical crash rate, with an over-representation of angled and rear-end crash types. Rear-ends are common at AWSC, but angled crashes are rare. One bicycle crash was recorded at this intersection during the study timeframe.

The existing traffic control at this intersection is not warranted based on traffic volumes. AWSC is traditionally most effective at intersections with even traffic distribution. Uneven distribution can often result in non-compliance which is a safety concern for vehicles and pedestrians alike. AWSC can also induce a feeling of unnecessary delay which has been proven to increase speeding downstream of an unwarranted AWSC.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



12 Total Crashes

Critical Crash Rate?
- [x] Yes
- [ ] No

Above Average Crash Rate?
- [x] Yes
- [ ] No

Repeatable Crash Types?
- [ ] Yes
- [ ] No

Multimodal Facilities

- [ ] **Recent Pedestrian Crash?**
- [x] **Recent Bicycle Crash?**
- [ ] **Within 1/4 Mile of School?**
- [ ] **Along Transit Route?**
- [ ] **Crossing with 4 of More Lanes?**
- [ ] **Crossing with Speeds Higher than 35 MPH?**
- [ ] **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant.

Traffic Control Warrants

- [ ] **Meets Signal Warrants?**

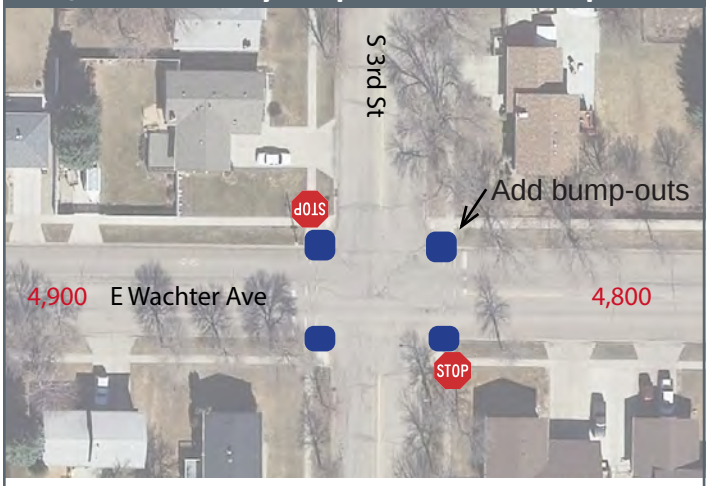
1/8 Warrant 1: Eight Hour Traffic Volumes
0/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

- [ ] **Meets Warrant for Dedicated Left-Turn Phasing?**
- [ ] **Meets All-Way Stop Control Warrants?**

0/8 Minimum Traffic Volumes

Existing all-way stop control is not warranted based on observed traffic volumes.

Alternative 1:
NB/SB Two-Way Stop Control + Bump-Outs



Safety
Unwarranted AWSC has been found to diminish driver compliance and increase vehicle speeds due to the perceived lack of benefits from all-way stop control.

Multimodal Conditions
Removing control from Wachter Avenue makes pedestrian crossings more difficult but given the low traffic volumes, finding gaps in traffic should not be difficult. The addition of bulb-outs should reduce exposure and help control vehicle speeds.

Traffic Operations
The stop-controlled minor approaches are expected to operate at LOS E in the AM peak hour and LOS C in the PM peak hour.

Cost and Impacts
Minimal cost for removing eastbound and westbound stop signs. Estimated cost of $100,000 for bump-outs.

Other Notes
None

Alternative 2:
Mini-Roundabout

Safety
Data shows a 54 percent reduction in serious crashes and minimal changes in total crashes after converting all-way stop control to a single lane roundabout. Given the propensity for angled crashes at this AWSC, a mini-roundabout is expected to be particularly effective.

Multimodal Conditions
Roundabouts offer similar crossing benefits to all-way stop control.

Traffic Operations
All approaches would operate at LOS A in the AM peak hour and LOS B in the PM peak hour.

Cost and Impacts
Estimated cost of $70,000 if curbs are not modified. Some on-street parking removal would be required.

Other Notes
None

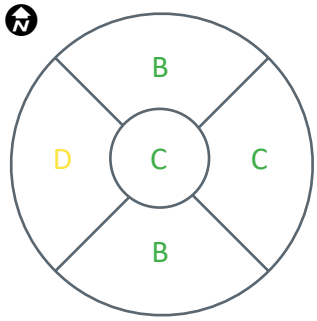
Summary: The current AWSC is unwarranted and the crash history at this intersection indicates it is not effectively managing the types of crashes typically improved by AWSC. A TWSC may not be the proper solution given the expected peak hour delays possibly contributing to increased crash rates. A mini-roundabout appears to provide the greatest benefits to safety, crashes, and multimodal conditions.

Washington Street and W Ave C
Bismarck

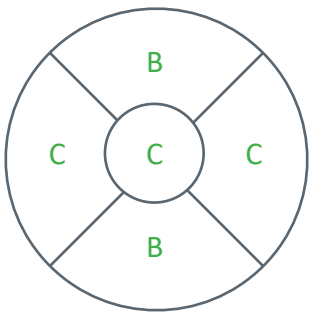
The Washington Street and W Avenue C signalized intersection is located just west of downtown and is surrounded by residential land uses.

The intersection operates effectively with the current control and geometry but experiences some peak hour delays. All left turns at the intersection are fully permissive even though left-turn warrants are met with current volumes. Overall, crashes at this intersection are lower than expected, but left-turn crashes made up an unusually high proportion of the total crashes.

Traffic Operations
Level of Service

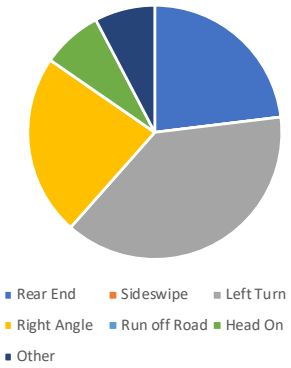


AM Peak Hour



PM Peak Hour

Crash History
01/01/2013 - 12/31/2017



13 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

Sidewalks are present on all intersection approaches.

Traffic Control Warrants

☑ **Meets Signal Warrants?**

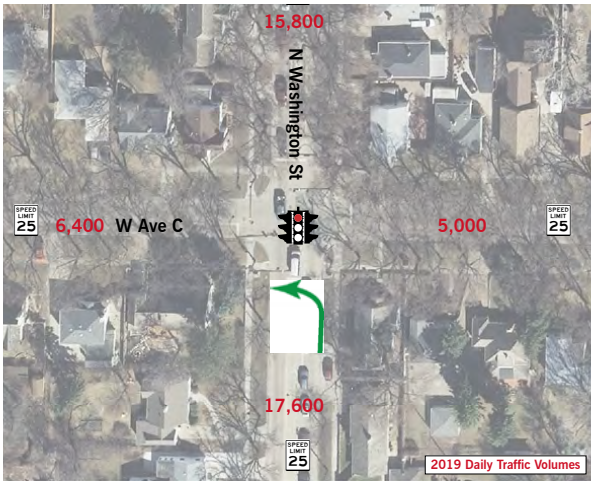
12/8 Warrant 1: Eight Hour Traffic Volumes
13/4 Warrant 2: Four Hour Traffic Volumes
10/1 Warrant 3: Peak Hour Traffic Volumes

☑ **Meets Warrant for Dedicated Left-Turn Phasing?**

☑ **Meets All-Way Stop Control Warrants?**
14/8 Minimum Traffic Volumes

Based on observed volumes, northbound protected/permitted left turn phasing is warranted.

Alternative 1: Northbound Left Turn Phasing



Safety
Data shows converting from permissive only left turn phasing to protected/permitted phasing at appropriate locations reduces crashes by 7 percent on that approach, and reduces injury crashes by 35 percent.

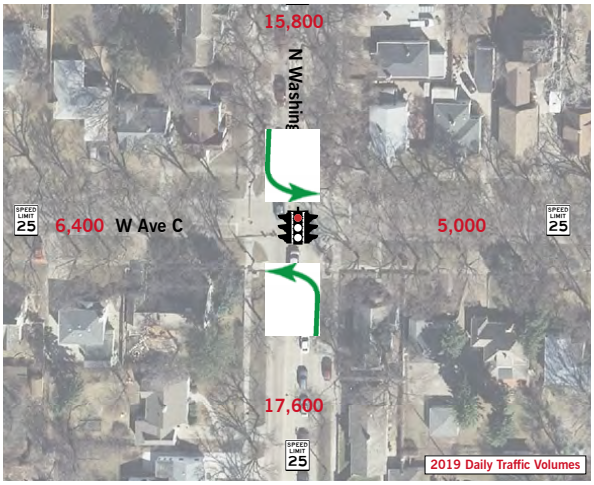
Multimodal Conditions
Minimal impact to pedestrian crossing comfort and safety as the permitted portion of northbound left turn operations will remain.

Traffic Operations
Operations remain at intersection LOS C during peak traffic conditions. The northbound and southbound left turns also operate with a similar LOS compared to existing conditions.

Cost and Impacts
No roadway or property impacts. Project cost depends on need to replace signal equipment, with estimated costs ranging from $10,000 to $150,000.

Other Notes
Northbound left turn phasing is warranted based on existing traffic volumes.

Alternative 2: NB and SB Left Turn Phasing



Safety
Data shows converting from permissive only left turn phasing to protected/permitted phasing at appropriate locations reduces crashes by 7 percent on that approach, and reduces injury crashes by 35 percent.

Multimodal Conditions
Minimal impact to pedestrian crossing comfort and safety as the permitted portion of northbound and southbound left turn operations will remain.

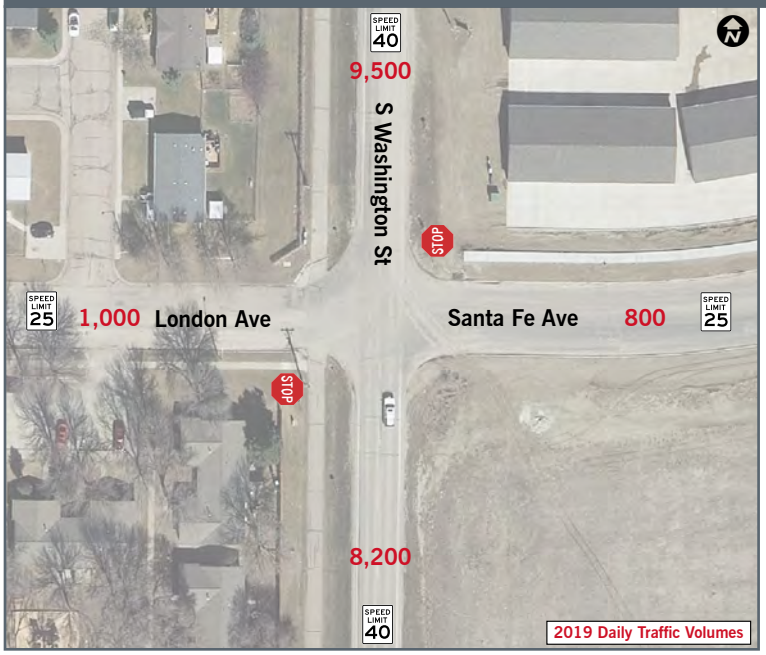
Traffic Operations
Operations remain at intersection LOS C during peak traffic conditions. The northbound and southbound left turns also operate with a similar LOS compared to existing conditions, but the southbound 95th percentile queue would be reduced by one to three car lengths in this alternative.

Cost and Impacts
No roadway or property impacts. Project cost is dependent on need to replace signal equipment, with estimated costs ranging from $10,000 to $150,000.

Other Notes
Northbound left turn phasing is warranted based on existing traffic volumes, but southbound left-turns phasing is not warranted.

Summary: Implementing protected/permitted left turn phasing appears to be a low-cost improvement that has the potential for both safety and operational benefits. While only the northbound left-turn phase is currently warranted, given traffic patterns and volumes, it may only be a matter of time before Washington Street volumes increase and the southbound protected left-turn phase is warranted. It would make sense to make these improvements concurrently.

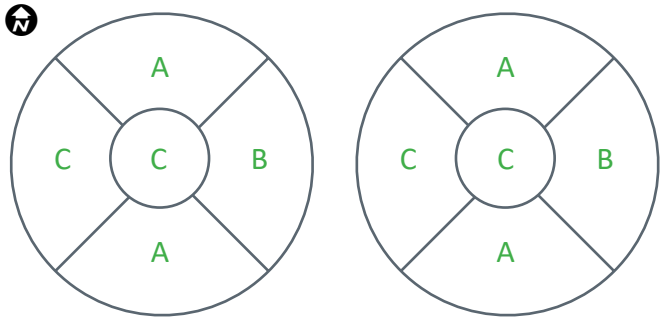
Washington Street and London Avenue
Bismarck



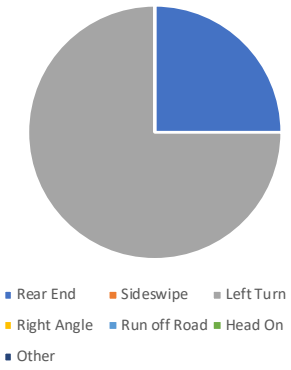
Washington Street and London Avenue is a two-way stop controlled intersection located in a growing area of south Bismarck. Surrounding land use is single and multi-family residential, with some developable property in the southeast quadrant of the intersection.

Public comments noted that turning onto Washington Street during peak hours is very challenging. Congestion is noteworthy on the sidestreets but not considered deficient according to current standards. Traffic volumes are forecasted to grow substantially by 2030.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☑ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on the west edge of Washington Street, the south side of London Avenue, and the north side of Santa Fe Avenue.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

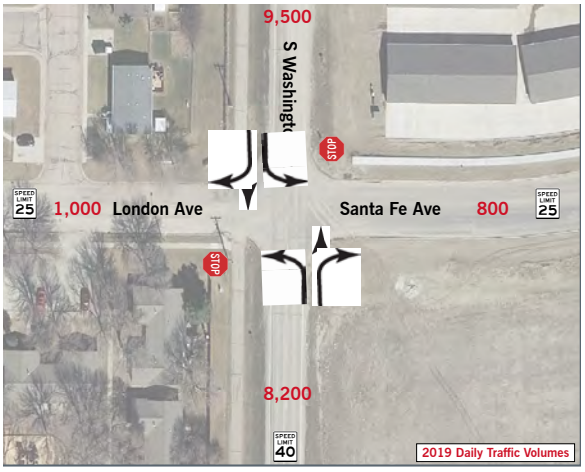
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Add NB/SB Left Turn Lanes



Safety
Adding left turn lanes to Washington Street would reduce potential, with research showing a 26 percent crash reduction after adding right turn lanes on the major approaches of stop-controlled intersections.

Multimodal Conditions
Minimal impact on pedestrian comfort and safety.

Traffic Operations
Delay for vehicles would improve slightly compared to existing conditions. Overall LOS would increase to LOS B from LOS C in both peak hours. Northbound and southbound traffic would no longer be free flow but would still be operating at LOS B or better at all times.

Cost and Impacts
Requires constructing new turn lanes, with an estimated cost of $80,000. Right-of-way (ROW) is tight in this area, potentially requiring some ROW acquisition.

Other Notes
Safety benefits will become more pronounced as traffic volumes increase in the future.

Alternative 2: Roundabout

Safety
Data shows a 72 percent crash reduction with a single lane roundabout compared to two-way stop control, with a 88 percent reduction in injury crashes.

Multimodal Conditions
Reduced vehicle speeds entering the roundabout on Washington Street will improve pedestrian crossing conditions compared to stop control only on the minor approaches.

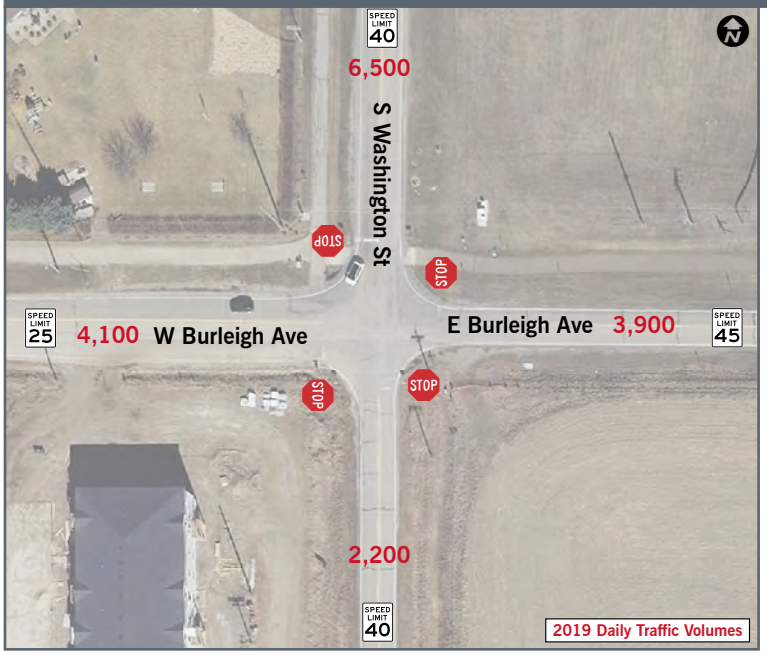
Traffic Operations
This alternative will operate at LOS A during both peak hours. This is a significant improvement compared to LOS C under existing conditions.

Cost and Impacts
Requires intersection reconstruction, with an estimated project cost of $700,000. Right-of-way (ROW) is tight in this area, potentially requiring some ROW acquisition.

Other Notes
None

Summary: Under current conditions, traffic operations and safety do not justify an improvement. However, anticipated growth in this area will likely amplify existing public concerns at this intersection. Turn lanes offer the potential to reduce crashes long-term on mainline Washington Street. A roundabout would improve sidestreet delays at the expense of mainline efficiency, and potentially increase rear-ends while likely having ROW impacts.

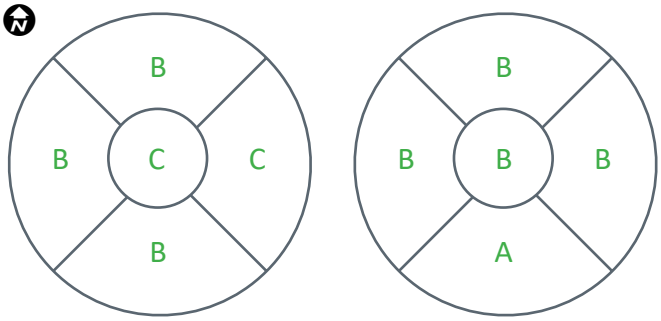
Washington Street and Burleigh Avenue
Bismarck



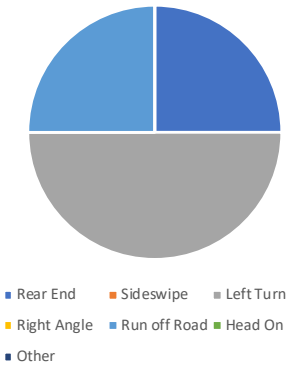
Washington Street and Burleigh Avenue is a two-way stop controlled intersection in a growing area of south Bismarck. Much of the surrounding area is currently undeveloped, with single and multi-family residential developments near the intersection as well.

The intersection operates acceptably but is more congested than other locations that experience much higher traffic volumes. The intersection does not currently meet the All-Way Stop Control (AWSC) warrants. Given the expected growth in the area, it is likely that AWSC warrants will be met in the near future.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☑ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☑ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

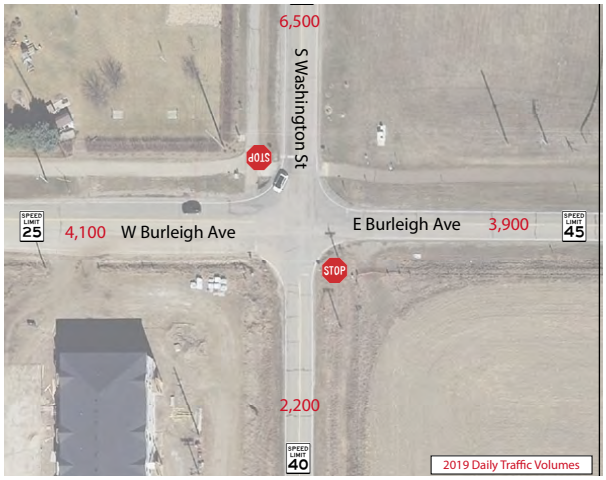
There is a sidewalk on the north side of Burleigh Avenue.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**
  - 3/8 Warrant 1: Eight Hour Traffic Volumes
  - 3/4 Warrant 2: Four Hour Traffic Volumes
  - 0/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**
  - 6/8 Minimum Traffic Volumes

Existing all-way stop control is not warranted based on observed traffic volumes.

Alternative 1: Two-Way Stop Control



Safety
Given the delays associated with two-way stop controls, it is likely that crash potential will increase, as drivers accept shorter gaps than they typically would.

Multimodal Conditions
Removing stop control will reduce the amount of traffic control, making pedestrian crossings more difficult on uncontrolled approaches.

Traffic Operations
Minor approach LOS F is expected in the AM peak hours under both northbound/southbound or eastbound/westbound two-way stop control.

Cost and Impacts
Minimal costs associated with removing stop signs.

Other Notes
The existing all-way stop control is not warranted today. However, it is likely that AWSC warrants will be met in the near future given the potential for new development in the surrounding area.

Alternative 2: Roundabout

Safety
Data shows a 54 percent reduction in serious crashes and minimal changes in crashes after converting all-way stop control to a single lane roundabout.

Multimodal Conditions
Roundabouts and all-way stop control provide similar benefits to pedestrian crossings.

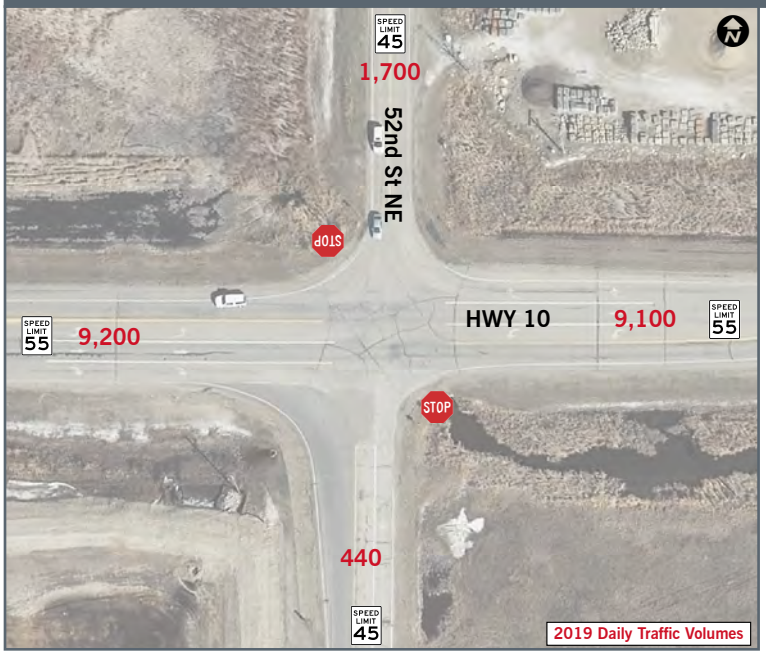
Traffic Operations
This alternative will operate at LOS A during the AM peak hour and LOS C during the PM peak hour. Compared to LOS C and B under existing conditions, respectively.

Cost and Impacts
Requires intersection reconstruction, with an estimated project cost of $700,000.

Other Notes
None

Summary: The current intersection configuration and design provides acceptable operations and has not induced a high crash rate. As traffic increases, the addition of turn lanes or a roundabout may be warranted to maintain acceptable operations and prevent increased crashes. Improvements at this intersection may benefit from consistency at Washington Street and London Avenue improvements to the north.

52nd Street and Main Avenue
Bismarck

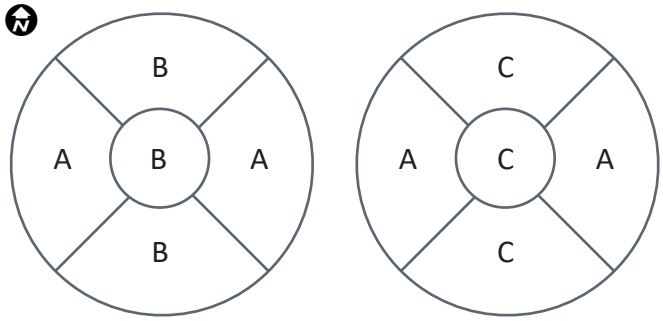


52nd Street and Main Avenue is a two-way stop controlled intersection in east Bismarck. There are some rural homes nearby to the intersection, but most of the surrounding area is undeveloped.

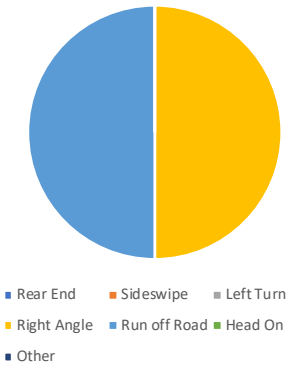
Traffic volumes, traffic operations, multimodal conditions and crash history do not warrant conversion from two-way stop control. Year 2030 traffic forecasts do not indicate any growth in the near-term at this intersection. The primary concern at this intersection is related to the north-south skew of the roadway. However, the number of vehicles that travel north-south (or vice versa) is currently minimal.

No improvement strategies were identifed as part of this study. Once future development occurs, traffic control can be revisited. As part of a future roadway project, a better alignment of the north and south approaches should be considered.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☑ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

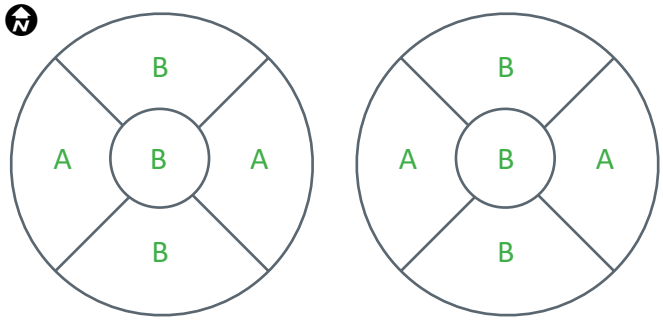
  0/8 Minimum Traffic Volumes

Burlington Drive and Morrison Avenue
Bismarck

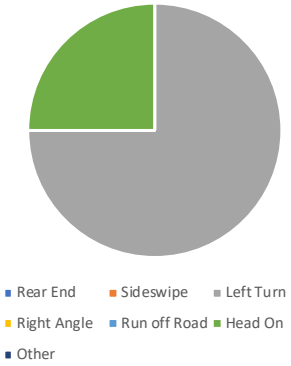
Burlington Drive and Morrison Avenue is a two-way stop controlled intersection in east Bismarck south of the Walmart and Sam's Club. Morrison Drive is a minor arterial that people use to avoid the railroad crossing on Yegan Road. Historical crash data indicates a critical crash rate at this intersection. Yield control was recently converted to two-way stop control (TWSC) to address noted crash concerns. Each crash at this intersection occured under yield control and was a failure-to-yield type of crash.

A quick review of the daily traffic volumes indicates that the stop signs are on the lower volume roadway, which is appropriate. No alternatives were studied at this intersection based on these characteristics. Recently, parking was restricted within 50 feet of the intersection on all approaches. This location should be monitored to see if future action is needed related to safety. If failure-to-yield type crashes continue, potential improvement opportunities include curb bulb-outs to improve stop sign visibility or a roundabout to minimize angled crashes.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



8 Total Crashes

Critical Crash Rate?
- [x] Yes
- [ ] No

Above Average Crash Rate?
- [x] Yes
- [ ] No

Repeatable Crash Types?
- [ ] Yes - Left Turn
- [x] No

Multimodal Facilities

- [ ] **Recent Pedestrian Crash?**
- [ ] **Recent Bicycle Crash?**
- [ ] **Within 1/4 Mile of School?**
- [ ] **Along Transit Route?**
- [ ] **Crossing with 4 of More Lanes?**
- [ ] **Crossing with Speeds Higher than 35 MPH?**
- [x] **High Land Use Density?**

Traffic Control Warrants

- [ ] **Meets Signal Warrants?**

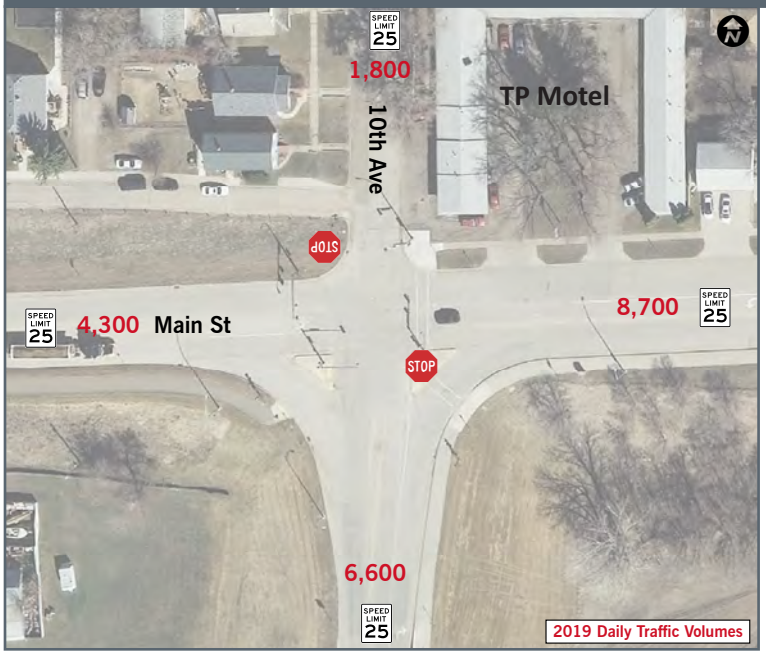
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- [ ] **Meets Warrant for Dedicated Left-Turn Phasing?**

- [ ] **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

10th Avenue NW and Main Street
Mandan

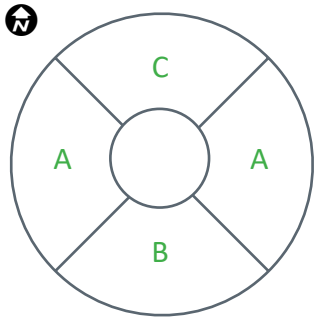


10th Avenue NW and Main Street is a two-way stop controlled intersection that serves as a gateway to downtown Mandan from the west. A signal was previously installed here, but was unwarranted and therefore removed.

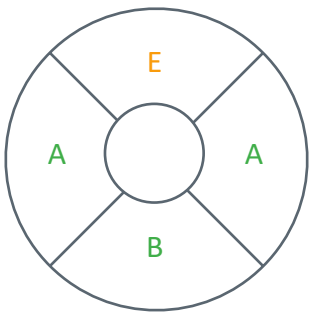
A grade separated railroad crossing is just south of the intersection, limiting reconfiguration options on the south approach. North of the intersection, land use is primarily single family residential, with the TP Motel on the northeast quadrant of the intersection.

Reassessing the traffic data reveals that the traffic signal is still not warranted, but an all-way stop control is warranted.

Traffic Operations
Level of Service

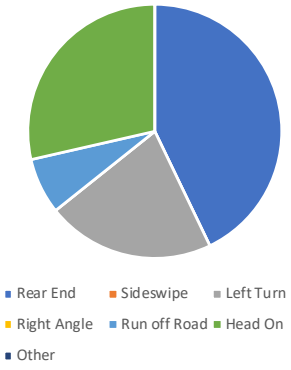


AM Peak Hour



PM Peak Hour

Crash History
01/01/2013 - 12/31/2017



*Traffic control change occured during crash data period

14 Total Crashes*

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on both sides of the south and east legs, and on the south side of the west leg. Bus Route 5 (Purple Route) runs through the intersection but there are no stops.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  2/8 Warrant 1: Eight Hour Traffic Volumes
  1/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☑ **Meets All-Way Stop Control Warrants?**
  13/8Minimum Traffic Volumes

Alternative 1: Roundabout

Safety
Single-lane roundabouts have been found to reduce crash frequency by 72 percent compared to two-way stop controlled intersections. Injury crashes have been found to decrease by 88 percent.

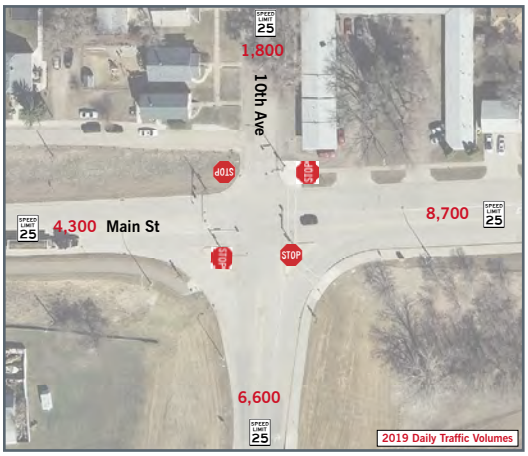
Multimodal Conditions
Reduced vehicle entering speeds into a roundabout improve crossing opportunities across Main Street. The railroad bridge south of the intersection connects the north and south halves of Mandan.

Traffic Operations
This alternative would improve all approaches to operate at LOS A in the AM and PM peak hours.

Cost and Impacts
Requires intersection reconstruction. Estimated project cost of $700,000.

Other Notes
Proximity to the railroad crossing must be considered, however, preliminary analysis indicates a roundabout can be constructed without impacting the bridge.

Alternative 2: All-Way Stop Control



Safety
Research shows a 68 percent crash reduction when converting urban minor approach stop control to all-way stop control.

Multimodal Conditions
All-way stop control adds control to all approaches, improving pedestrian crossing comfort and safety.

Traffic Operations
All-way stop control provides AM peak intersection LOS B and PM peak intersection LOS C.

Analysis assumes that existing NB and EB channelized right turns are converted to dedicated right turn lanes with no channelization.

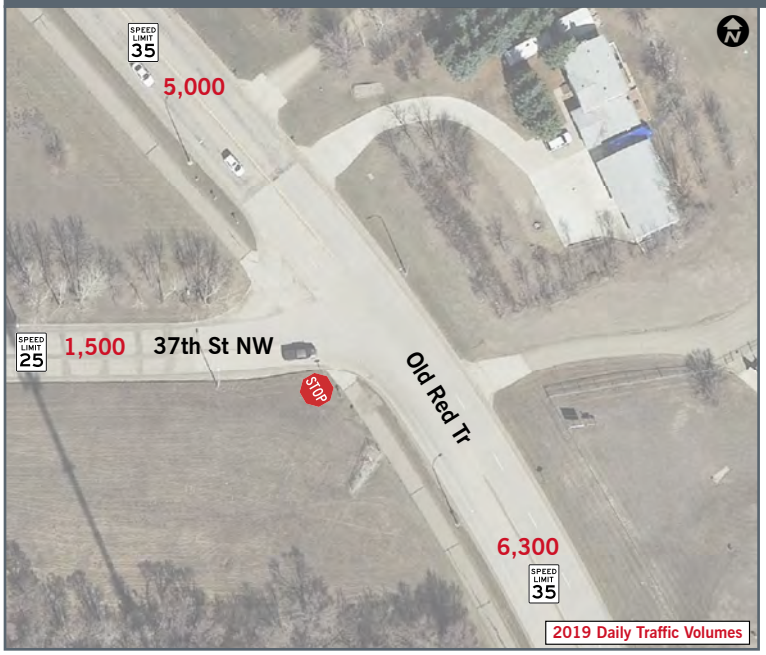
Cost and Impacts
Low cost improvement if just stops signs are added, however more significant costs if channelizing islands are removed.

Other Notes
All-way stop control configuration with channelizing islands is an uncommon configuration.

Proximity to the railroad crossing must be considered, however, preliminary analysis indicates a roundabout can be constructed without impacting the bridge.

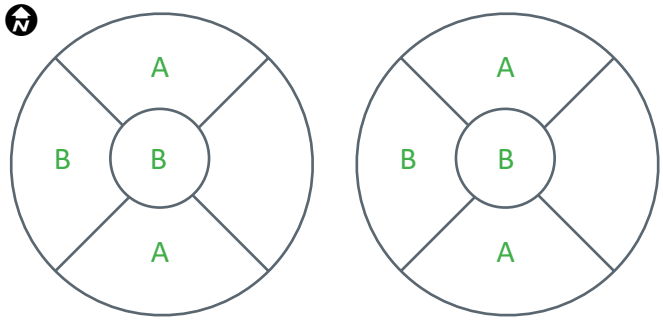
Summary: The traffic volumes are high enough to warrant an All-Way Stop Control or Roundabout. The Roundabout, in particular, appears to have some clear safety and multimodal crossing benefits. This improvement does come at a high cost, especially with potential additional costs associated with the railroad bridge to the south. Without a long history of crash data under two-way stop control and the recent revisions, it may be best to monitor this intersection for a longer period of time (1-3 years) before making any additional changes.

Old Red Trail and 37th Street NW
Mandan

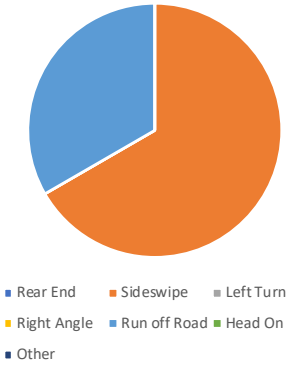


The intersection of Old Red Trail and 37th Street NW is a stop-controlled intersection in northwest Mandan, adjacent to both low-density residential and industrial land uses. Old Red Trail is a three-lane roadway with a two-way left turn lane, and 3rd Street is a two-lane roadway. The intersection is on a skew but experienced minimal crash tendencies. The intersection operates well and experiences minimal pedestri-an and bicycle activity.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



3 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

This intersection has a multi-use trail along the west edge of Old Red Trail. There is a marked crosswalk on the west leg of the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

A signal is not warranted at this intersection.

Alternative 1:
Striped Turn Lanes on 37th Street

Safety
Data shows a 25 percent crash reduction when adding a minor approach left turn lane at unsignalized T-intersections.

Multimodal Conditions
Increased number of travel lanes to traverse, but more organized traffic. Overall pedestrian safety changes are expected to be minimal.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Low Cost Improvement - $5,000 - $10,000

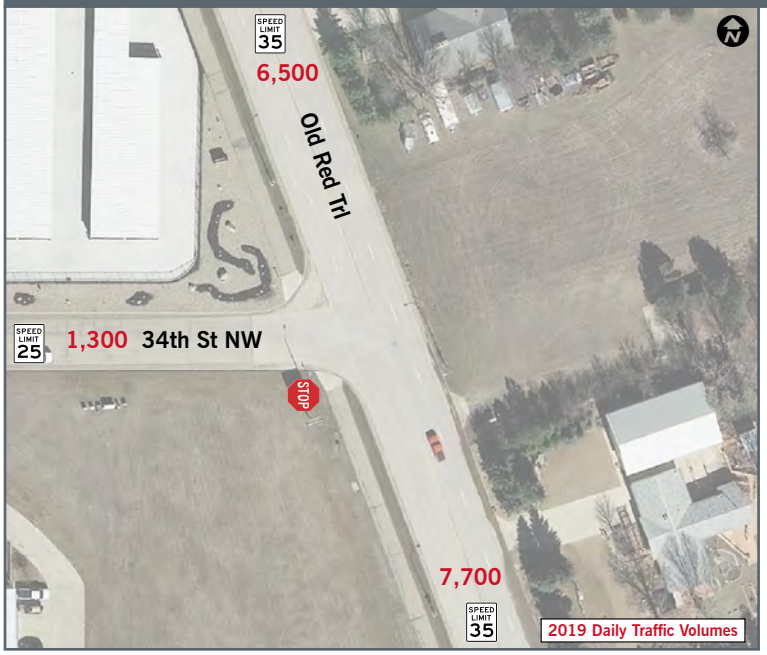
No impacts to curblines or adjacent property. Striping can fit within the existing roadway footprint.

Other Notes
None

No other alternatives considered at this location.

Summary: Existing conditions do not exhibit any overrepresented deficiencies. However, adding minor approach turn lanes as part of a larger roadway project can provide slight operational and safety benefits with minimal investment.

Old Red Trail and 34th Street NW
Mandan

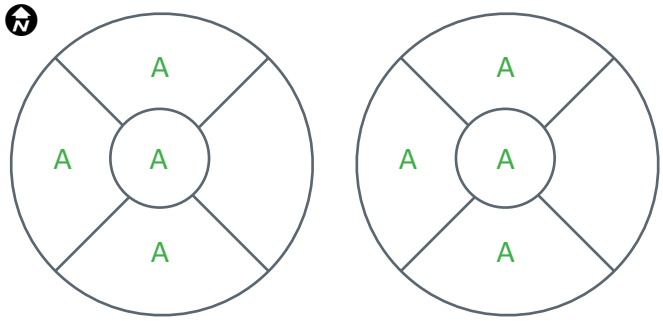


The intersection of Old Red Trail and 34th Street NW is a stop-controlled intersection in northwest Mandan, generally providing access to industrial land uses, with some light residential areas also adjacent to the intersection. Given the industrial land uses in the area, truck traffic is common at this intersection.

This intersection has experienced no crashes over the past 10 years, operates well, has few reasons for pedestrians or bicycles to cross the street. Overall, there is no evidence suggesting that traffic control should be adjusted at this intersection.

The moderate traffic volumes and excess capacity may lead to frequent speeding conditions, especially with the 35 MPH speed limit. Speed data was not explicitly collected at this intersection.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017

0 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

This intersection has a multi-use trail along the west edge of Old Red Trail. There is a marked crosswalk on the west leg of the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

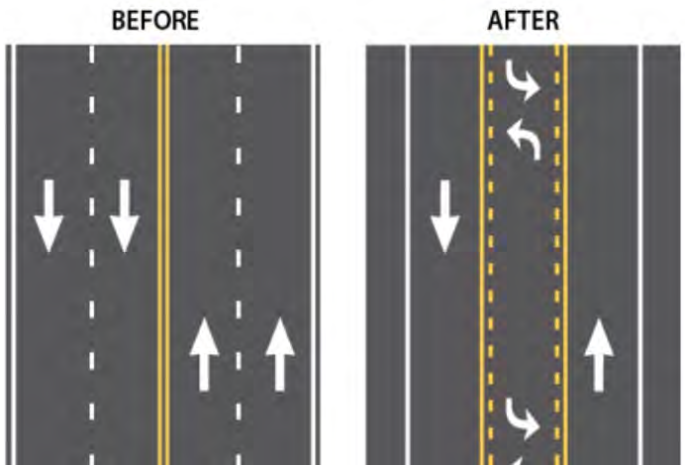
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

A signal is not warranted at this intersection.

Alternative 1:
Road Diet on Old Red Trail with Striped Side Streets



Safety
Safety improvements are expected, with data showing a 19 to 47 percent reduction in crashes after converting a four-lane roadway to a three-lane roadway with a two-way left turn lane.

Multimodal Conditions
Road diets reduce crossing exposure by reducing the number of travel lanes to cross. Road diets also enable the provision of future bike lanes, if desired.

Traffic Operations
Level of Service for the stop-controlled 34th Street approach would remain the same in the PM peak hour and decrease from LOS A to LOS B in the AM peak hour.

As such, capacity reduction on Old Red Trail is not expected to introduce operations issues.

Cost and Impacts
Moderate cost improvement - $175,000 to $250,000 per mile of road diet.

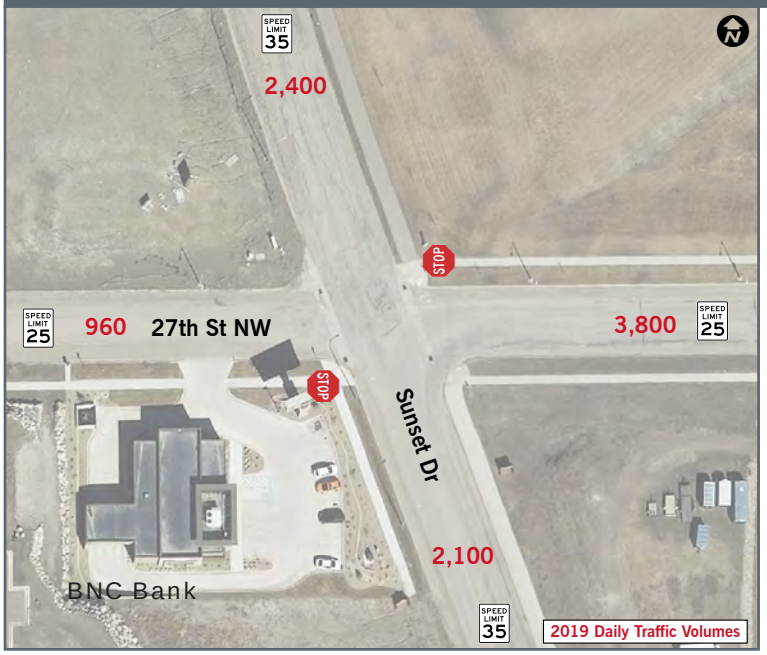
No impacts to curblines or adjacent property.

Other Notes
None

No other alternatives considered at this location.

Summary:
Consider re-striping Old Red Trail to three lanes as part of larger roadway project. Depending on regional bike connectivity plans, this can be coupled with bike lanes along the corridor. ADTs indicate that a three lane section would provide adequate capacity throughout the entirety of Old Red Trail and provide more defined safety benefits to the southeast, where access density is higher. The corri-dor is already designed as a three-lane section to the north.

Sunset Drive and 27th Street NW
Mandan

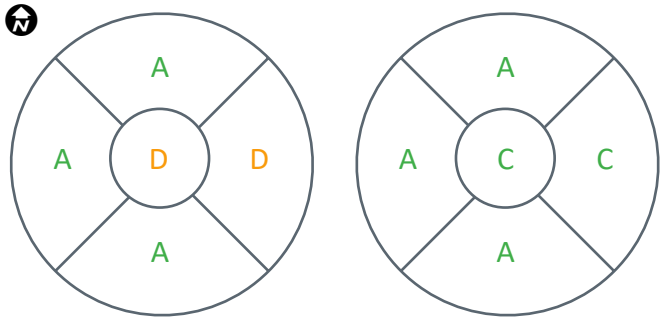


The intersection of Sunset Drive and 27th Street NW is a stop-controlled intersection in north Mandan, with adjacent land uses including Mandan Middle School, light commercial areas, and apartments. 27th Street provides access to single family homes to the east.

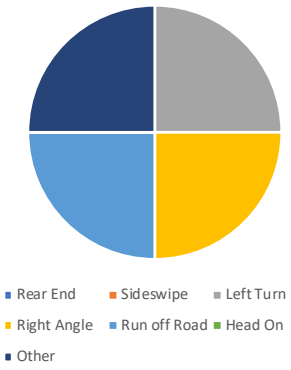
Given the proximity to the school, residents have expressed concerns related to poor gap availability on Sunset Drive after school.

The intersection has an above average crash rate, but does not exhibit clear trends. The intersection would benefit from improved traffic control during peak hours associated with the school but otherwise operates acceptably.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

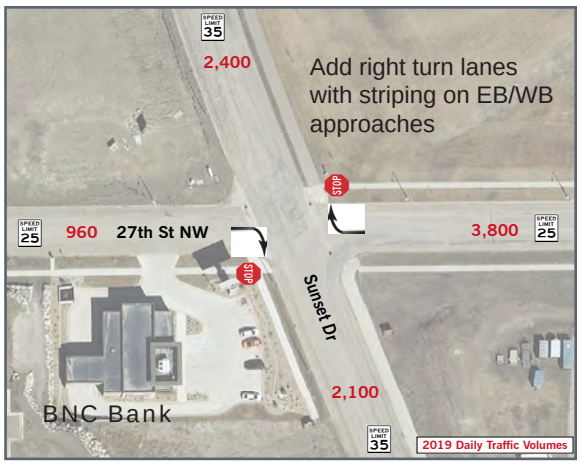
There are sidewalks on all four quadrants of the intersection (NW not shown on the aerial image above). There is a marked crosswalk on the east leg of this intersection.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**
  - 0/8 Warrant 1: Eight Hour Traffic Volumes
  - 0/4 Warrant 2: Four Hour Traffic Volumes
  - 2/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**
  - 2/8 Minimum Traffic Volumes

Peak hour warrant is met, however, it is uncommon to install signals using this warrant, especially if other options can pro-vide acceptable operations.

Alternative 1: Striped Turn Lanes



Safety
Minor safety benefits are likely from designated turn lanes, especially for rear-end crashes. Note that limited safety data is available for such improvements on stop-controlled approaches at four-legged intersections.

Multimodal Conditions
Increased number of travel lanes to traverse, but more organized traffic. Overall pedestrian safety changes are expected to be minimal.

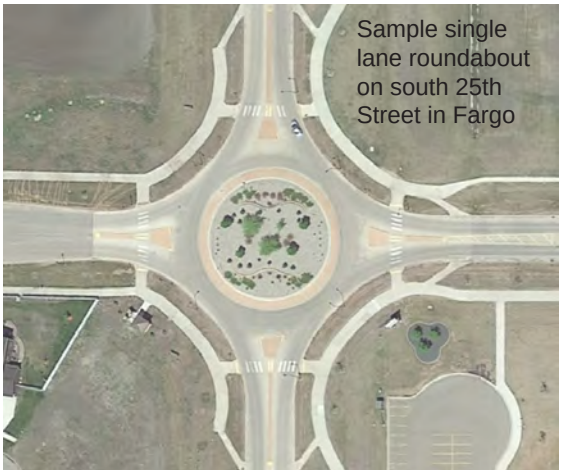
Traffic Operations
Minimal changes to peak hour traffic operations.

Cost and Impacts
Low Cost Improvement - $10,000 - $20,000

No impacts to curblines or adjacent property

Other Notes
None

Alternative 2: Roundabout



Safety
Single lane roundabouts reduce crash potential compared to two-way stop control, with data showing a 72 percent reduction in total crashes and an 88 percent reduction in injury crashes.

Multimodal Conditions
Reduced vehicle speeds entering a roundabout would improve crossing safety across Old Red Trail.

Traffic Operations
Intersection operations would improve to LOS A for all approaches in the AM and PM peak hours.

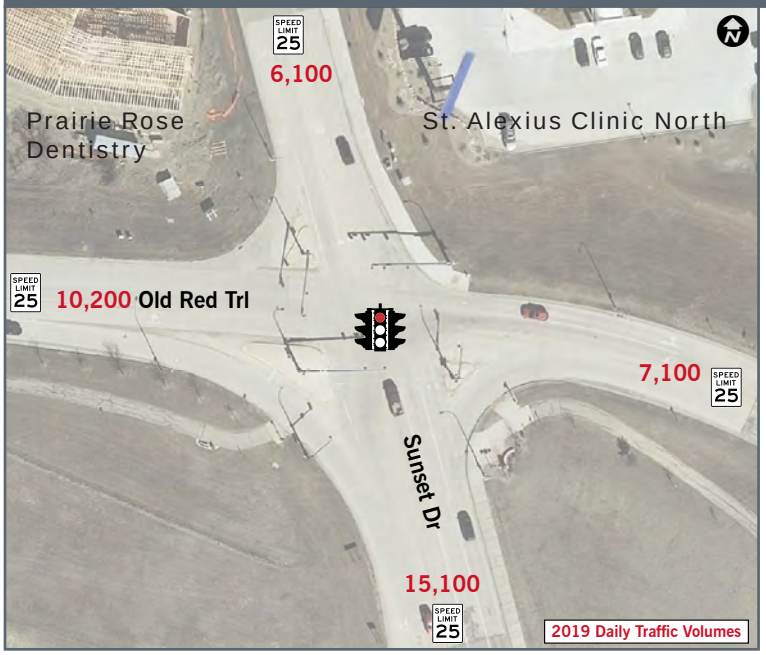
Cost and Impacts
Higher Cost Improvement - $700,000

Requires intersection reconstruction, which will not impact adjacent buildings.

Other Notes
The intersection grades will likely require extra costs for grading and new retaining walls. Detailed cost estimates were not developed for this intersection.

Summary: Consider turn lane striping as part of a maintenance project and consider single-lane roundabout during a future reconstruction project. Roundabouts provide an improvement to operations, safety and speed. While speed data wasn't explicitly collected in this area, the wide roadway cross-section may lend itself to speeding.

Sunset Drive and Old Red Trail
Mandan



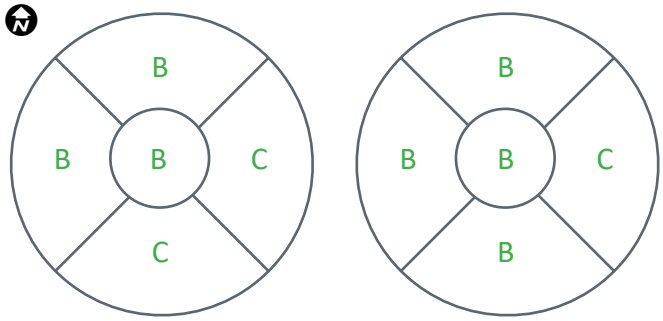
This signalized intersection is a gateway to residential areas in north Mandan, and is located adjacent to commercial land use, with Wal-Mart directly to the east.

Residents have raised concerns at this location. WB left turn movement conflicts with EB right turn – WB left is not protected, but this change could be warranted.

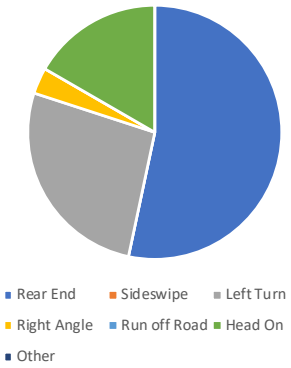
The EB right-turn movement is signal controlled with a lane added. This design, coupled with southbound traffic headed towards I-94 creates a weaving maneuver. Many drivers treat the EB right-turn lane as yield controlled. This condition is a primary contributor to the overrepresented crash trends.

The porkchop island can be uncomfortable as a pedestrian, as motorists frequently look upstream for gaps in traffic instead of scanning for pedestrians.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



30 Total Crashes

Critical Crash Rate?
- ☑ Yes
- ☐ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Rear End
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are marked crosswalks with signs on all legs and multi-use paths on each quadrant except for the northwest quadrant. Bus Route 6 (Purple Route) passes through the intersection without stopping.

Traffic Control Warrants

☑ **Meets Signal Warrants?**

7/8 Warrant 1: Eight Hour Traffic Volumes
4/4 Warrant 2: Four Hour Traffic Volumes
2/1 Warrant 3: Peak Hour Traffic Volumes

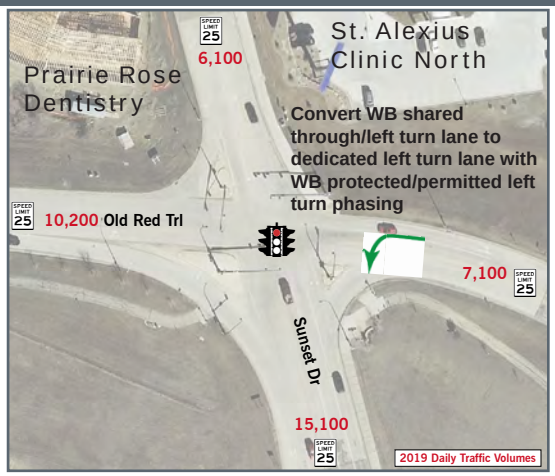
☑ **Meets Warrant for Dedicated Left-Turn Phasing?**

☑ **Meets All-Way Stop Control Warrants?**

15/8 Minimum Traffic Volumes

The dual northbound left-turn lanes warrant a protected left-turn phase, which is currently in-place at the intersection. Based on observed traffic conditions, westbound protected left-turn phasing is warranted.

Alternative 1:
Dedicated WB Left Turn Lane + Left Turn Phasing



Safety
Implementation of westbound protected/permitted left turn phasing is expected to improve intersection safety, with data showing an expected 7 percent reduction in overall crashes and a 35 percent reduction in fatal and injury crashes.

Multimodal Conditions
Protected/permissive left turn phasing partially reduces vehicle/pedestrian conflicts, but conflicts remain during permissive phases.

Traffic Operations
The intersection would operate at LOS C and LOS B during the AM and PM peak hours, respectively. The northbound and southbound approaches would decrease by one level of service, the westbound approach would improve by one level of service, and the eastbound approach would remain the same.

Cost and Impacts
Low cost improvement - $5,000 to $30,000, depending on need to replace signal cabinet.

No impacts to curblines or adjacent property.

Other Notes
None

Alternative 2: Remove Porkchops and Revise Lane Configuration

Safety
Dedicated eastbound and westbound turn lanes reduce rear-end crash potential by separating out turning vehicles from the through traffic stream.

Multimodal Conditions
Removing channelizing porkchop islands will improve pedestrian comfort and safety by reducing turning vehicle speeds.

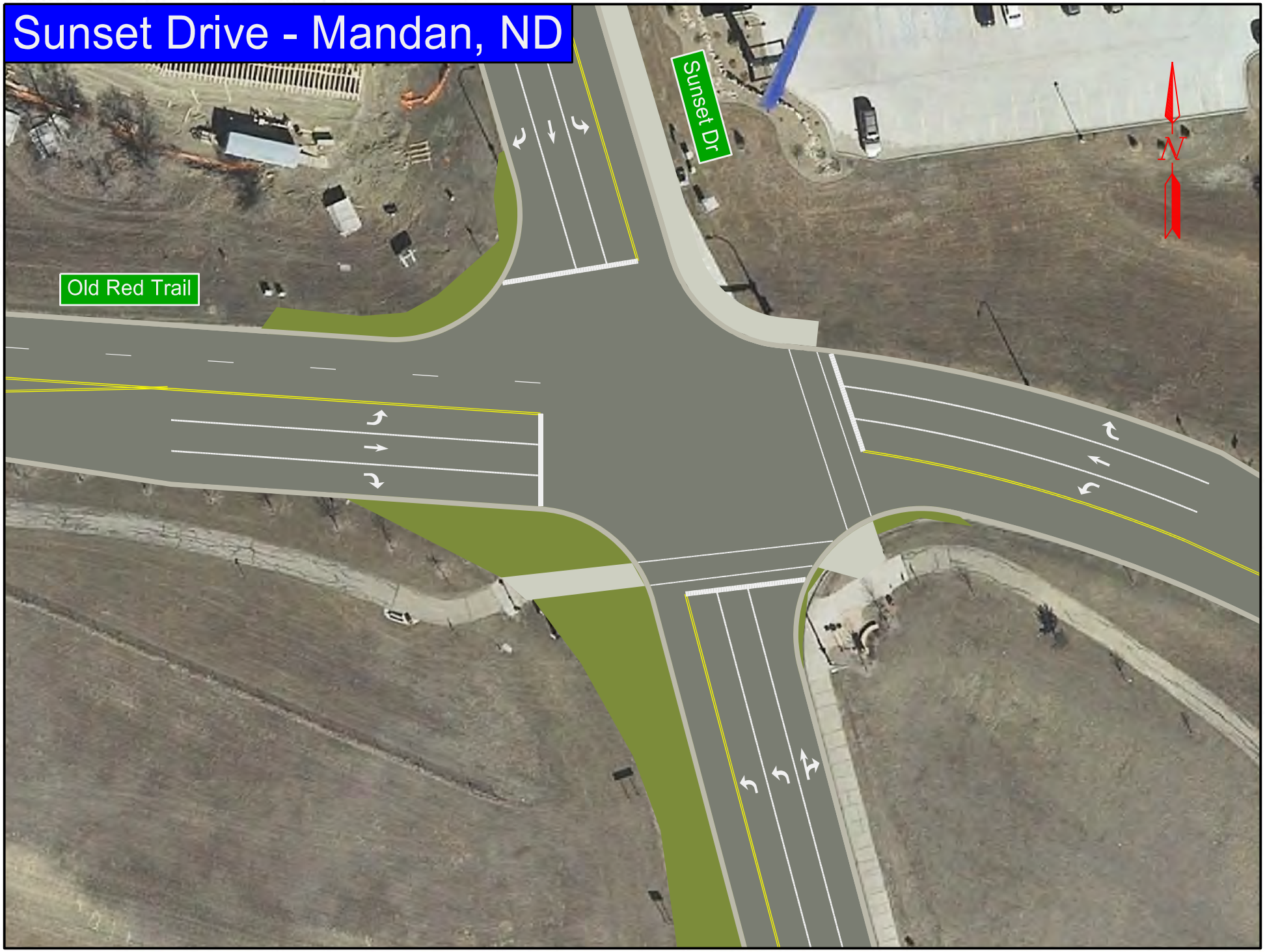
Traffic Operations
Operations at this intersection would remain the same as existing except the westbound approach would improve from LOS C to LOS B in the AM peak hour.

Cost and Impacts
Higher cost improvement - $900,000

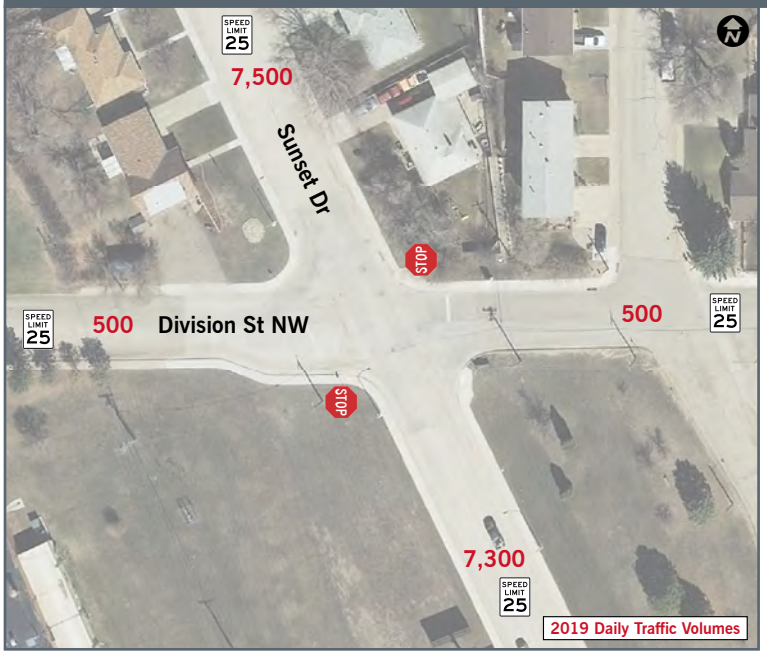
Would require intersection reconstruction, but no building impacts are expected.

Other Notes
None

Summary: Consider implementing westbound protected/permitted left turn phasing for immediate operational benefits. Consider the reconfiguration of the intersection to improve the critical crash trends as part of a larger roadway project.


Sunset Drive - Mandan, ND
Old Red Trail
Sunset Dr
N

Sunset Drive and Division Street NW
Mandan



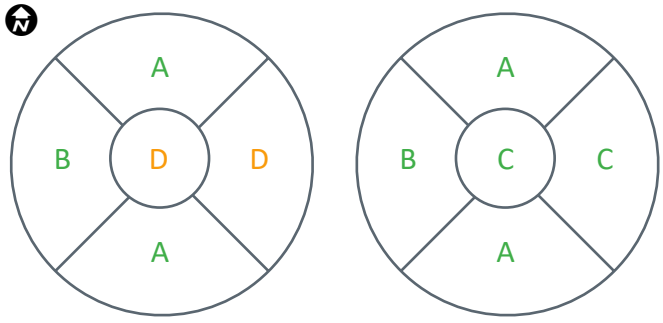
Sunset Drive and Division Street NW is a stop-controlled intersection adjacent to Mandan High School. Steep vertical grades are present on the east and west approaches.

The intersection experiences acceptable operations throughout the day, however AM peak LOS D occurs on the low volume westbound approach. During the AM peak hour, both the east and west approaches carry fewer than 40 cars.

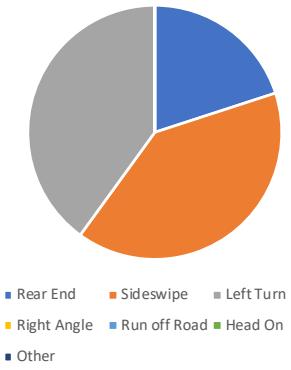
Increased traffic control is unnecessary because operations are acceptable, crash trends are below average, and side street traffic volumes are low.

Traffic speed data collected as part of this study indicate that speed is a concern, with 85 percent speeds at 33 MPH.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



5 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

This intersection has sidewalks on each quadrant, but no marked crosswalks. Bus Route 6 (Purple Route) runs through the intersection and has a sheltered stop 200 feet south of the intersection on the west side of Sunset Drive.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

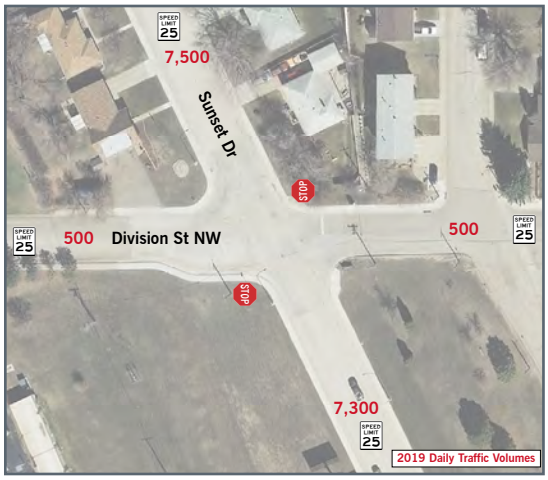
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Add Turn-Lanes



Safety
Adding left turn lanes on Sunset Drive and a right turn lanes on the west approach of Division Street would reduce rear-end crash potential, however crash history does not suggest an issue. The westbound approach of Division Street would benefit from separating right turning vehicles on a steep grade.

Multimodal Conditions
Turn lanes are expected to have minimal impact on multimodal safety and operations.

Traffic Operations
Turn lanes are not expected to result in any level of service changes.

Operations with a southbound right turn lane were also studied, however no LOS changes are expected. This roadway space would be better used for a two-way left turn lane given the extent of property access along the corridor.

Cost and Impacts
Low cost improvement - $20,000
Roadways are wide enough to stripe turn lanes without curbline or property impacts.

Other Notes
Extending the existing eastbound right turn lane as part of a future project is recommended.

Alternative 2: Conflict Warning System for Southbound Steep Grade.

Safety
This improvement would place signs and beacons on Sunset Drive that would flash when vehicles are approaching on Division Street. A major safety benefit is notifying drivers when vehicles are approaching from the steep downhill grade on the east approach, especially during slippery roadway conditions.

Multimodal Conditions
A conflict warning system is expected to have minimal impact on multimodal safety and operations.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

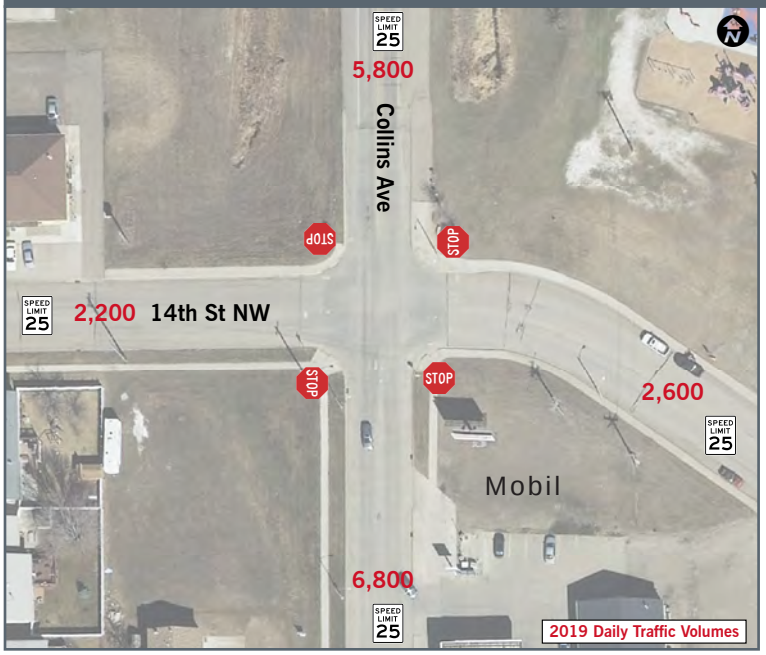
Cost and Impacts
Low cost improvement - $20,000

No impact to curblines or adjacent properties.

Other Notes
Most installations of this treatment are in rural areas, therefore benefits in urban areas are not well understood.

Summary: Despite the steep approaching grades at this intersection, crash trends do not indicate this has been a major contributor to crashes. The primary concern in this area is traffic speeds, which are unlikely to be corrected with intersection traffic control without creating new safety issues. A two-way left-turn lane along this corridor has the potential to tighten lane width, reduce speeding, and improve safety into the driveways along the corridor but would come at the expense of parking.

Collins Avenue and 14th Street NW
Mandan

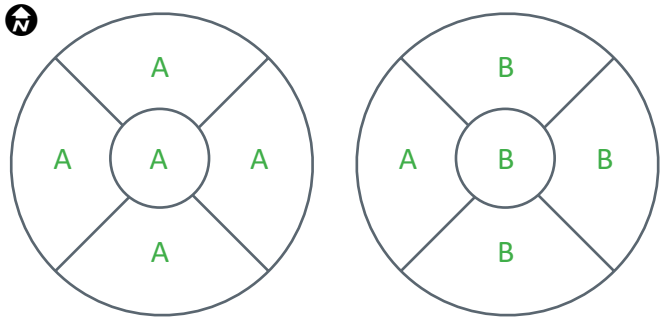


Collins Avenue and 14th Street NW is an all-way stop controlled (AWSC) intersection located just south of one of the few crossings of I-94 in Mandan. Eagles Park is located on the northeast quadrant of the intersection and a Mobil gas station is located on the southeast quadrant of the intersection. Other surrounding land use is residential, including several apartment buildings.

Away from the intersection, parking is allowed on both sides of 14th Street.

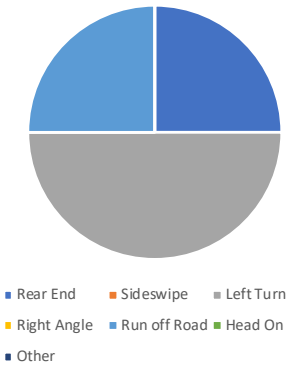
The traffic control at this intersection is not warranted based on traffic volumes. AWSC is traditionally most effective at intersections with even traffic distributions. Uneven distribution often leads to non-compliance which is a safety concern for vehicles and pedestrians alike. AWSC can also induce a feeling of unnecessary delay which has been shown to increase speeding downstream of an unwarranted AWSC.

Traffic Operations
Level of Service



AM Peak Hour | PM Peak Hour

Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant except for the north leg which has a multi-use path on the east side of Collins Avenue. Bus Route 6 (Purple Route) runs through the intersection with a stop a few blocks to the west near a senior living community.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  1/4 Warrant 2: Four Hour Traffic Volumes
  1/1 Warrant 3: Peak Hour Traffic Volumes

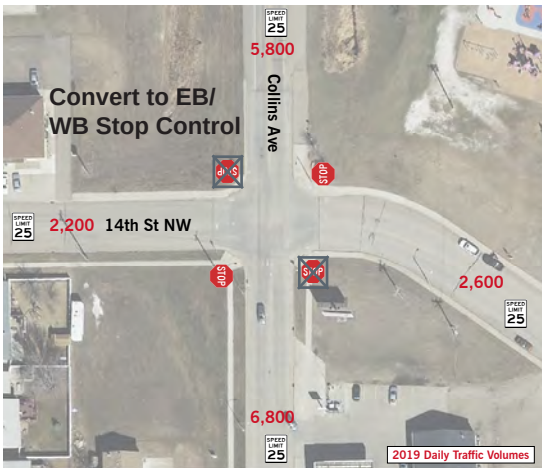
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  4/8 Minimum Traffic Volumes

The existing all-way stop control is not warranted based on observed traffic volumes. The peak hour signal warrant is met, but signals are not typically installed if only this warrant is met, especially if acceptable operations can be provided with other traffic control.

Alternative 1: Two-Way Stop Control



Safety
The existing all-way stop control configuration is unwarranted based on observed traffic volumes. Research shows decreased compliance at unwarranted all-way stop control, which increases crash potential. As such, safety benefits are expected with a conversion to two-way stop control.

Multimodal Conditions
Removing northbound/southbound stop control creates more vehicle/pedestrian conflicts as it requires pedestrians crossing Collins Avenue to wait for acceptable gaps.

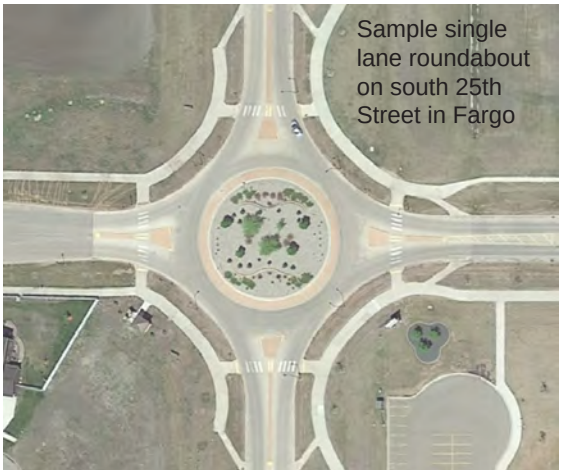
Traffic Operations
The eastbound and westbound approaches would decrease to LOS B in the AM peak hour and LOS C in the PM peak hour. The northbound and southbound operations would improve to LOS A as free approaches.

Cost and Impacts
Low Cost Improvement - Minimal costs for removing stop signs. A supplemental pedestrian beacon has an approximate cost of $15,000 to $20,000.

No impacts to curblines or adjacent properties.

Other Notes
Adding an actuated pedestrian beacon nearby could mitigate pedestrian crossing issues associated with removing traffic control on Collins Avenue.

Alternative 2: Roundabout



Safety
Data shows a 54 percent reduction in serious crashes and minimal changes in crashes after converting all-way stop control to a single lane roundabout. Data is limited as most studies have focused on converting two-way stop control and signals to roundabouts.

Multimodal Conditions
Removing stop control on all approaches can result in more vehicle/pedestrian conflicts, however noncompliant drivers at the existing all-way stop control also create safety issues for pedestrians. Lower entering speeds for vehicles also reduce potential for high speed conflicts.

Traffic Operations
AM peak operations are expected to be unchanged, with small improvement expected in the PM peak hour (intersection LOS B with all-way stop control to LOS A with roundabout).

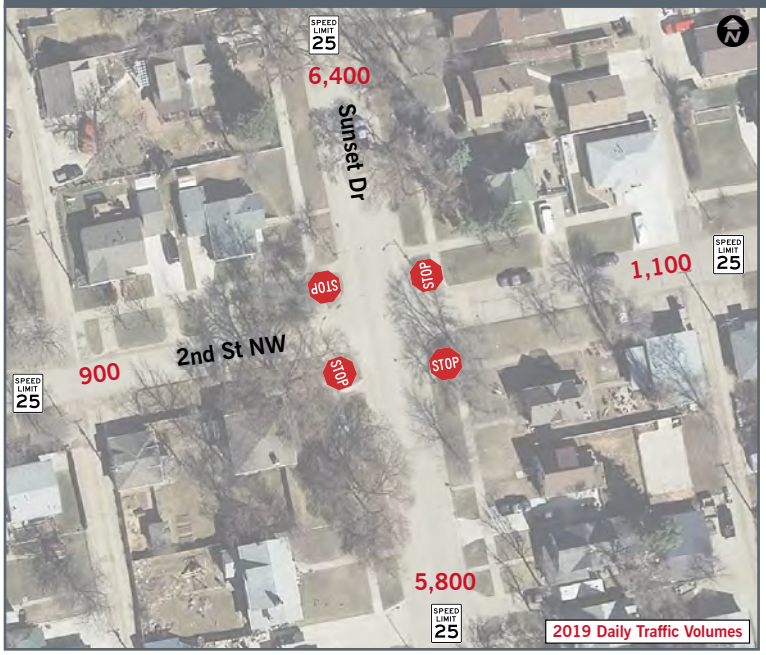
Cost and Impacts
Higher cost improvement - $700,000

Requires intersection reconstruction, but without building impacts.

Other Notes
None

Summary: Consider conversion to eastbound/westbound two-way stop control. This improvement would increase compliance and reduce crash potential without sacrificing traffic operations. Consideration should be given to a supplemental pedestrian beacon system to connect dense pedestrian development on both sides of the interseciton and Eagles park. The beacon would allow for traffic control to be limited to times when control is needed.

Sunset Drive and 2nd Street NW
Mandan

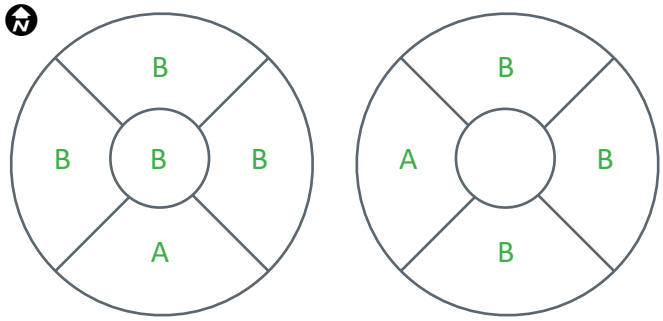


The intersection of Sunset Drive and 2nd Street NW is an all-way stop controlled intersection located on the northwest periphery of downtown Mandan. Surrounding land use is primarily single family residential.

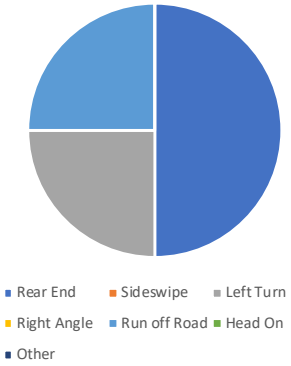
Supplemental overhead flashing beacons are present for the northbound and southbound approaches due to historic compliance issues on Sunset Drive.

The traffic control at this intersection is not warranted based on traffic volumes. AWSC is most effective at intersections with even traffic distributions. Uneven distribution can often leads to non-compliance which is a safety concern for vehicles and pedestrians alike. AWSC can also induce a feeling of unnecessary delay which has been proven to increase speeding downstream of an unwarranted AWSC.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



4 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on both sides of the road for all legs. There are no marked crosswalks.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Existing all-way stop control is not warranted based on ob-served traffic volumes.

Alternative 1: Two-Way Stop Control

Safety
The existing all-way stop control configuration is unwarranted based on observed traffic volumes. Research shows decreased compliance at unwarranted all-way stop control, which increases crash potential. Safety benefits are expected with a conversion to two-way stop control.

Multimodal Conditions
Removing northbound/southbound stop control creates more vehicle/pedestrian conflicts, however non-compliant drivers at the existing all-way stop control also create safety issues for pedestrians.

Traffic Operations
The eastbound and westbound approaches would decrease to LOS C for both peak hours. The northbound and southbound operations would improve to LOS A as free approaches.

Cost and Impacts
Minimal costs for removing stop signs.

No impacts to curblines or adjacent property.

Other Notes

Alternative 2: Two-Way Stop Control with Pedestrian Crossing Ammenities

Safety
The existing all-way stop control configuration is unwarranted based on observed traffic volumes. Research shows decreased compliance at unwarranted all-way stop control, which increases crash potential. As such, safety benefits are expected with a conversion to two-way stop control.

Multimodal Conditions
Rectangular rapid flashing beacons increase driver compliance for yielding to pedestrians, with data showing yielding percentages increasing from 18 percent with no devices to 81 percent after modern beacon installation.

Traffic Operations
The eastbound and westbound approaches would decrease to LOS C for both peak hours. The northbound and southbound operations would improve to LOS A as free approaches.

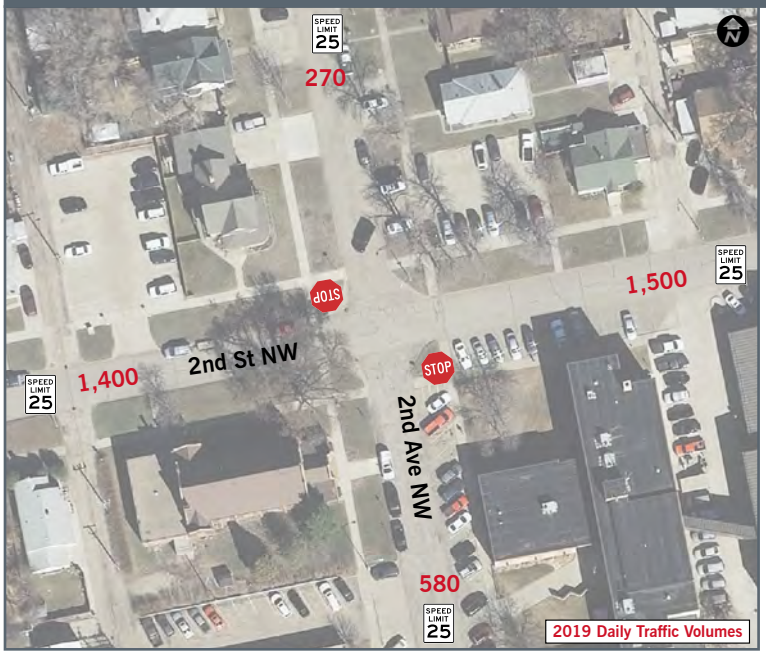
Cost and Impacts
Low Cost Improvement - $20,000

No impacts to curblines or adjacent property.

Other Notes
Potential beacon options include a rectangular rapid flashing beacon or a pedestrian hybrid beacon. Based on available pedestrian data, a pedestrian hybrid beacon does not appear to be warranted.

Summary: Consider converting to eastbound/westbound two-way stop control with a modern mid-block pedestrian beacon north or south of the intersection. The overhead flashing beacons indicate a history of non-compliance but crash data does not indicate a historic crash trend under the current configuration. The conversion would be a proactive safety measure.

2nd Avenue NW and 2nd Street NW
Mandan



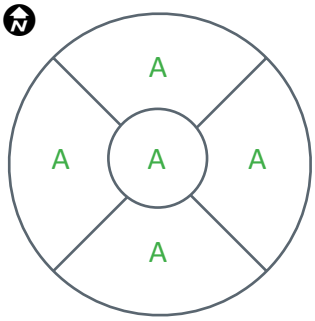
The intersection of 2nd Avenue NW and 2nd Street NW is a two-way stop controlled intersection on the north edge of downtown Mandan. This intersection is adjacent to the Morton County Courthouse and other surrounding land uses are primarily single family residential.

This intersection had no crashes over the past 5 years, acceptable operations, and low traffic volumes that made finding a gap in traffic to cross the street common. This intersection experienced no comments from the public.

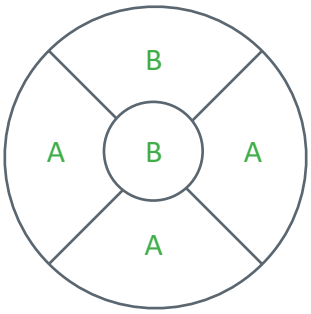
No issues were identified at this intersection, therefore no improvements are analyzed or recommended.

If complaints arise related to pedestrian crossings and sight-distance, curb bulb-outs can be considered to reduce pedestrian crossing distances and improve visibility. However, this will come at the expense of popular parking spaces.

Traffic Operations
Level of Service



AM Peak Hour



PM Peak Hour

Crash History
01/01/2013 - 12/31/2017

0 Total Crashes

Critical Crash Rate?

☐ Yes
☑ No

Above Average Crash Rate?

☐ Yes
☑ No

Repeatable Crash Types?

☐ Yes
☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant.
There are no marked crosswalks.

Traffic Control Warrants

☐ **Meets Signal Warrants?**

0/8 Warrant 1: Eight Hour Traffic Volumes
0/4 Warrant 2: Four Hour Traffic Volumes
0/1 Warrant 3: Peak Hour Traffic Volumes

☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

☐ **Meets All-Way Stop Control Warrants?**

0/8 Minimum Traffic Volumes

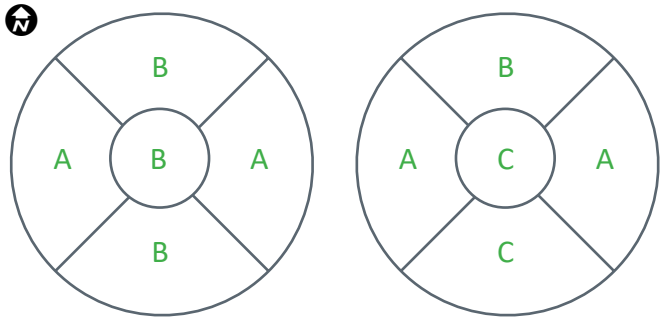
3rd Avenue NE and 1st Street NE
Mandan

1st Street NE and 3rd Avenue NE is a two-way stop controlled (TWSC) intersection east of downtown Mandan. Most surrounding land use is residential, but the intersection is in close proximity to downtown land uses.

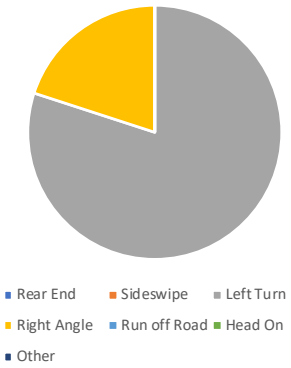
There is angle street parking on both sides of the west approach. Parallel parking is provided on the south side of the east approach, and on the east side of the north approach. Parking occupancy rates are low on 1st Street.

This intersection operates effectively and does not experience traffic volumes that warrant up-regulation of traffic control. The intersection does experience a higher than average crash rate. The majority of crashes are left-turn crashes.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



5 Total Crashes

Critical Crash Rate?

- ☐ Yes
- ☑ No

Above Average Crash Rate?

- ☑ Yes
- ☐ No

Repeatable Crash Types?

- ☑ Yes - Left Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant, colored pavement to mark crosswalk areas, and bulb-outs.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

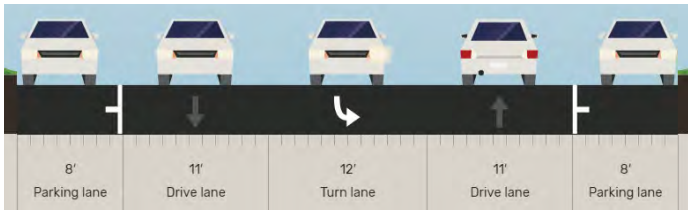
- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Three-Lane Section

1st Street - East of 3rd Avenue

1st Street - West of 3rd Avenue



Safety

A two-way left turn lane reduces rear end crash potential, with data showing a 20 percent reduction in overall intersection crashes after converting to a three-lane section. Additionally, conversion to parallel parking will improve sight lines.

Multimodal Conditions

Pedestrians will have more lanes of moving traffic to cross but overall crossing distance and exposure will remain the same. The three lane section may naturally constrict the driving lanes potentially providing some minor speed reductions.

Traffic Operations

Delay for vehicles would remain similar to existing conditions for this alternative. The left-turn lane will improve efficiency through the intersection as drivers will not need to decelerate in the through lane to turn left.

Cost and Impacts

Low cost improvement - $100,000 per mile

Does not impact curblines or adjacent properties, but does result in a decrease in parking spaces.

Other Notes

This would require converting multiple intersections to this configuration. Additionally, the roadway width differs on the east and west sides of 3rd Avenue.

Alternative 2: Bump-Outs

Safety

Bump-outs serve as a traffic calming devise and also improve sight-lines, reducing travel speeds and the potential for angle conflicts.

Multimodal Conditions

Bump-outs reduce pedestrian crossing exposure by reducing crossing distances and improving visibility. Research shows an approximate 40 percent pedestrian crash reduction after installing bump-outs.

Traffic Operations

Minimal impact to traffic operations, however this limits the possibility for future lane re-configurations to respond to evolving traffic patterns.

Cost and Impacts

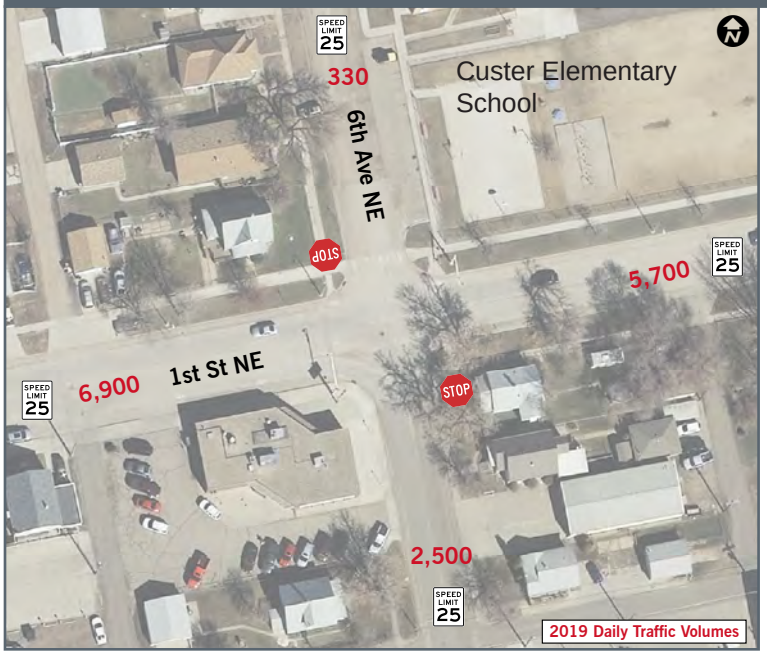
Estimated cost of $50,000 for two bump-outs at the intersection.

Other Notes

It is recommended that bump-outs are considered on the west side of the intersection.

Summary: The bulb-outs would provide a small-scale solution to the existing crash deficiency, would improve pedestrian crossing safety, would match corridor design to the east and would not have an adverse effect on parking. Given the acceptable delays, crash patterns could be mitigated from minor parking restrictions while keeping the existing roadway configuration.

6th Avenue NE and 1st Street NE
Mandan



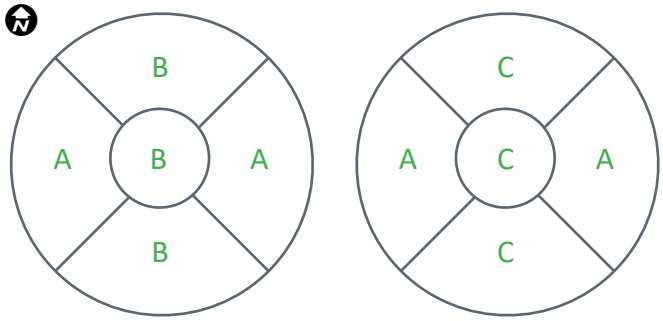
1st Street NE and 6th Avenue NE is a two-way stop controlled intersection adjacent to Custer Elementary School. Land use around the intersection varies with single family residential, downtown businesses, and the school.

Given the proximity to Custer Elementary School, pedestrian activity is common at this intersection. Overhead flashing beacons are present at the intersection on the eastbound and westbound approaches, however this does not conform to modern standards.

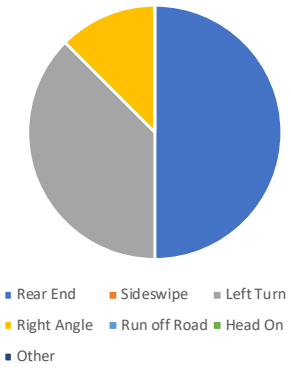
The intersection operates with some minor congestion during the PM peak hour but does not experience enough traffic to warrant up-regulated traffic control.

The intersection experiences higher than average crash rates, high a high amount of repeatability for rear-end and left-turn crash types, common at intersections without turn lanes or frequent stops such as pedestrian crossings.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



8 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Rear End
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

This intersection has sidewalks and marked crosswalks on each quadrant with signing. Bus Route 6 (Purple Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

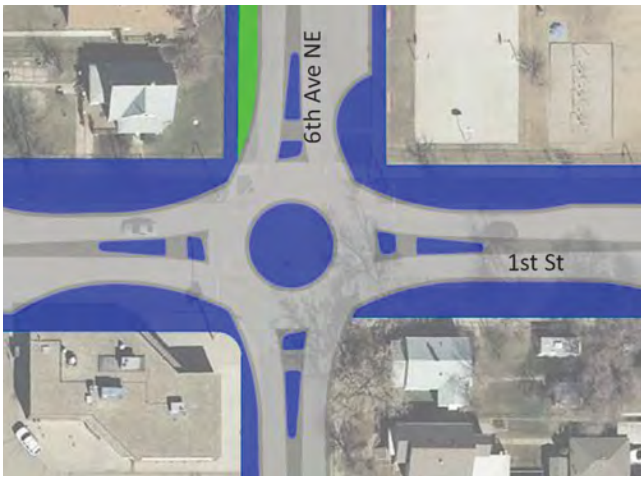
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Roundabout



Safety
Data shows a 72 percent crash reduction with a single lane roundabout compared to two-way stop control, with a 88 percent reduction in injury crashes.

Multimodal Conditions
Reduced vehicle speeds entering the roundabout on 1st Street will improve pedestrian crossing conditions compared to stop control only on the minor approaches.

Traffic Operations
For this alternative, all approaches would improve to LOS A for both the AM and PM peak hours.

Cost and Impacts
A standard single lane roundabout will require reconstruction of the intersection with an estimated cost of $700,000.

Other Notes
Roundabouts can be designed with pedetsrian beacons to further improve pedestrian crossing conditions.

Alternative 2: Raised Intersection

Source: NACTO

Safety
Raised intersections have been found to be one of the most predictable treatments in reducing vehicle speeds, which reduces the potential for conflicts with high speed differentials. However, this design is not expected to reduce the most prevalent crash trends at the intersection.

Multimodal Conditions
Data shows driver compliance increases from 10 percent at standard intersections to 55 percent at raised intersections. A raised intersection also improves visibility of pedestrians and reduced vehicles speeds which reduced serious crash potential for pedestrians.

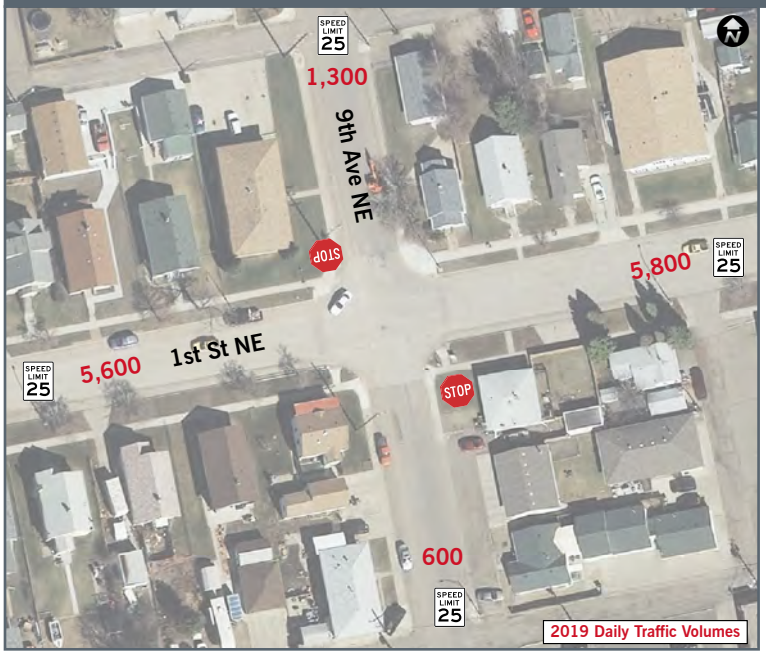
Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Costs vary based on drainage conditions and materials that are used, with FHWA data showing a typical cost between $25,000 and $70,000.

Other Notes
None

Summary: Both the roundabout and raised intersection cost offer traffic calming benefits with good traffic operations. The raised intersection option could be considered as a lower-cost option depending on drainage needs.

9th Avenue NE and 1st Street NE
Mandan

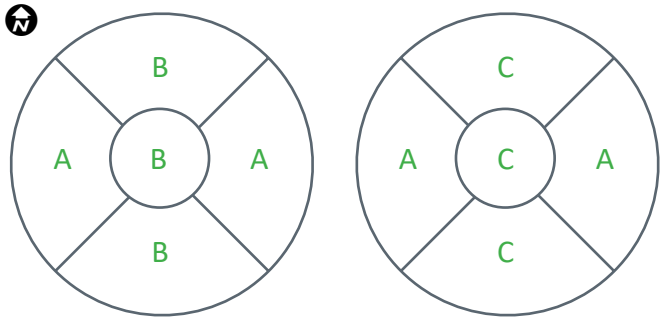


The intersection of 9th Avenue NE and 1st Street NE is a two-way stop controlled (TWSC) intersection east of downtown Mandan. Most surrounding land use is low intensity residential.

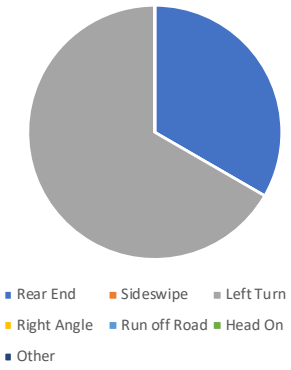
Parallel parking is provided on each side of all intersection approaches. Parking demand is light surrounding this intersection.

The intersection operates effectively, crash rates are low, and traffic volumes do not suggest any change in traffic control is warranted. The land use density and proximity to Custer Elementary School suggest that pedestrian activity could be common.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



3 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☑ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

This intersection has sidewalks on each quadrant. Bus Route 6 (Purple Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**
  - 0/8 Warrant 1: Eight Hour Traffic Volumes
  - 0/4 Warrant 2: Four Hour Traffic Volumes
  - 0/1 Warrant 3: Peak Hour Traffic Volumes
- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☐ **Meets All-Way Stop Control Warrants?**
  - 0/8 Minimum Traffic Volumes

Alternative 1: Bulb-Outs

Source: PEDSAFE

Safety
Bulb-outs serve as a traffic calming device, which can reduce crash severity by lowering vehicle speeds.

Multimodal Conditions
Improves pedestrian visibility and reduces vehicle speeds, improving pedestrian crossing conditions. Data shows that pedestrian crashes decrease approximately 40 percent after implementation.

Traffic Operations
Minimal impact to traffic operations, however vehicle speeds will be slightly decreased.

Cost and Impacts
Requires modifying curblines, but not full intersection reconstruction. Estimated cost of $50,000.

Other Notes
Drainage impacts must be considered.

Alternative 2: Three-Lane Section

Safety
A two-way left turn lane reduces rear end crash potential, with data showing a 20 percent reduction in overall intersection crashes after converting to a three-lane section. Additionally, conversion to parallel parking will improve sight lines.

Multimodal Conditions
Pedestrians will have more lanes of moving traffic to cross but overall crossing distance and exposure will remain the same. The three lane section may naturally constrict the driving lanes and reduce vehicle speeds.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

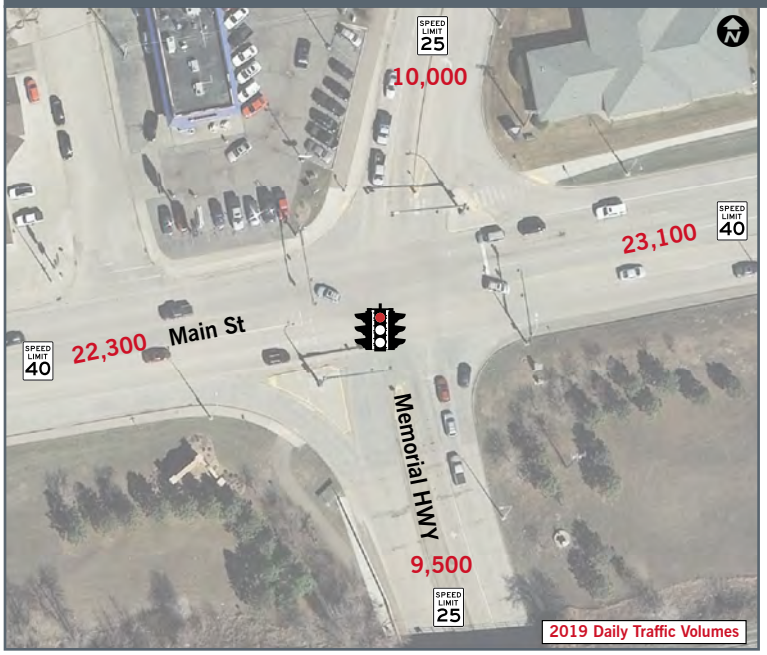
Cost and Impacts
Low cost improvement - $100,000 per mile

Does not impact curblines or adjacent properties, but does result in fewer parking spaces.

Other Notes
This would require converting multiple intersections to this configuration.

Summary: Given the lack of clear deficiencies in operations, safety, multimodal conditions, and traffic control, it is suggested that the Do Nothing option be considered, with continued monitoring in the event that bulb-outs or a three-lane section become a higher need in the future.

Memorial Highway and Main Street
Mandan

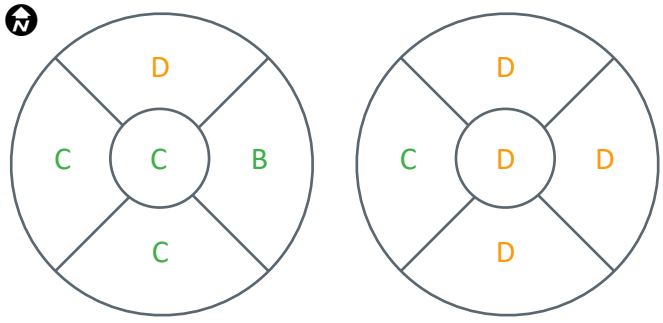


The Memorial Highway and Main Street intersection is a major junction in Mandan carrying tens of thousands of vehicles each day. The intersection operates at near deficient levels during the PM peak hour.

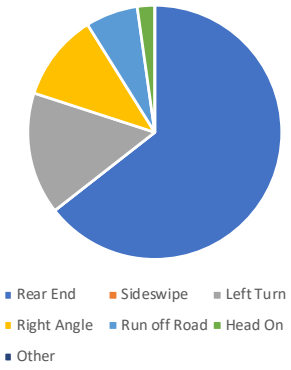
The intersection experiences critical crash rates, primarily of the rear-end variety. Rear-ends are common on signalized intersections, especially those with long queues and along high-speed roadways. Traffic coming to this intersection from the North, East and South are all moving very fast, given the lack of impedances to traffic flows and high-speed design. This intersection also has very dense access spacing just west of the intersection, which can contribute to higher crash rates.

The skewed intersection uses porkchop islands to operate EB/WB right-turns. These designs can also contribute to rear-ends as different driver types use these designs differently.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



45 Total Crashes

Critical Crash Rate?
- ☑ Yes
- ☐ No

Above Average Crash Rate?
- ☑ Yes
- ☐ No

Repeatable Crash Types?
- ☑ Yes - Rear End
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☑ **Crossing with Speeds Higher than 35 MPH?**
- ☑ **High Land Use Density?**

There are sidewalks on both sides of Main Street. There are muti-use paths on the west edge of Memorial Highway. There are marked crosswalks on the north and west legs. Bus Route 6 (Purple Route) runs through the intersection.

Traffic Control Warrants

- ☑ **Meets Signal Warrants?**

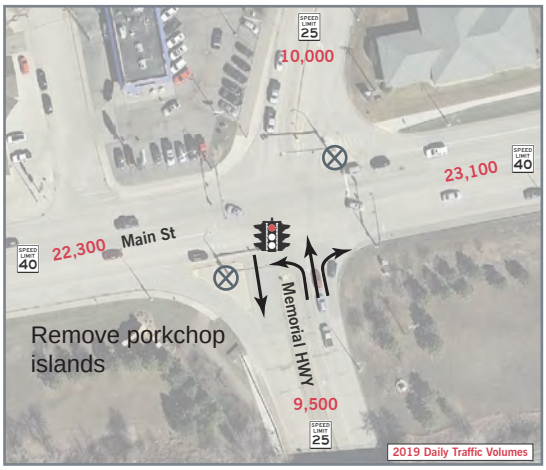
16/8 Warrant 1: Eight Hour Traffic Volumes
12/4 Warrant 2: Four Hour Traffic Volumes
10/1 Warrant 3: Peak Hour Traffic Volumes

- ☑ **Meets Warrant for Dedicated Left-Turn Phasing?**
- ☑ **Meets All-Way Stop Control Warrants?**

16/8 Minimum Traffic Volumes

The northbound and southbound left turns meet warrants and currently run as protected. The eastbound and westbound left turns do not meet warrants and currently run as permissive.

Alternative 1: Remove Porkchop and Reconfigure Lanes



Safety
Removing porkchops (also referred to as channelizing islands improves sight lines and reduces turning speeds, reducing rear-end crash potential. Rear-end crashes are common at this intersection.

Reconfiguring the northbound approach to have dedicated left and right turn lanes reduces crash potential by moving turning movements from the through traffic stream. This will however require reducing the number of southbound receiving lanes from two to one.

Multimodal Conditions
Removing channelizing islands reduces vehicle turning speeds, improving pedestrian crossing safety.

Traffic Operations
Lane reconfiguration enables operating NB and SB left turns with protected/permitted phasing, improving intersection level of service from LOS C to LOS B in the AM peak hour and from LOS D to LOS B in the PM peak hour.

Cost and Impacts
Requires some intersection reconstruction, but will not expand the footprint. Estimated cost of $300,000.

Other Notes
Freight movement may necessitate larger curb radii provided with channelizing islands.

Alternative 2: NB and SB Advance Warning Flashers

Safety
Both the northbound and southbound approaches have vertical and horizontal roadway curvature upstream of the intersection, and the westbound approach has visibility obscured by the railroad bridge. Advance warning flashers can notify drivers of an upcoming yellow or red phase when the signal heads themselves cannot be seen. Research has shown that right-angle crashes are reduced by 62 percent and rear end crashes are reduced by 36 percent after installing advance warning flashers.

Multimodal Conditions
Advanced warning flashers can mitigate potential high-speed collisions between automobiles and crossing pedestrians.

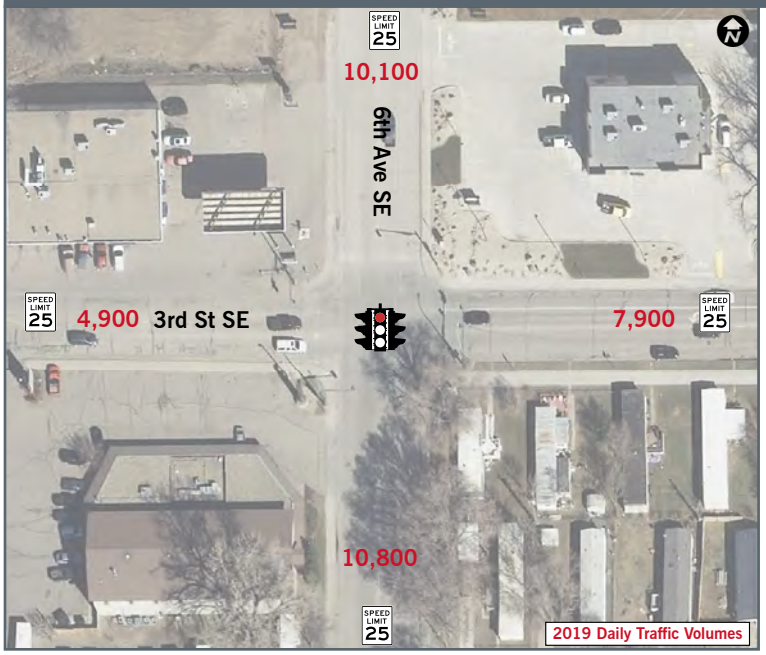
Traffic Operations
No impact to traffic operations.

Cost and Impacts
Estimated cost of $60,000 for advance warning flashers on the northbound, southbound, and westbound approaches.

Other Notes
None

Summary: Adding advanced flashers would reduce rear-end crash potential and overall critical crash trends. If crash trends continue, consider more impactful reconfiguration that would have protected/permitted NB+SB left turn phasing and add capacity to the north and south approaches. More detailed engineering analysis related to traffic operations and potential intersection geometry revisions would be required if intersection reconfiguration is desired.

3rd Street E and 6th Avenue SE
Mandan

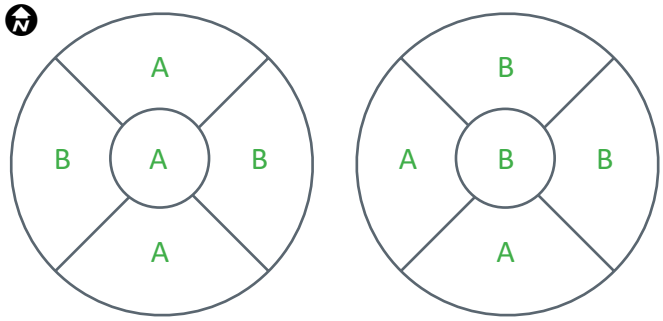


The 3rd Street and 6th Avenue intersection is signalized and located in central Mandan. The intersection is abutted by primarily light commercial land uses, with residential land uses also near the intersection. The traffic signal operates effectively and meets signals warrants.

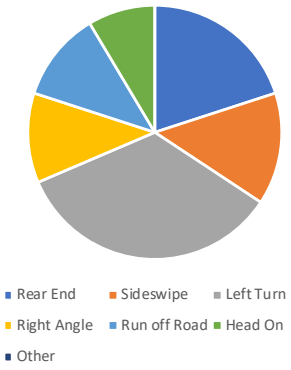
The intersection has a critical crash rate with disproportionate left-turn, angled and rear-end crash trends. 6th Avenue is a four lane roadway, which minimizes opportunities for left-turn lanes and left-turn phasing. Four lane corridors designed in this fashion frequently have increased left-turn and rear-end crash trends.

Excess capacity on 6th Avenue induces speeding. The 85% speed along the corridor was found to be ten miles per hour over the limit. The sidewalks directly abutting the high-speed roadway walking conditions uncomfortable for pedestrians. This intersection had both a pedestrian and bicycle crash in the past 10 years.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



35 Total Crashes

Critical Crash Rate?
- [x] Yes
- [ ] No

Above Average Crash Rate?
- [x] Yes
- [ ] No

Repeatable Crash Types?
- [ ] Yes
- [x] No

Multimodal Facilities

- [x] **Recent Pedestrian Crash?**
- [x] **Recent Bicycle Crash?**
- [ ] **Within 1/4 Mile of School?**
- [x] **Along Transit Route?**
- [x] **Crossing with 4 of More Lanes?**
- [ ] **Crossing with Speeds Higher than 35 MPH?**
- [ ] **High Land Use Density?**

There are sidewalks on each quadrant. Bus routes 5 and 6 run through the intersection.

Traffic Control Warrants

- [x] **Meets Signal Warrants?**

  6/8 Warrant 1: Eight Hour Traffic Volumes
  5/4 Warrant 2: Four Hour Traffic Volumes
  2/1 Warrant 3: Peak Hour Traffic Volumes

- [ ] **Meets Warrant for Dedicated Left-Turn Phasing?**

- [x] **Meets All-Way Stop Control Warrants?**

  16/8 Minimum Traffic Volumes

Alternative 1: Road Reconfiguration Option 1 - Bike Lanes

Safety
Road reconfigurations from four lane roadways to three lane roadways with two-way left-turn lanes have been found to reduce crashes by 47 percent.

Multimodal Conditions
Road reconfigurations re-allocate roadway space for cyclists, and also reduce the number of lanes of moving traffic pedestrians must cross. This design is expected to reduce traffic speeds. The bike lane buffer from traffic would improve pedestrian comfort.

Traffic Operations
Overall intersection operations would decrease to LOS B from LOS A in the AM peak hour and to LOS C from LOS B in the PM peak hour.

Cost and Impacts
A pavement rehabilitation project on 6th Avenue SE/ND 1806 is currently listed for 2021 in the Transportation Improvement Program, making costs incidental to this project.

Other Notes
None

Alternative 2: Road Reconfiguration Option 2 - Parking with Bump-Outs

Safety
Road reconfigurations from four lane roadways to three lane roadways with two-way left-turn lanes have been found to reduce crashes by 47 percent.

Multimodal Conditions
The road reconfiguration would reduce the number of lanes of moving traffic pedestrians must cross. This design is expected to reduce traffic speeds. The parking/buffer would improve pedestrian comfort. The bump-outs would reduce pedestrian exposure at intersections.

Traffic Operations
Overall intersection operations would decrease to LOS B from LOS A in the AM peak hour and to LOS C from LOS B in the PM peak hour. Similar to Alternative 1.

Cost and Impacts
A pavement rehabilitation project on 6th Avenue SE/ND 1806 is currently listed for 2021 in the Transportation Improvement Program, making costs incidental to this project.

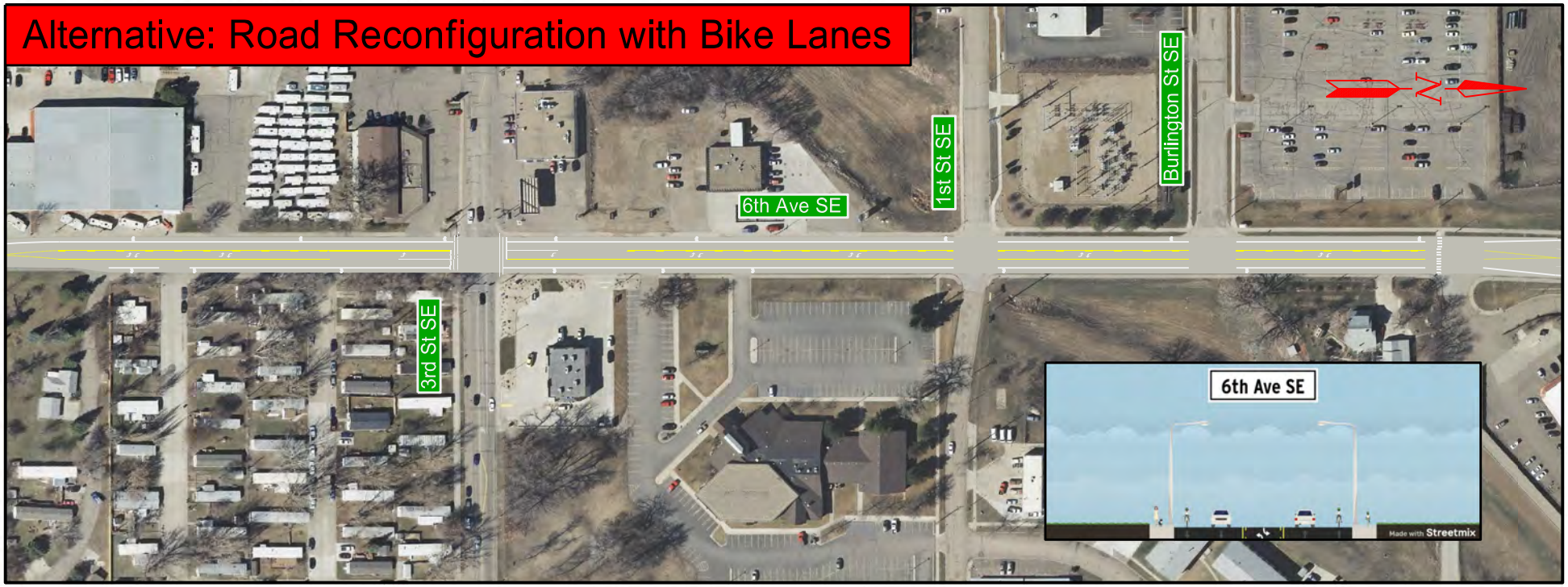
Other Notes
Overall, these is little demand for parking and it would likely operate similar to a shoulder.

Summary: A roadway reconfiguration provides several safety benefits for vehicles and pedestrians. The reconfiguration allows for a reduction in speeding, reduction in vehicular crash rates and reduction in vehicular exposure. Between the two reconfiguration option, the bike option provides the most value. The parking lane would be underutilized and act more like a shoulder. This does provide an option for curb bulb-outs but at the expense of facilitating bicycles.

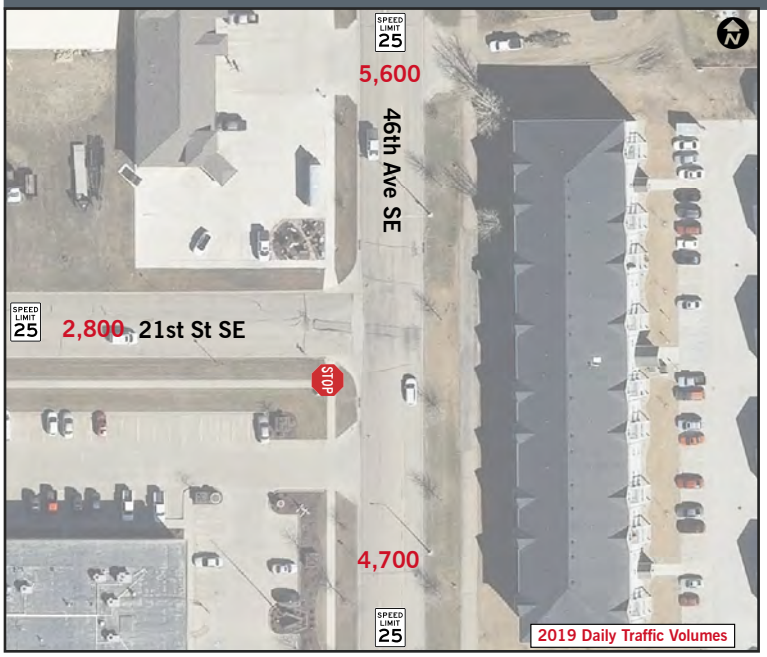
6th Ave SE - Mandan, ND

Alternative: Road Reconfiguration with Parking Lane/Shoulders

Alternative: Road Reconfiguration with Bike Lanes



46th Avenue SE and 21st Street SE
Mandan

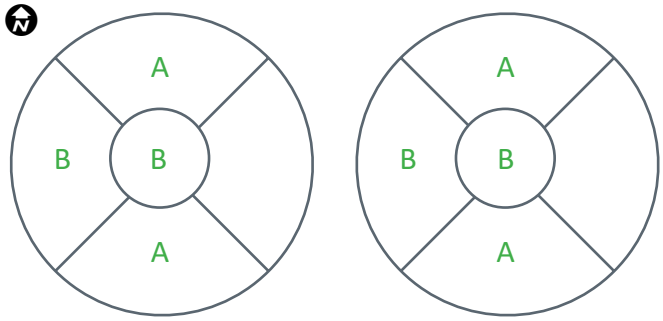


The intersection of 46th Avenue and 21st Street in south Mandan is a stop controlled T-intersection that is abutted by low intensity commercial uses and multi-family residential.

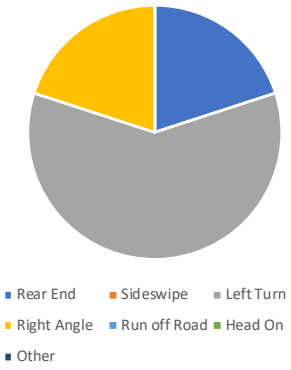
Note that the image to the left does not show the three-lane section with a two-way left turn lane that exists today.

The intersection operates well but has a history of left-turn crashes. There is a shared use path on the east side of 46th Avenue that is not easily connected to 21st Street SE.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



5 Total Crashes

Critical Crash Rate?

- ☐ Yes
- ☑ No

Above Average Crash Rate?

- ☑ Yes
- ☐ No

Repeatable Crash Types?

- ☑ Yes - Left-Turn
- ☐ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant except the north side of 21st Street. Bus Route 5 (Brown Route) runs through the intersection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

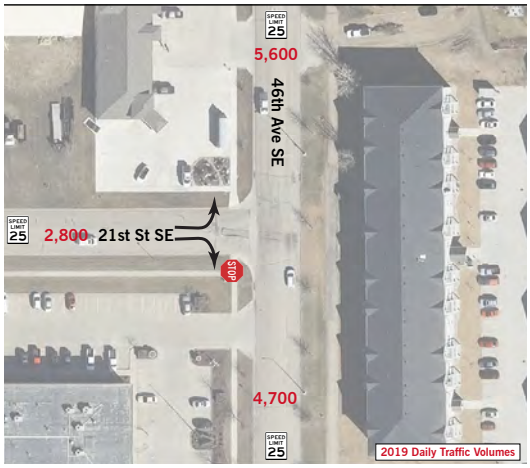
  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Side Street Turn Lanes



Safety
Data shows a 25% crash reduction when adding a minor approach left turn lane at unsignalized T intersections.

Multimodal Conditions
Increased number of travel lanes to traverse, but more organized traffic. Overall pedestrian safety changes are expected to be minimal.

Traffic Operations
Delay for vehicles would remain similar to existing conditions for this alternative.

Cost and Impacts
Low Cost Improvement - $5,000 - $10,000

No impacts to curblines or adjacent property.

Other Notes

Alternative 2: Pedestrian Refuge Island

Safety
Pedestrian refuge islands can serve as a traffic calming device, reducing vehicle speeds.

Multimodal Conditions
Data shows refuge islands reduce pedestrian crashes by around 40 percent. This would provide connectivity between the high density multi-family dwellings along 21st Street SE and the shared use path along 46th Avenue.

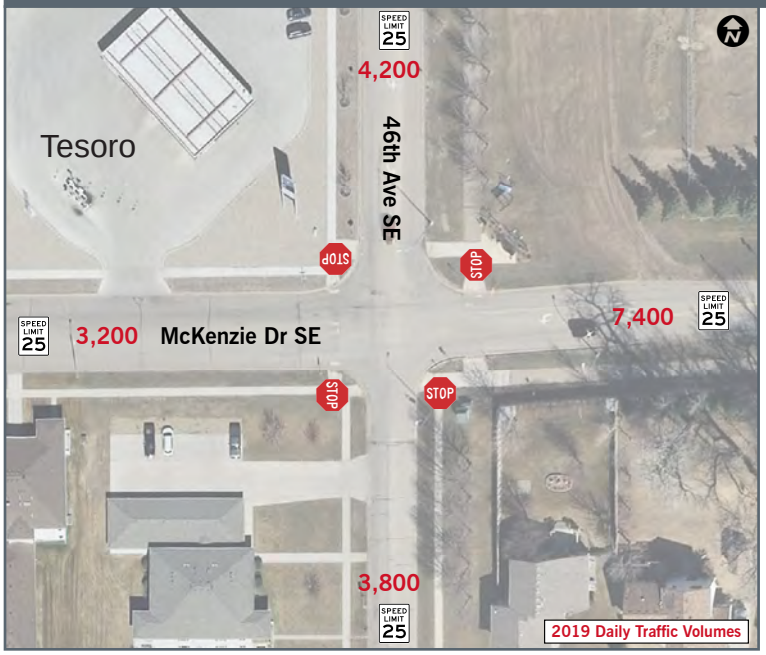
Traffic Operations
Little impact to traffic operations compared to existing conditions.

Cost and Impacts
Requires minor roadway reconstruction, however will not impact curblines or adjacent property. Estimated cost of $70,000.

Other Notes
If a refuge island is provided, the north approach is the most logical location to minimize conflicts.

Summary: A pedestrian refuge island on the north intersection approach would serve as a traffic calming device, improving multimodal connectivity and pedestrian crossing safety, however maintaining the existing configuration could be considered if thought is given to improving sight lines via parking restrictions at the intersection.

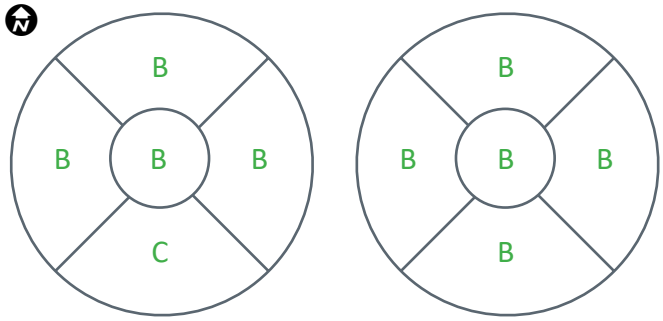
46th Avenue SE and McKenzie Drive SE
Mandan



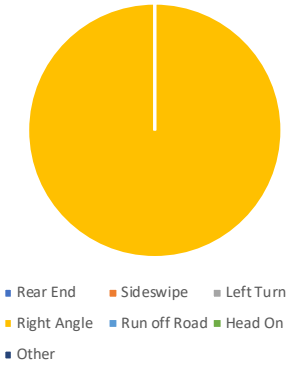
46th Avenue and McKenzie Drive SE is an all-way stop controlled intersection in southeast Mandan. Land use is mixed in the area, with multi-family residential and single-family residential being predominant. Family Wellness and Raging Rivers Waterpark are on the northeast quadrant and a Tesoro gas station is on the northwest approach.

This intersection operates well and has few crashes. While it does not warrant all-way stop control, it is very close.

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



2 Total Crashes

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☑ **Along Transit Route?**
- ☑ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks and marked crosswalks on each quadrant. Bus Route 5 (Brown Route) runs through the intesection.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  1/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**
  7/8 Minimum Traffic Volumes

Existing all-way stop control is not warranted, however it is very close with 7 of 8 hours meeting volume warrants.

Alternative 1: Roundabout

Safety
Data shows a 54 percent reduction in serious crashes and minimal changes in crashes after converting all-way stop control to a single lane roundabout. Data is limited as most studies have focused on converting two-way stop control and signals to roundabouts.

Multimodal Conditions
Removing stop signs reduces the amount of control for crossing pedestrians, however this is somewhat mitigated by lower vehicle entering speeds.

Traffic Operations
This alternative would improve all approaches to operate at LOS A (from LOS B in the AM and PM peak hours.

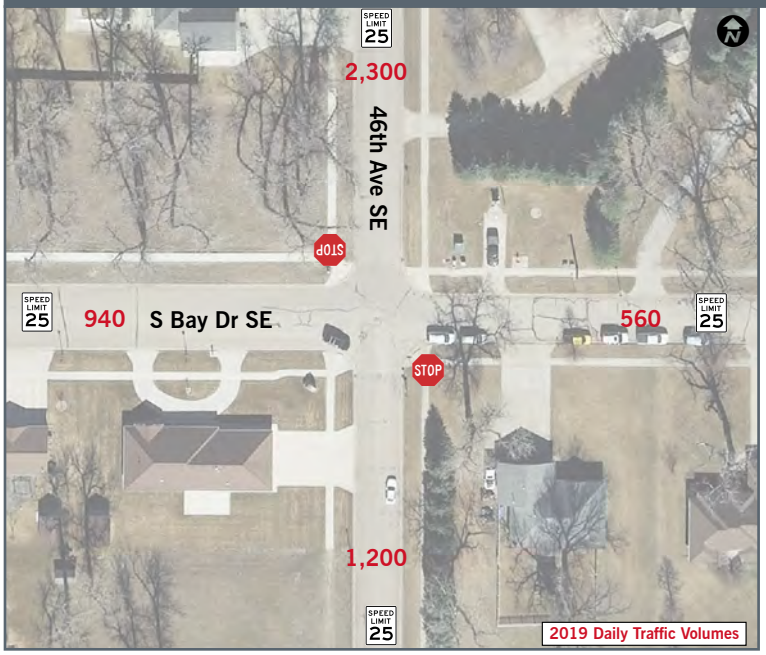
Cost and Impacts
Requires intersection reconstruction with an estimated project cost of $700,000. Also impacts some adjacent driveway access.

Other Notes
All-way stop control is nearly warranted, and is likely to become warranted in the near future with traffic growth.

No other alternatives considered at this location.

Summary: Replacing the AWSC with a roundabout would come at a high cost and have minimal overall benefits under existing traffic volumes, however benefits could be more pronounced in the future under increased traffic.

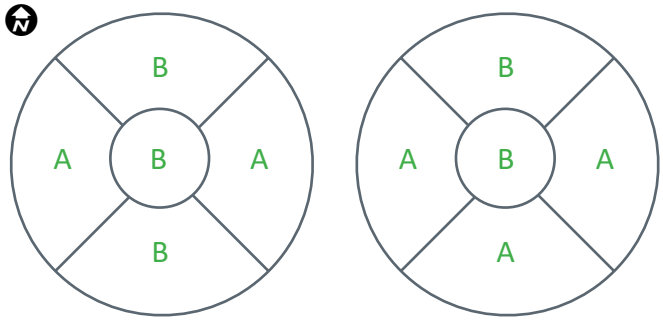
46th Avenue SE and South Bay Drive SE
Mandan



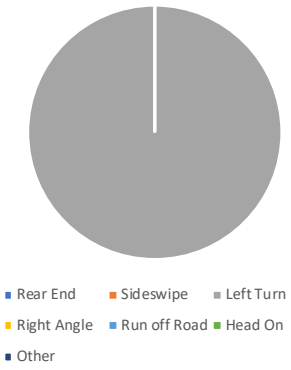
The intersection of 46th Avenue SE and South Bay Drive SE is a two-way stop controlled (TWSC) intersection in south-east Mandan, with adjacent land uses being primarily single family residential.

This intersection operates effectively with few crashes under the current traffic control configuration. However, the daily traffic volumes are more than twice as high on 46th Avenue (stop controlled) as South Bay Drive (free).

Traffic Operations
Level of Service



Crash History
01/01/2013 - 12/31/2017



1 Crash

Critical Crash Rate?
- ☐ Yes
- ☑ No

Above Average Crash Rate?
- ☐ Yes
- ☑ No

Repeatable Crash Types?
- ☐ Yes
- ☑ No

Multimodal Facilities

- ☐ **Recent Pedestrian Crash?**
- ☐ **Recent Bicycle Crash?**
- ☐ **Within 1/4 Mile of School?**
- ☐ **Along Transit Route?**
- ☐ **Crossing with 4 of More Lanes?**
- ☐ **Crossing with Speeds Higher than 35 MPH?**
- ☐ **High Land Use Density?**

There are sidewalks on each quadrant.

Traffic Control Warrants

- ☐ **Meets Signal Warrants?**

  0/8 Warrant 1: Eight Hour Traffic Volumes
  0/4 Warrant 2: Four Hour Traffic Volumes
  0/1 Warrant 3: Peak Hour Traffic Volumes

- ☐ **Meets Warrant for Dedicated Left-Turn Phasing?**

- ☐ **Meets All-Way Stop Control Warrants?**

  0/8 Minimum Traffic Volumes

Alternative 1: Change Stop Sign Direction

Safety
Converting to eastbound/westbound two-way stop control should reduce crash potential by placing stop controller on the lower volumes approaches, which is a more logical configuration.

Multimodal Conditions
Pedestrians are still required to cross approaches with no traffic control, so impacts are expected to be minimal.

Traffic Operations
Minimal impacts to level of service, but improved traffic operations from more logical configuration.

Cost and Impacts
Low cost improvement - around $1,000.

Other Notes
None

No other alternatives considered at this location.

Summary: The current intersection configuration operates effectively, given the low volumes at this intersection. Converting the two control from north/south controlled to east/west controlled would prioritize the route with twice as much traffic. While these benefits may not be felt by a traffic model, the benefits toward removing unnecessary delay and avoiding noncompliance will likely be felt by the neighborhood.

Appendix D

Public Engagement Summary

Public Input Meeting #1 Summary

On January 28th, 2020 two public input meetings were held for the Bismarck-Mandan Intersection Analysis Study. The first meeting was held at the Bismarck Parks District at 400 E Front Avenue between 11:30 AM and 1 PM. The second meeting was held at the Mandan City Hall Veterans Room at 205 2nd Avenue NW between 5 PM and 6:30 PM.

The meetings were advertised through a variety of channels including an ad in the Bismarck Tribune, press release with news stories before and after the meeting, social media posts on the Bismarck-Mandan MPO Facebook page and shared by local partners, a radio advertisement on Dakota Access Media, a rotating advertisement on Dakota Access Media, and a newsletter mailed to the MPO's interested parties list.

Both meetings included a short presentation, open house, and issues mapping exercise for each of the 65 study intersections and the 10 traffic speed calming locations. There were seven attendees at the first meeting and six at the second meeting. Despite the light attendance in person, there were more than 560 comments submitted to the online issues map (www.BisManIAS.com) and more than 25 written comments emailed to the project team. Not all comments received were relevant to this particular study. In these cases, the comments were provided to the relevant local government staff for review.

Summary of Comments

The public was invited to submit comments at the public input meeting, on the online issues map, and directly to the project team. These comments were aggregated and summarized below.

Online Comments

The public was allowed to comment on any intersection throughout the Bismarck-Mandan-Lincoln metro area. Figure 1 shows a screenshot of the comments received on the online issues map. The comments are still available for review at www.BisManIAS.com. Through this process, there were 569 comments received. Using ArcGIS, these comments were assigned to the nearest study intersection. Comments more than 500 feet from the assigned intersection were removed, and the remaining 190 summarized by comment type.

Figure 1: Screenshot of Comments on Online Issues Map

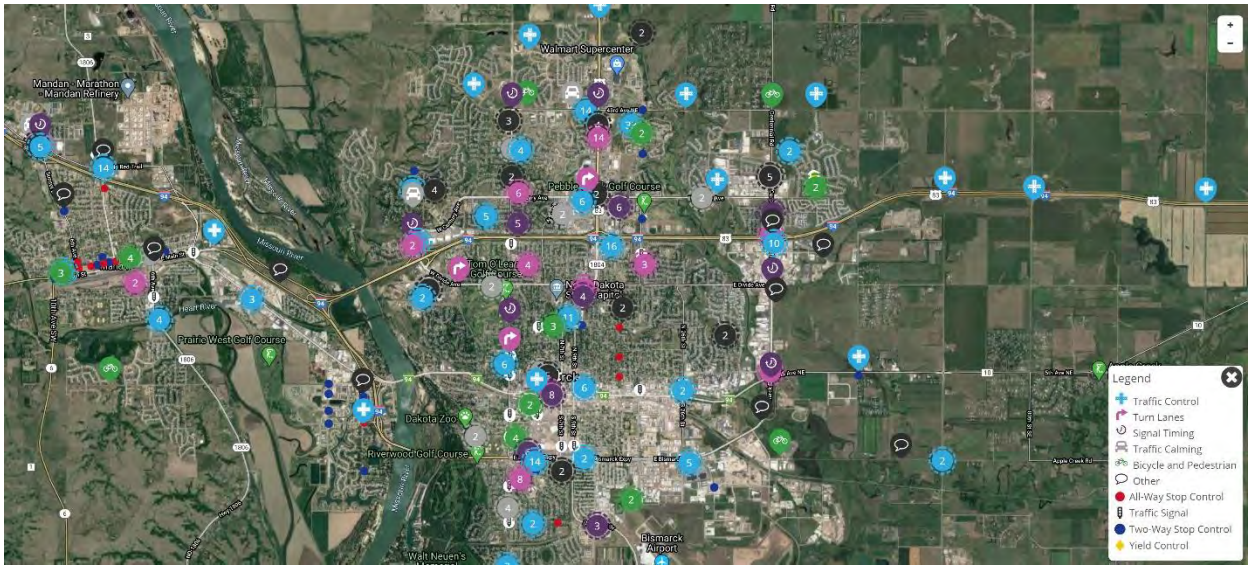


Table 1 and Table 2 shows the comment summary for Bismarck and Mandan study intersections. Figure 2 and Figure 3 graphically display the comment frequency and subject for Bismarck and Mandan study intersections. Figure 4 displays the comment density and location for all comments received. The full comments are incorporated in the public input appendix.

Table 1: Bismarck Intersections Comment Summary

ID	Name	Total Comments	Bicycle & Pedestrian	Traffic Control	Signal Timing	Turn Lanes	Traffic Calming	Other
Bismarck Intersections								
1	3rd St & Bowen Ave	2	1		1			
2	Washington St & Bowen Ave (N)	1	1					
3	Washington St & Bowen Ave (S)	2	1	1				
4	Washington St & Arbor Ave	4	1		3			
5	6th St & Boulevard Ave	6	1	2	2	1		
6	7th St & Arbor Ave	1		1				
7	9th St & Arbor Ave	1		1				
8	19th St & 43rd Ave	26	1	25				
9	19th St & Calgary Ave	6	1	5				
10	19th St & Capital Ave	5			3	2		
11	Tyler Pkway & Century Ave	6		6				
12	3rd St & Boulevard Ave	1		1				
13	3rd St & Thayer Ave	0						
14	Washington St & Turnpike Ave	8		1	2	5		
15	Washington St & Reno Ave	6		2		3	1	
16	Washington St & Wachter Ave	5		2		1	2	
17	Airport Rd & Broadway Ave	0						
18	3rd St & Rosser Ave	0						
19	4th St & Rosser Ave	1				1		
20	5th St & Rosser Ave	0						
21	6th St & Rosser Ave	2		1				1
22	State St & Boulevard Ave	7		7				
23	Tyler Pkwy & Valley Dr	2		1				1
24	Tyler Pkwy & Country West Rd	2		2				
25	Roosevelt Dr & Hitchcock Dr	0						
26	16th St & Boulevard Ave	0						
27	16th St & E Ave C	0						
28	16th St & Rosser Ave	2		2				
29	3rd St & Denver Ave	0						
30	3rd St & Wachter Ave	2		1				
31	Washington St & Ave C	9		3		1	2	3
32	Washington St & Rosser Ave	2		1	1			
33	Washington St & London Ave	5		5				
34	Washington St & Burleigh Ave	9	1	6			1	1
35	52nd St & Main Ave	1		1				
36	Burlington Dr & Morrison Dr	2		2				
37	19th St & Shiloh Dr	15		15				

Table 2: Mandan Intersections Comment Summary

ID	Name	Total Comments	Bicycle & Pedestrian	Traffic Control	Signal Timing	Turn Lanes	Traffic Calming	Other
Mandan Intersections								
38	Collins Ave & 1st St NW	3	1	1		1		
39	10th Ave & Main St	13	2	11				
40	Memorial Hwy & 3rd St SE	3		3				
41	46th Ave & McKenzie Dr	1		1				
42	37th St & Old Red Tr	0						
43	Old Red Tr & 34th St	2				1	1	
44	Sunset Dr & 27th St	0						
45	Sunset Dr & Old Red Tr	11		4	1	4		2
46	Sunset Dr & Division St	1						1
47	Collins Ave & 14th St	0						
48	Sunset Dr & 2nd St	2	1	1				
49	2nd Ave & 2nd St	0						
50	Sunset Dr & 1st St	0						
51	4th Ave & 1st St NW	0						
52	3rd Ave & 1st St NW	1		1				
53	2nd Ave & 1st St NW	0						
54	1st Ave & 1st St NW	2	1				1	
55	3rd Ave & 1st St NE	2	1				1	
56	6th Ave & 1st St NE	0						
57	9th Ave & 1st St NE	3	1				2	
58	Memorial Hwy & Main St	0						
59	6th Ave & 3rd St	4		2		2		
60	40th Ave & 19th St	0						
61	40th Ave & 21st St	0						
62	40th Ave & Shoal Loop	0						
63	40th Ave & McKenzie Dr	0						
64	46th Ave & 21st St	1						1
65	46th Ave & South Bay Dr	0						

Non-Study Intersections

There were 379 comments received online that did not apply to study intersections. These comment locations are shown in Figure 5. Frequently commented locations include

- Old Red Trail and ND 1806 – comments primarily included concerns about traffic control and preference for and against the planned roundabout.
- State Street and 43rd Avenue/ Ottawa Street and 43rd Avenue – need for improved traffic control and turn lanes
- Bismarck Expressway and I-94 Interchange Functional Area – comments on traffic control, turn lanes, and signal timing.
- Bismarck Expressway between Washington Street and University Drive – comments on traffic control, turn lanes, and signal timing, citing the difficulties of coming off the freeway and the lane drops.

- Main Avenue from 5th Street to 9th Street – signal timing

Written Comments

In addition to the online comments, 25 written comments were submitted. Most frequently, these comments involved the 19th Street and Shiloh Drive intersection. These comments have not been incorporated into the summary tables above but comments on study intersections are generally summarized below.

- 19th Street and Shiloh Drive – 12 comments regarding traffic control
- 19th Street and 43rd Avenue – 1 comment on traffic control
- Washington Street and Turnpike Avenue – 1 comment on signal timing
- 40th Avenue and 21st Street – 1 comment on traffic control

Similarly to the online issues map, some comments did not apply to the 65 study intersections. These comments were compiled and will be submitted to the appropriate city staff.

Figure 2: Bismarck Study Intersections by Comment Types and Frequency

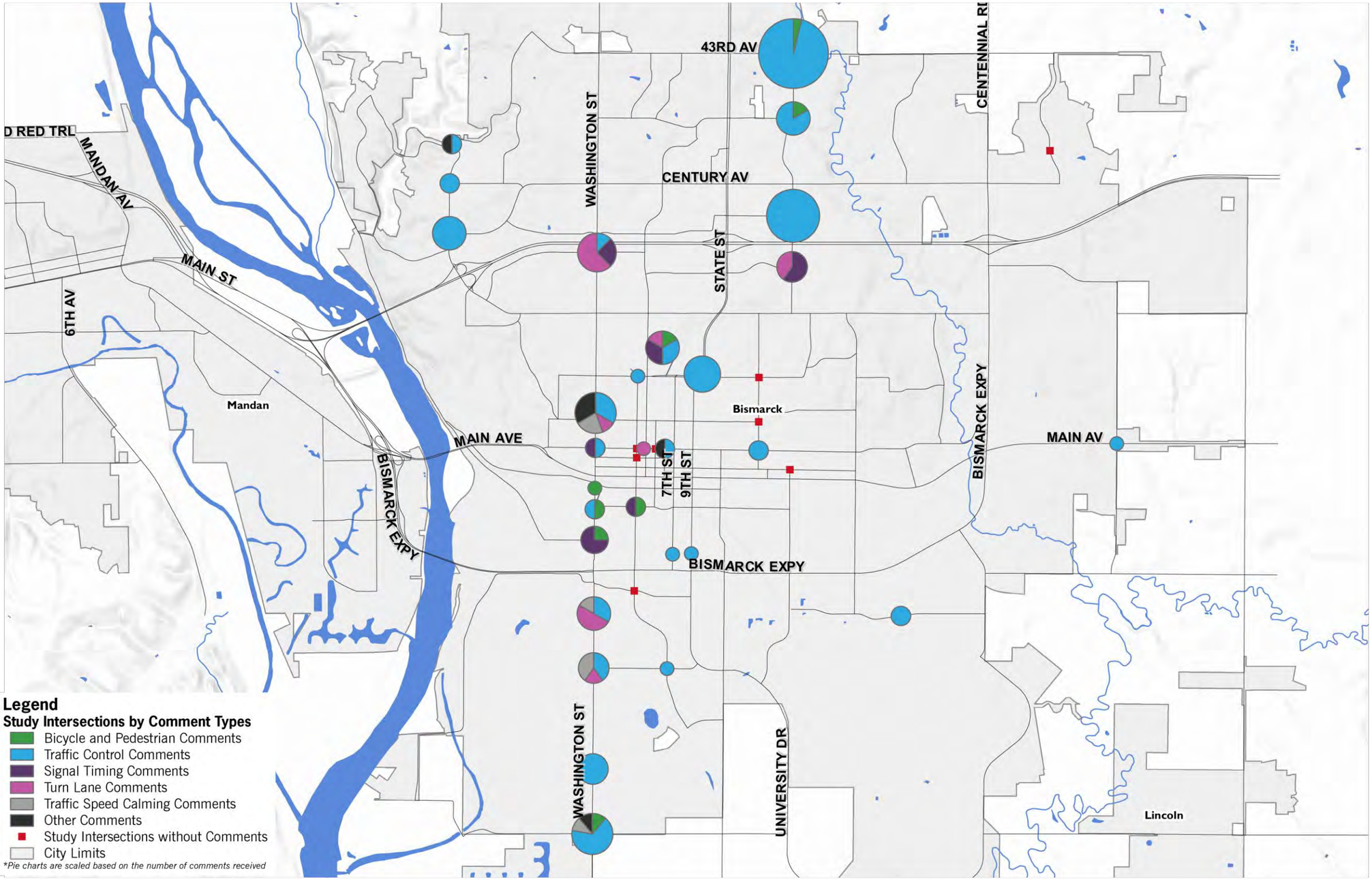


Figure 3: Mandan Study Intersections by Comment Types and Frequency

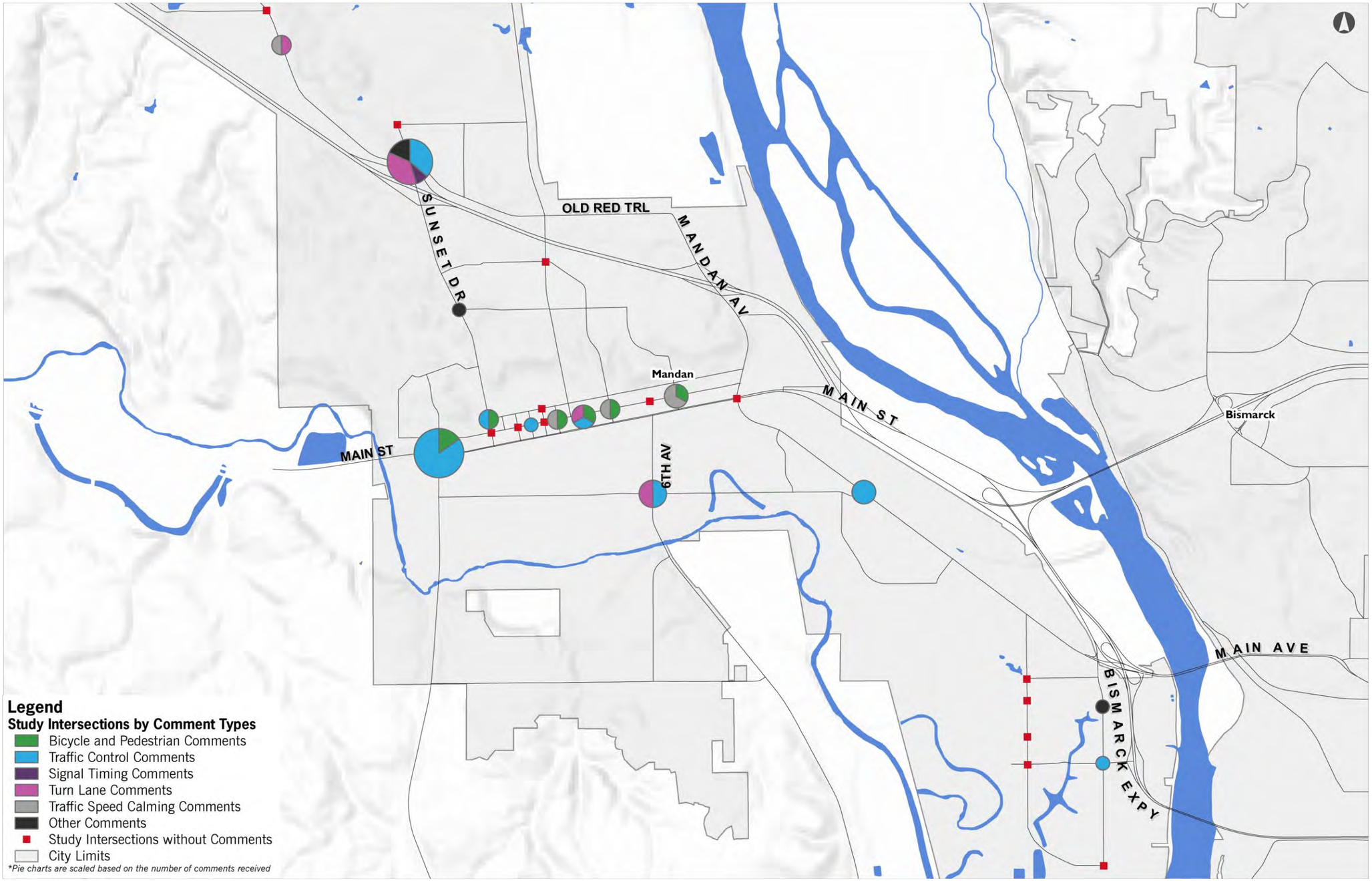


Figure 4: Total Comment Density and Location

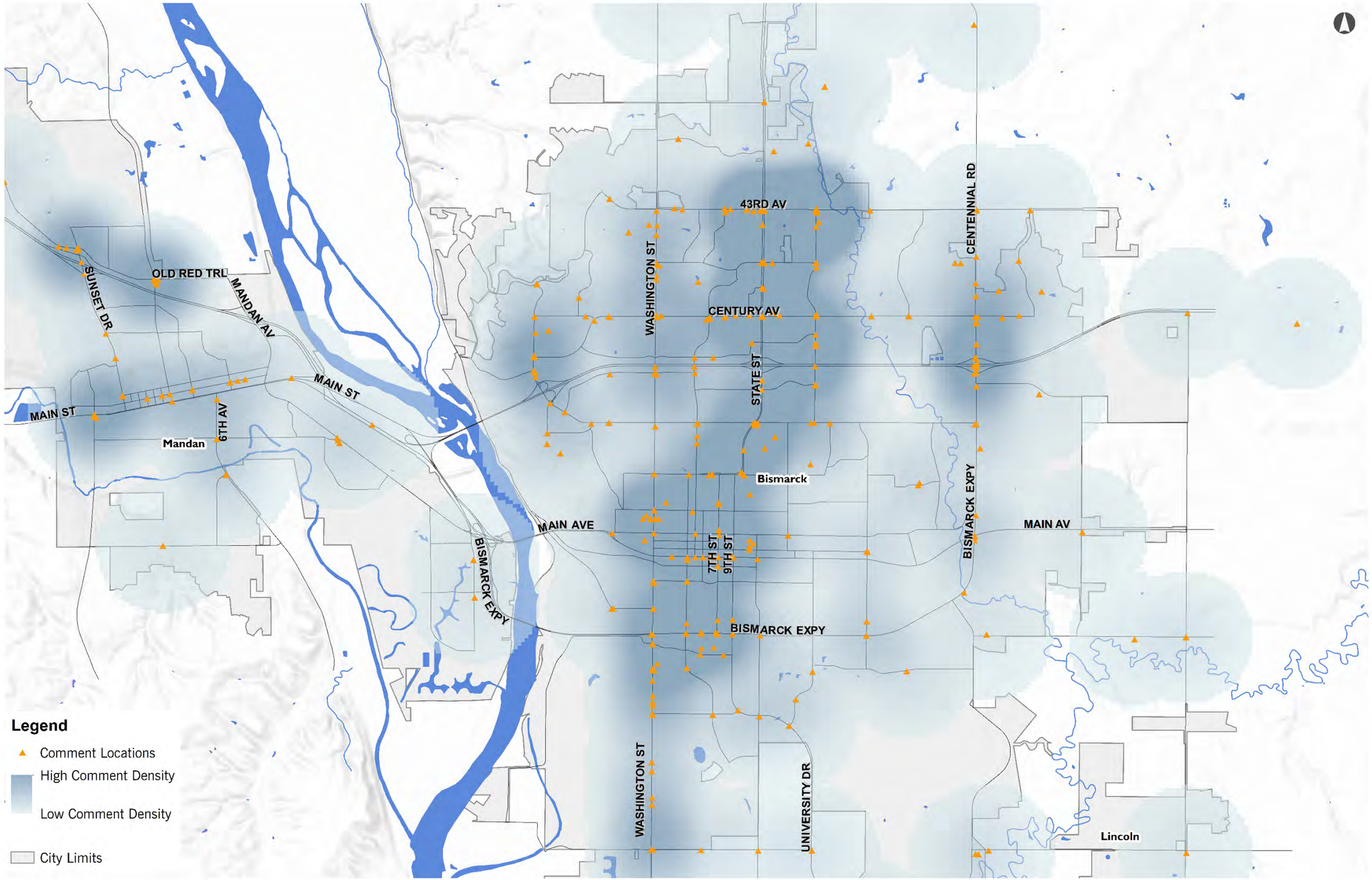
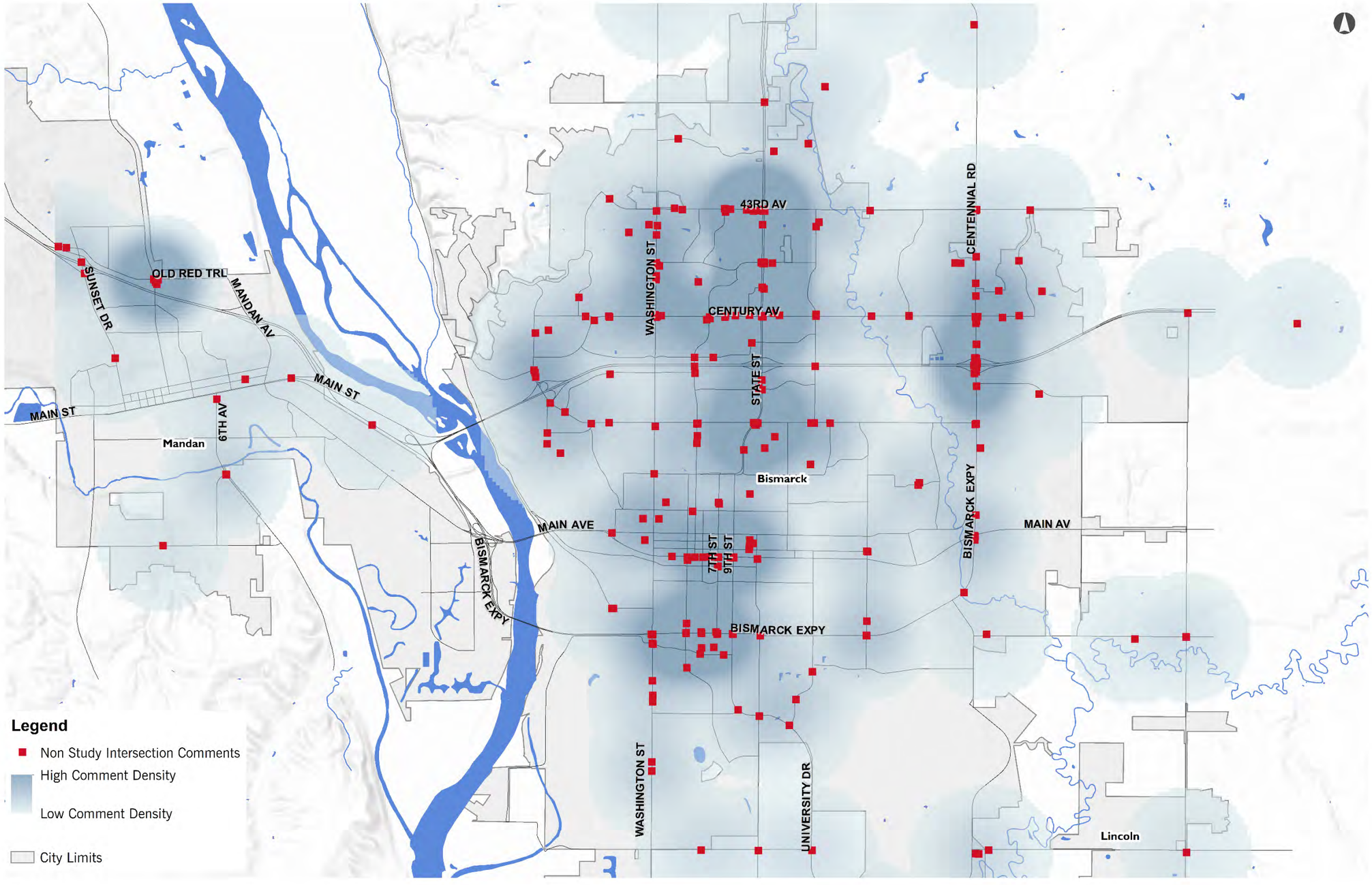


Figure 5: Non Study Intersection Comment Density



Name	ID_1	Type	Comment
3rd St & Bowen Ave	1	Bicycle and Pedestrian	Bike/Ped PIM Comment
3rd St & Bowen Ave	1	Signal Timing	The timing needs to be improved for the lights on 3rd. It is only possible to make the lights by speeding, which many do.
Washington St & Bowen Ave (N)	2	Bicycle and Pedestrian	Bike/Ped PIM Comment
Washington St & Bowen Ave (S)	3	Bicycle and Pedestrian	Bike/Ped PIM Comment
Washington St & Bowen Ave (S)	3	Traffic Control	Poorly designed
Washington St & Arbor Ave	4	Signal Timing	Signal Timing PIM Comment
Washington St & Arbor Ave	4	Bicycle and Pedestrian	Bike/Ped PIM Comment
Washington St & Arbor Ave	4	Signal Timing	Trying to turn north or south onto Washington from Arbor ave takes 4min 30sec (I have timed this) in the mornings when trying to get to work. This could be two stop signs going east and west, and would keeo Washington street flowing faster as well.
Washington St & Arbor Ave	4	Signal Timing	Instead of stop signs, I would recommend a left turn signal for traffic turning left off of Washington Street and change the sensitivity of the traffic sensors for vehicles on Arbor Avenue so traffic can flow better N/S. It would also help vehicles need
6th St & Boulevard Ave	5	Traffic Control	round about is needed
6th St & Boulevard Ave	5	Traffic Control	This intersection seems to work for the most part. It can slow through traffic on boulevard, but provides safe access to and from the Capitol Grounds.
6th St & Boulevard Ave	5	Turn Lanes	When turning left to the Capitol and someone is turning left across from you to go south it is extremely difficult to see oncoming traffic.
6th St & Boulevard Ave	5	Signal Timing	This light takes a substantial amount of time unless there is multiple cars waiting.
6th St & Boulevard Ave	5	Signal Timing	This light should be eliminated altogether. It's a total time waster.
6th St & Boulevard Ave	5	Bicycle and Pedestrian	Boulevard traffic does not feel safe to travel on as a cyclist from 2nd street until reaching the bike path on the Capitol Grounds.
7th St & Arbor Ave	6	Traffic Control	This stoplight should be blinking yellow for southbound drivers on 7th after the mall closes. This light is unneeded when the mall is closed.
9th St & Arbor Ave	7	Traffic Control	When heading either east or west on this road, the traffic signal will keep you at red for 5 or more minutes. Even when no traffic is heading northbound on this road, you still have to wait an inordinate amount of time. This traffic signal needs to be up
19th St & 43rd Ave	8	Traffic Control	There needs to be a stoplight here, especially for traffic on 19th trying to cross over 43rd.
19th St & 43rd Ave	8	Traffic Control	Probably the most dangerous intersection in Bismarck.... A roundabout would help immensely, but that whole street needs to be widened!!!!! From Washington to centennial....
19th St & 43rd Ave	8	Traffic Control	This is the worst intersection. Always accidents because people risk it when they have a small Chance to cross, because traffic doesnâ€™t allow many chances. Traffic light or roundabout is needed terribly!
19th St & 43rd Ave	8	Traffic Control	Def. a stoplight and 19th should be widened to have a left turn lane and a lane to cross 43rd and turn right
19th St & 43rd Ave	8	Traffic Control	This is a death trap. I drive miles out of my way to avoid this intersection during peak times. I literally hold my breath and say a prayer driving through here, even when I have the right of way. The misalignment of the roads is terrible. Drivers tha
19th St & 43rd Ave	8	Traffic Control	Very difficult to cross safely, especially during rush hour. Sometimes it can take 5 minutes or longer to get a break in traffic.
19th St & 43rd Ave	8	Traffic Control	Definitely needs to be a traffic light here. There have been several times that I have been coming down the hill from the west and car has pulled across the road in front of me. I have also seen several accidents here over the years.
19th St & 43rd Ave	8	Traffic Control	Need something here, either roundabout or lights. 5 o'clock traffic is exremely hard to cross 43rd
19th St & 43rd Ave	8	Traffic Control	Terrible intersection. Cars constantly pull out onto 43rd in front of other cars. Always nervous driving through here during rush hour and expect to slam on the breaks when a car pulls out.
19th St & 43rd Ave	8	Traffic Control	Needs a stoplight
19th St & 43rd Ave	8	Traffic Control	I would love to see a roundabout here. I drive thru this intersection multiple times a day, and a stoplight would impede the flow of traffic and back things up. With a roundabout, traffic continues moving, as long as people yield to those already in the
19th St & 43rd Ave	8	Traffic Control	I hate round abouts.
19th St & 43rd Ave	8	Traffic Control	Please add a light at N 19th and 43rd ave. Dangerous intersection where people pull out in front of you since taking a left to get onto 43rd going East is nearly impossible. Also this intersection is at an odd angle.
19th St & 43rd Ave	8	Traffic Control	This intersection is AWFUL with no light. During busy times you will wait forever to turn either way.
19th St & 43rd Ave	8	Traffic Control	This intersection needs a stop light or something to help traffic control. Turning off of 19th onto 43rd either direction is very dangerous.
19th St & 43rd Ave	8	Traffic Control	This intersection needs a stoplight
19th St & 43rd Ave	8	Traffic Control	I live on Chandler Ln and drive to Lincoln for work every day. I'm a huge fan of the roundabouts out there and think one would do wonders for this intersection. It wouldn't however, help pedestrian traffic much. A surprising number of people walk 19th
19th St & 43rd Ave	8	Traffic Control	Roundabouts are also more cost-effective in the long run.
19th St & 43rd Ave	8	Traffic Control	You can have crosswalks with roundabouts. That would help with the pedestrian traffic.
19th St & 43rd Ave	8	Traffic Control	This intersection gets really busy during high peak hours. The cars at the stop sign to the South gets pretty long as well just waiting to be able to get onto 43rd.
19th St & 43rd Ave	8	Traffic Control	The intersection is so dangerous. The vehicles driving on 43rd are going so fast that it's crazy trying to cross on 19th. I purposely avoid this intersection if I have the option - surprised there haven't been deadly accidents at this location.
19th St & 43rd Ave	8	Traffic Control	Traffic backs up on 19th. Very difficult to turn left.
19th St & 43rd Ave	8	Traffic Control	This intersection is becoming a nightmare with all the development in the area. 43rd Ave is very busy and only going to get busier especially with all the new apartments, the high school, and growing businesses. This needs to be an intersection with a s
19th St & 43rd Ave	8	Traffic Control	This intersection has become hazardous with the increased traffic flow in this area due to the new developments and additions of major retailers along with high density residential.
19th St & 43rd Ave	8	Bicycle and Pedestrian	It would be nice to have a sidewalk on 19th for Pedestrian and bicycling.
19th St & 43rd Ave	8	Traffic Control	This intersection NEEDS a light or a roundabout. Way too many accidents. A roundabout would be the best fit. Also, 19th needs to be widened close to 43 Ave.

Name	ID_1	Type	Comment
19th St & Calgary Ave	9	Traffic Control	It can be pretty stressful making left turns onto 19th from Calgary. Depending on the amount of traffic on 19th, a 4-way stop might be a good idea. That should certainly help slow down speeders on 19th as well - since that speed display sign doesn't co
19th St & Calgary Ave	9	Traffic Control	A 4-way stop would add to the congestion from here to Century in the morning. But it is a dangerous intersection, especially with how densely populated this area is from 19th to the end of Calgary. A traffic signal may helped if timed with 19th and Cen
19th St & Calgary Ave	9	Bicycle and Pedestrian	Bike/Ped PIM Comment
19th St & Calgary Ave	9	Traffic Control	19th and Calgary needs a TRAFFIC SIGNAL !
19th St & Calgary Ave	9	Traffic Control	Definitely need some sort of traffic signal or roundabout.
19th St & Calgary Ave	9	Traffic Control	Definitely not enough traffic there for a traffic light.
19th St & Capital Ave	10	Turn Lanes	Turn Lane PIM Comment - WBR
19th St & Capital Ave	10	Signal Timing	Green arrow changes too quickly when turning left onto Capitol Ave from 19th St. At times only one car gets through during morning commute.
19th St & Capital Ave	10	Signal Timing	There is no green arrow. You normally just wait for a break in the rush of cars to get in. I agree that there should be a green arrow for both turn lanes to get traffic through.
19th St & Capital Ave	10	Signal Timing	Early in the morning the lights change without any cars waiting on Capitol Ave. Better sensors or timing is needed at these lights.
19th St & Capital Ave	10	Turn Lanes	There needs to be a left turn signal (there is a left turn lane) when heading North on 19th and making a left on E. Capital Ave. All intersections in Bismarck with left turn lanes need a green left turn arrow. They also ALL need a flashing yellow arrow a
Tyler Pkway & Century Ave	11	Traffic Control	From 4:30 pm to 6:00 pm this intersection is a mess. When traffic is backed from the stoplight to the south drivers heading west continue to go around to south blocking the intersection so no traffic can move. Put a stoplight Here!!!!
Tyler Pkway & Century Ave	11	Traffic Control	The Tyler Parkway intersection by the Fire Station should be evaluated for conversion to a roundabout. I don't see any other likable solution.
Tyler Pkway & Century Ave	11	Traffic Control	Just south of here, the entrance into gate city and the funeral home is extremely difficult to get in and out of as well due to the congestion at the burnt boat dr road and all the traffic coming from century and tyler parkway north of here.
Tyler Pkway & Century Ave	11	Traffic Control	There needs to be a stoplight here. This intersection is chaos when it is busy.
Tyler Pkway & Century Ave	11	Traffic Control	A round-about would be an alternative, although the land requirements for one may be a barrier at this location. With the extension of Tyler Parkway north to Ash Coulee, this intersection is going to burst with congestion.
Tyler Pkway & Century Ave	11	Traffic Control	Very difficult to cross here during the morning commute as the traffic on Century does not stop and has the right of way. It will frequently back up from the light at Burnt Boat and there is no opening for southbound cars to cross on Tyler Parkway.
3rd St & Boulevard Ave	12	Traffic Control	This intersection gets very congested in the morning, but through traffic seems to do ok. You just cant expect to make a left turn to the south or north from Boulevard. Drivers will cut through the private parking lot going from WB Blvd to SB 3rd.
Washington St & Turnpike Ave	14	Turn Lanes	If youâ€™re on Turnpike going East and need to go straight through the light, be ready to wait. The light is too quick, especially when you have to wait for for cars to turn left which are waiting on traffic traveling the opposite direction.
Washington St & Turnpike Ave	14	Turn Lanes	Every other intersection in town has a dedicated, separate left turn lane. This one has left/straight combined and a right turn lane. WHY? Do this here and give a dedicated left turn lane AND signal. The only time this intersection isn't painfully time c
Washington St & Turnpike Ave	14	Signal Timing	Add lights that create a designated time for turning, and every designated turn light should be blinking. At non busy times, it is painful to wait when clearly no one is coming.
Washington St & Turnpike Ave	14	Turn Lanes	The lanes on Turnpike need to be adjusted. Currently they have two lanes, one that is right turn only and one that is for left turns and going straight. They should be changed so that there is a left turn only lane and the straight and right turns are co
Washington St & Turnpike Ave	14	Turn Lanes	I concur, this configuration doesn't make sense for through traffic on Turnpike. Further confusion is added when the average driver wont use indicators and someone is just sitting there in the thru lane and not moving on a green light.
Washington St & Turnpike Ave	14	Turn Lanes	Also, there are multiple occurrences where the right turn lane goes straight. Itâ€™s a very irregular intersection.
Washington St & Turnpike Ave	14	Signal Timing	Trying to turn left off of Turnpike is awful in the mornings. The street lights only usually allow 3-4 cars to pass through. Plus having the straight and turn lane together creates a very long line of cars.
Washington St & Turnpike Ave	14	Traffic Control	Add on and off ramp would be a good idea
Washington St & Reno Ave	15	Turn Lanes	The turn lanes on Reno are opposite on each side of Washington so people that should yield to the traffic going straight are sometimes expecting that traffic to turn. Please standardize the lanes. Also please put signs on the stop light to indicate turn
Washington St & Reno Ave	15	Traffic Calming	Traffic Calming PIM Comment
Washington St & Reno Ave	15	Traffic Control	See my wachter comment.
Washington St & Reno Ave	15	Traffic Control	The sensed timing of this lights creates an easy way onto Washington. Signal timing should be adjusted so that if you arrive you await 45 seconds before a green light.
Washington St & Reno Ave	15	Turn Lanes	I agree that Washington, south of expressway, should be turned into 3 lanes with designated turning lanes. But, I don't agree with the bike lane, too many people use those lanes as turning lanes or even passing lanes.
Washington St & Reno Ave	15	Turn Lanes	I agree that no bike lanes are needed. I don't agree that the roadway should be condensed to three lanes. If anything, the roadway needs to be increased to five lanes south of Expressway. The roadway needs a complete reconstruction anyway so it would

Name	ID_1	Type	Comment
Washington St & Wachter Ave	16	Traffic Calming	Traffic Calming PIM Comment
Washington St & Wachter Ave	16	Turn Lanes	The turning lanes on Wachter that are painted onto the street are different than pretty much every other residential intersection. I have had multiple times where people that donâ€™t use it frequently drive straight from the turning lane and the people g
Washington St & Wachter Ave	16	Traffic Control	Can dedicated left turns (green arrows) be considered here and at Reno rather than attempting a lane reduction or otherwise? I come south this way after work and this turns into a racing and jockeying cooridor due to impatience with people turning left.
Washington St & Wachter Ave	16	Traffic Control	I fully agree with this. I need to turn left off of Washington onto Wachter regularly, and it is one of the most frustrating intersections on my drive. It is not uncommon for me to hold up straight traffic for 1/2 or 3/4ths of the duration of the green l
Washington St & Wachter Ave	16	Traffic Calming	Washington Street South is purely residential - homes, churches, and a school - with 4 lanes of traffic and posted speed of 35 mph (and city allowed speed of 44 mph), the street is unsafe and needs traffic calming controls. PIM Comment
4th St & Rosser Ave	19	Turn Lanes	Drivers waiting to turn left on to Rosser backs up traffic even during low density times. Drivers wanting to go straight end up trying to squeeze past them through the parking area and creates a dangerous situation where left-turning vehicles on the oppo
6th St & Rosser Ave	21	Traffic Control	This should have a protect left when you are Going west on Rosser and turn Left(south) on 7th. There is often a line of cars turning that stretches past 8th St.
6th St & Rosser Ave	21	Other	People cross the road here on foot and they can be very hard to see. Please consider putting up a railing to funnel them to a traffic light, better lighting so they can be seen, or a crosswalk. Iâ€™m afraid someone is going to get hit.
State St & Boulevard Ave	22	Traffic Control	Round about needed
State St & Boulevard Ave	22	Traffic Control	This intersection is horrible something needs to be done as I've witnessed several close calls in the last 10yrs, between cars wanting to cross the lanes of traffic
State St & Boulevard Ave	22	Traffic Control	Due to the angle of the turn lane, it's hard to see in coming traffic when looking south.
State St & Boulevard Ave	22	Traffic Control	I worked in the State Office Building for 2 years and we frequently witnessed accidents at this intersection as well as 9th/boulevard. The combination of speed reduction, blind corner, and downhill grade send a lot of drivers over the curb and into the
State St & Boulevard Ave	22	Traffic Control	I agree. This entire intersection needs to be completely re-designed and redone. It's a disaster.
State St & Boulevard Ave	22	Traffic Control	This intersection needs more control than a Stop sign. It is unsafe to essentially have to look behind you, in your blind spot, to determine if it is safe to cross State Street without being stuck by East-North travelling traffic.
State St & Boulevard Ave	22	Traffic Control	Why is there a yield sign for those headed straight east on Boulevard? It makes more sense to have those turning into Boulevard from State St yield to those going straight.
Tyler Pkwy & Valley Dr	23	Traffic Control	Agree that this intersection needs a light. It's blind on Valley otherwise and confusing for who has the right of way.
Tyler Pkwy & Valley Dr	23	Other	It's a very hard right turn from T. Parkway onto Valley, most vehicles turn into the turning lane or hit the curb with back wheel to avoid vehicles in turning lane.
Tyler Pkwy & Country West Rd	24	Traffic Control	This could be a suitable place for a roundabout.
Tyler Pkwy & Country West Rd	24	Traffic Control	This intersection is messy and needs a light.
16th St & Rosser Ave	28	Traffic Control	I agree, there needs to be a light here. Too much traffic for a 4 way stop.
16th St & Rosser Ave	28	Traffic Control	Especially during before/after school hours!
3rd St & Wachter Ave	30	Traffic Control	This intersection is functional most of the time for now. It currently gets a line of 5 to 10 vehicles in multiple directions for the 800 rush, but it manageable so far. I can see this intersection getting busier. Wachter is becoming more and more of
3rd St & Wachter Ave	30	Traffic Control	I would recommend at the next intersection, Wachter and University that they use the right hand lane as a right turn only and the left turning lane as the dual lane for turning left or driving across the street. Currently the right lane is dual and the t
Washington St & Ave C	31	Turn Lanes	If the city can't manage to put turn lanes in from all 4 directions, at least ban left turns from C to Washington during rush hours. 3 out of 4 isn't bad, but eastbound C is frustrating every morning. Add the lane or ban the turns. And pull back the "no
Washington St & Ave C	31	Other	This intersection needs a dedicated left turn signal.
Washington St & Ave C	31	Other	I avoid ever attempting to make a left turn anywhere on this stretch of Washington. During peak hours it can be impossible to make a left turn without running a red light.
Washington St & Ave C	31	Other	Something needs to be done about Washington in general. It really needs to be 4 lanes in it's entirety along with turn lanes and signals. There is no other convenient North/South artery in west Bismarck.
Washington St & Ave C	31	Traffic Control	Need traffic light or cut down the trees to see on coming traffic. You can not cross the street when traffic is high
Washington St & Ave C	31	Traffic Control	Can not get onto Washington St at certain time of the day
Washington St & Ave C	31	Traffic Control	Can not get on to Washington ST at certain times of the day
Washington St & Ave C	31	Traffic Calming	Need wider roads when people park on the street
Washington St & Ave C	31	Traffic Calming	Very unsafe road
Washington St & Rosser Ave	32	Signal Timing	This is a timed light and it never benefits people on Rosser. It's too short from that direction and you feel like you're sitting there forever during late night hours when there's no one else at the intersection.
Washington St & Rosser Ave	32	Traffic Control	This intersection needs left turn lanes and green left turn arrows from every direction
Washington St & London Ave	33	Traffic Control	The Burliegh to Canal segment gets very congested at peak times in the mornings. Cars queue up and its very difficult to make a right turn and you can forget about making a left turn. To make a right, you just wait and wait until a slightly larger gap
Washington St & London Ave	33	Traffic Control	I agree that this stretch needs to be widened to five lanes where there are two northbound and two southbound lanes with a center left-turn lane. The speed limit is fine at 40 or 45 mph but the lane number needs to be higher.
Washington St & London Ave	33	Traffic Control	Should add four lanes at minimum. During peak traffic flow it's nearly impossible to turn across traffic to join the flow.
Washington St & London Ave	33	Traffic Control	The more lanes the better. Reducing lanes to add a continuous left turn lane will not solve the problem.
Washington St & London Ave	33	Traffic Control	South Washington St needs additional lanes to help with the growth that is occurring there with more developments and homes being built.

Name	ID_1	Type	Comment
Washington St & Burleigh Ave	34	Bicycle and Pedestrian	Bike/Ped PIM Comment
Washington St & Burleigh Ave	34	Traffic Control	Looking forward .... I would suggest a traffic circle here.
Washington St & Burleigh Ave	34	Traffic Control	I like the idea of a round about or traffic circle here. I live directly off of washington and I frequently see semi trucks of different types coming through here. Not sure if they are supposed to, but something to consider. There is also a lot of tra
Washington St & Burleigh Ave	34	Traffic Control	Widen Washington St to five lanes so there are two northbound and two southbound lanes plus a center left turn lane. A traffic signal would be great. Please do NOT place a roundabout in this area!!!! A controlled intersection with lights and dedicated
Washington St & Burleigh Ave	34	Traffic Control	I agree, a round about / traffic circle here would be much better than a light in my opinion.
Washington St & Burleigh Ave	34	Traffic Control	A round a bout would be perfect here. No one fully stops at the 4-way stop currently.
Washington St & Burleigh Ave	34	Traffic Control	Traffic Control PIM Comment
Washington St & Burleigh Ave	34	Traffic Calming	Traffic Calming PIM Comment
Washington St & Burleigh Ave	34	Other	The main issue with this intersection is that it becomes extremely icy in the winter. Needs better winter cleaning.
52nd St & Main Ave	35	Traffic Control	This should be a roundabout.
Burlington Dr & Morrison Dr	36	Traffic Control	Round about
Burlington Dr & Morrison Dr	36	Traffic Control	Everybody hates roundabouts until they use them and are amazed at how smooth it works.
19th St & Shiloh Dr	37	Traffic Control	Huge traffic problems with people turning left into the Shiloh school. The left turn lane are too short and pushes back traffic into the back intersection sometimes. The Shiloh students and parents often do not move over enough into the left lane and so
19th St & Shiloh Dr	37	Traffic Control	Congestion/traffic at the Shiloh turn is an accident waiting to happen. Either a traffic light is needed here or a roundabout.
19th St & Shiloh Dr	37	Traffic Control	I agree! The people turning into Shiloh sometimes will block traffic or hit the brakes suddenly in the north bound lane. Sometimes exiting Shiloh, they try to squeeze between oncoming traffic and if turning onto interstate right away, they sometimes will
19th St & Shiloh Dr	37	Traffic Control	A slower speed for a school zone may help as well.
19th St & Shiloh Dr	37	Traffic Control	Need a traffic light here. Had to wait 6 minutes yesterday to turn onto 19th from the west.
19th St & Shiloh Dr	37	Traffic Control	A stoplight here would be a great idea that operates before & after school, then blinks yellow the rest of the time.
19th St & Shiloh Dr	37	Traffic Control	This intersection is awful. Lots of completely stopped and backed up vehicles everyday. I feel like itâ€™s an accident waiting to happen. A stop light would benefit this intersection greatly. Iâ€™ve waited up to 15 min to turn onto 19th.
19th St & Shiloh Dr	37	Traffic Control	A traffic light is definitely need here. Like stated before it can be set up to only operated before school starts and ends, then blinking yellow the rest of time for north/south bound traffic and constant red for east/west.
19th St & Shiloh Dr	37	Traffic Control	I works like to see the turn lane into Shiloh extended further back. People turning do not get far enough over to allow traffic to continue moving southward around them, and traffic has gotten backed up all the way to the Century stoplight. I think a fla
19th St & Shiloh Dr	37	Traffic Control	A traffic light would be great here but I worry how it would affect the access to Basin Electric, interstate ave, Red Door Pediatric, and the dome. My kids attend Shiloh, participate in sports at the dome and Scheels baseball complex, and have gone to Re
19th St & Shiloh Dr	37	Traffic Control	Definitely agree that a stoplight needs to happen here. At certain times of the day it is impossible to turn left from Shiloh Dr. onto 19th. That is why everyone turns right and then immediately turns left onto Interstate Ave., backing that turn lane up
19th St & Shiloh Dr	37	Traffic Control	The speed limit through this area is increased north of Capitol Avenue and then reduces north of Century Avenue. With the numerous accesses off of 19th Street the 35 mph speed needs to be reduced back down to 25 mph as it is north and south of this sect
19th St & Shiloh Dr	37	Traffic Control	Its probably not the city's problem, or at least not high on the priority list, but trying to make left turns onto 19th from the Basin parking lot (& presumably Shiloh & the Interstate Ave intersections too) is pretty difficult during rush hour times. It
19th St & Shiloh Dr	37	Traffic Control	Or maybe a long roundabout that reaches both the Basin and Shiloh entrances and a second roundabout for the Interstate Ave intersection... or one really long one for all three? It would be nice if something was done though.
19th St & Shiloh Dr	37	Traffic Control	This is a difficult intersection trying to get onto 19th street coming from the west turning north and even from the east headed north. Also, the turn left turn lane on 19th can get backed up going north to head west on interstate ave.
Collins Ave & 1st St NW	38	Bicycle and Pedestrian	Bike/Ped PIM Comment
Collins Ave & 1st St NW	38	Traffic Control	Traffic Control PIM Comment
Collins Ave & 1st St NW	38	Turn Lanes	Main St. needs turn lanes up and down the entire street.

Name	ID_1	Type	Comment
10th Ave & Main St	39	Traffic Control	I live nearby and this is a main road taken by a lot of semi truck traffic, farm equipment traffic, high school kids taking the â€œback wayâ€ out of the high school, along with multiple pick up/drop offs for the Roosevelt school. I have seen on numerous
10th Ave & Main St	39	Traffic Control	This intersection is a hazard for commuters and pedestrians. The on 10th driving straight through the intersection (north) is almost impossible. I think itâ€™s crazy that they put the light out of service.
10th Ave & Main St	39	Traffic Control	Dangerous without a light I can never go straight across 10th anymore.
10th Ave & Main St	39	Bicycle and Pedestrian	Bike/Ped PIM Comment
10th Ave & Main St	39	Traffic Control	We live west of Mandan and this intersection is AWFUL since you took the light away!!! Bring it back! It is so unsafe and there is going to be a serious injury.
10th Ave & Main St	39	Traffic Control	Traffic Control PIM Comment
10th Ave & Main St	39	Traffic Control	This intersection can be busy depending on the time of day. My concerns are the speed of trucks and vehicles moving from west to east. They are often exceeding the speed limit. The light would reduce speed to allow safer crossing and reduce speed down
10th Ave & Main St	39	Bicycle and Pedestrian	I live near this intersection and used to walk across it regularly on a walk to the golf course down the street. Since the light was taken away, I have not tried to walk across this intersection once, as i drive it and see how fast traffic goes thru it.
10th Ave & Main St	39	Traffic Control	Not very well marked. Was in a 3 vehicle accident and someone could have been killed. This intersection needs a working stoplight.
10th Ave & Main St	39	Traffic Control	This intersection needs the traffic light back. I have seen and been in many close calls or near miss accidents here. The city lets some guy from the federal government come and tell us we don't need a light here is crazy. Way to go commissioners, redeem
10th Ave & Main St	39	Traffic Control	Agreed. The traffic light is necessary at this intersection.
10th Ave & Main St	39	Traffic Control	With the removal of the traffic signal at this intersection, something needs to be done to alleviate the backups occurring here. The signals may not meet warrant but at times of the day, i'm sure they do. Defining turn lanes or adding turn lanes with m
10th Ave & Main St	39	Traffic Control	Intersection of century and Tyler pky is a mess. Needs better signage or a 3 way stop light. Gets backed up and No one moves. Westbound century cars block intersection even though there is nowhere for them to go wen traffic backs up
Memorial Hwy & 3rd St SE	40	Traffic Control	HORRIBLE, from what Iâ€™ve heard there will be a traffic light here soon
Memorial Hwy & 3rd St SE	40	Traffic Control	A street light here to control traffic at this busy interesection would be great here. Seems like there are many accidents also here without one
Memorial Hwy & 3rd St SE	40	Traffic Control	This intersection is very busy and there are no traffic control!! It is so dangerous!
46th Ave & McKenzie Dr	41	Traffic Control	The current 4-way stop in place works very well. I travel this intersection at least twice a day. I have never encountered more than 10 cars total from all directions. It would help if drivers treated this 4-way stop as ""stop and wait for your turn t
Old Red Tr & 34th St	43	Turn Lanes	What was the point in drawing the new turn lane lines? People dont seem to understand you can stay in the left lane and drive over the double yellow when turning left (south) onto 34th from old red. The old turn lane was better because people actually un
Old Red Tr & 34th St	43	Traffic Calming	Traffic Calming PIM Comment
Sunset Dr & Old Red Tr	45	Traffic Control	The left turn lanes need a left turn light. People donâ€™t know that left turns should yield to right turns.
Sunset Dr & Old Red Tr	45	Traffic Control	Heading south on Sunset and turning left (east) onto Old Red Trail is terrifying because you can't see past the cars in the opposite left turn lane. You have to creep out into the intersection and by the time you *think* it's safe to turn, the light has
Sunset Dr & Old Red Tr	45	Other	Other PIM Comment
Sunset Dr & Old Red Tr	45	Turn Lanes	Traffic headed south on Sunset and turning left onto Old Red Trail (toward Wal-Mart) have to yield to oncoming traffic. Most times, if there is a car sitting in the turning lane on the other side of the intersection, you cannot see the oncoming traffic u
Sunset Dr & Old Red Tr	45	Other	Other PIM Comment
Sunset Dr & Old Red Tr	45	Signal Timing	Signal Timing PIM Comment
Sunset Dr & Old Red Tr	45	Traffic Control	Why is there a right turn yield on green here? It would be far safer to have designed left turn lights on old red trail with the right turn being no turn on red. It's extremely dangerous.
Sunset Dr & Old Red Tr	45	Turn Lanes	Traffic going west on old red and turning left (south) on sunset need to yield to people making right turns from the east. I have almost been hit so many times because people dont know how to drive for some reason when it comes to this intersection. It's
Sunset Dr & Old Red Tr	45	Turn Lanes	This right turn lane (south onto sunset drive) has a sign that says right turn yield on green. This is not something I've seen at any other intersection. It's confusing and potentially dangerous. Additionally, many people making this right turn immediat
Sunset Dr & Old Red Tr	45	Turn Lanes	I agree that this is a terrible design. The green light instead of a yield sign is incredibly confusing. I was rear-ended in this exact location.
Sunset Dr & Old Red Tr	45	Traffic Control	Hardly anyone obeys the yield on green sign here. There should be a yield sign on the ground as well.
Sunset Dr & Division St	46	Other	PIM Comment
Sunset Dr & 2nd St	48	Bicycle and Pedestrian	Bike/Ped PIM Comment
Sunset Dr & 2nd St	48	Traffic Control	This four-way stop seems silly. I travel this road every day, and there are rarely any cars traveling along 2nd St NW. Quoting a DOT FAQ: "Many studies have shown that stop signs are not an effective measure for controlling or reducing midblock speeds.
3rd Ave & 1st St	52	Traffic Control	This should also be a four way stop. It's inconsistent with other four ways from Collins to Sixth Ave. Confusing always to say the least. (Either no four ways between these intersections or all four way stops.
1st Ave & 1st St	54	Traffic Calming	Traffic Calming PIM Comment
1st Ave & 1st St	54	Bicycle and Pedestrian	Bike/Ped PIM Comment
3rd Ave & 1st St	55	Traffic Calming	Traffic Calming PIM Comment
3rd Ave & 1st St	55	Bicycle and Pedestrian	Bike/Ped PIM Comment
9th Ave & 1st St	57	Bicycle and Pedestrian	Bike/Ped PIM Comment
9th Ave & 1st St	57	Traffic Calming	Traffic Calming PIM Comment
9th Ave & 1st St	57	Traffic Calming	Sight Line Issue, excessive speed, hard to cross streets, can't turn left. PIM Comment

Name	ID_1	Type	Comment
6th Ave & 3rd St	59	Traffic Control	Space might be too limited but a round about would be great here. If traveling south and you get in the left lane, people in front turning left, you get stuck for a light or two.
6th Ave & 3rd St	59	Traffic Control	Completely agree a roundabout would keep the flow of traffic moving.
6th Ave & 3rd St	59	Turn Lanes	Throughput here could be improved by converting one of 6th Ave's two lanes in each direction to a left-turn lane onto 3rd St. It's not dangerous, but it is frustrating to travel south, not knowing whether you're going to be stuck in the left lane behind
6th Ave & 3rd St	59	Turn Lanes	Space might be too limited but a round about would be great here. If traveling south and you get in the left lane, people in front turning left, you get stuck for a light or two.
46th Ave & 21st St	64	Other	Can get very icy and never gets cleaned properly in winter. Better maintenance needed
		Traffic Calming	need wider road it is one way traffic with cars parked on the street
		Traffic Calming	Unsafe
		Traffic Calming	Speed is way too low for a busy street, this needs to be 35 not 25
		Turn Lanes	Traveling southbound on washington and attempting to make right turn onto augsburg requires slowing down greatly due to tight corner that can be slippery in winter. I am concerned about being rear-ended by speeding traffic when attempting to make this
		Traffic Calming	One lane only because of parking allowed on both sides. Very unsafe.
		Traffic Control	I see where the city engineers are coming from with wanting to change Washington Street to 1 northbound lane 1 southbound lane with a continuous left train lane in the center. This will help with traffic jams when a car wants to turn left but it will not
		Turn Lanes	2 turning lanes here
		Traffic Control	19th and 43rd avenue needs a signal light, must have
		Traffic Control	Needs a roundabout
		Traffic Control	Roundabout
		Signal Timing	The timing on the stoplight going eastbound or westbound on Burnt Boat Drive needs to be improved. The lights are green for less than 10 seconds. This leads to many people running this light
		Signal Timing	I would agree, the timing when driving both directions on Burnt Boat needs to be addressed. Traffic count has increased, but the length of the green light has not.
		Signal Timing	I agree. I often cross on bicycle and the loght will turn red while Iâ€™m still in the intersection. Scary
		Signal Timing	Trying to turn left from Burnt Boat drive westbound onto south Tyler Parkway has a double turn lane but the light is so short hardly anyone can get through. Especially if one of those vehicles is a semi it can't even get going and all the way through th
		Signal Timing	If you are going East from Burnt Boat Dr to cross Tyler Parkway, you literally get five seconds of green light protection. Not practical when you are the third car in line and you canâ€™t make the light.
		Signal Timing	Should have solid green arrow to turn left @ peak school times. Blinking caution arrow get no one across, protect our teachers! Everyone has to â€œrun the yellow lightâ€.
		Traffic Calming	Need Wider road one way traffic during Mas
		Traffic Calming	Today this is a safety issue
		Traffic Control	This is a turn left or right w/ one way traffic looking @ you. This light s/b arrows not a solid green light. Confusing if should go when just green & if S Bound has right of way also.
		Other	These three intersections (two that intersect I-94 on- and off-ramps and one with Old Red Trail) are confusing to navigate and need an overall strategy. To travel north, you have to weave left to avoid the right turn lane (for I-94 E), then weave right t
		Other	The pothole on 6th going under the bridge is awful. Between the huge pothole and ice/water accumulation, every you drive the speed limit under the bridge, you catch some serious air. Believe it or not, I donâ€™t want a TBI on my way to work every day.
		Traffic Control	We need to have yield signs or stop signs on a set direction on these streets. People cruise down Mandan St and the cross streets without bothering to yield or look. The traffic rule of yielding to the person on the right seems to be a very rare courtesy
		Signal Timing	Heading west, when coming up in the left turn lane if you arenâ€™t in the lane for a little bit before the west bound lanes turn green this turn arrow stays red. You ultimately have to wait a whole cycle of lights before your given a green arrow to go. I
		Traffic Control	Turning from east bound Expressway to southbound University is difficult. I don't believe the signal lights offer a protected left turn. I believe most of express doesn't offer protected left turns to go south.
		Traffic Control	There are yield signs here in two spots. It should become either 2 stop sign or a 4 way as it is difficult seeing and there are a lot of school kids that cross there
		Bicycle and Pedestrian	The park and path here are great, but there is no access to it from Sunrise school or from Century Ave
		Traffic Calming	Sight line issue, excessive speed, hard to cross streets, can't turn left. PIM Comment
		Turn Lanes	A right turning lane as you go towards Lowes is desperately needed here.
		Traffic Control	During school hours this can get very crazy with cars going and coming to the school and surrounding homes. Should have either 2 way stop sings, yields or a 4 way
		Turn Lanes	Left turn signals needed in all directions. It gets really busy during rush hours, which makes it impossible to turn left no matter where your coming from or going to at this intersection.
		Traffic Control	West bound express way to south bound 3rd street is not offered a protected green turn. East bound express way to north bound 3rd is offered a protected green turn. The south bound needs a protected left turn.
		Traffic Calming	Speed needs to be controlled here. This is a residential neighborhood with posted speed limit of 25 MPH, but speeds are typically 35-40 MPH.
		Traffic Control	This intersection is awful. A light & updated lane marking would make it much safer.
		Traffic Control	With the new blinking arrow signals, it is nearly impossible to get a green left turn arrow to turn from 3rd onto Expressway from either direction.
		Traffic Control	Agreed. The purpose of the arrow is for protected turns, most of the new blinking yellow never turn green so we are back to one car making it through and the others running a red.
		Traffic Control	I sat through 3 lights to get through 4 cars in the left-hand turn lane at 5pm last night. Frustrating. I'm in complete agreement with a blinky-left-turn arrow, however, we should have a solid arrow first allowing turns. Or if we won't do that, look a

Name	ID_1	Type	Comment
		Traffic Control	You will also never get a green turn arrow if you are westbound on Expressway and wanting to go south onto 3rd. It is always blinking yellow and only 1 car can make it through before the light turns red. This intersection is very frustrating.
		Traffic Control	This takes forever to get through. I am often waiting for the light to turn to solid yellow before making my left turn and oncoming traffic doesn't stop until my light is red, and I am stuck out in the intersection when cross traffic has green. Scary
		Traffic Calming	While heading southbound on Washington, making a right hand turn onto Augsburg or Wachter frequently leaves me concerned for being rear-ended. Traffic jockeys into the right hand lane to avoid people waiting to make left turns out of the left lane, then
		Bicycle and Pedestrian	I drive this at 7:45 AM and there are multiple kids crossing the street often in the dark, that is when the school opens up for breakfast. There are NO signs that indicate this road is adjacent to a school or in a school zone and NO signs that direct t
		Other	Might already be in the works, but traffic lights at 2nd, 4th and 6th Street seem unnecessary most times of day. Only having lights at 3rd, 5th and 7th Street could make the drive down Main feel less disjointed.
		Traffic Control	Add on and off ramp would be a good idea
		Traffic Control	Left turn arrows needed: From east Main Street turning south on 3rd From 3rd Street turning east on main
		Other	Make this section of Old Red Trail a 35mph zone again. It was recently reduced from 35 to 25 but everyone still drives 35-40 anyway because 25 on a wide 4 lane commercially zone road is painfully slow. This is now nothing more than a speed trap when pol
		Turn Lanes	Add turning lanes here on both sides
		Other	Street lights are needed here. Also the road is uncomfortably narrow and there is no sidewalk. I shouldnâ€™t need my brights on in town to make sure there isnâ€™t a neighborhood deer in my path. This hill should have been cut down for better sight dista
		Turn Lanes	Adding a turn lane for McDonalds, Texas Roadhouse and the gas station would also flow traffic better.
		Traffic Control	Traffic control is needed or this access point to the mall should be eliminated.
		Traffic Control	There is no question that a traffic signal light is needed here - very dangerous trying to enter Bismarck Expressway from the mall or across the street from the businesses there.
		Traffic Control	There has been no major crashes as a result of this entrance and there is no reason to change this.
		Traffic Control	This intersection had one lane added on Old Red Trail heading west, and they way the intersection is lays out-it is so hard to see turn signals. Again, traffic signal or a round about would be much better. The housing is growing north of Mandan and the r
		Traffic Calming	students speeding to and from high school to collage campus, Bismarck and the city added too many turning lanes to and takes away from good residential parking
		Bicycle and Pedestrian	Consider adding crosswalk/pedestrian facility to increases accessibility to Camp Hancock
		Signal Timing	All lights on main need to be timed
		Traffic Control	The horrible accidents at this location justify a stoplight.
		Traffic Control	For traffic coming out of the capitol complex, turning north on State Street, has no idea there is a merge lane. Please post a sign so traffic doesn't back up as much.
		Traffic Control	Placing a roundabout here would prevent having to stop the flow of traffic while allowing those exiting the Capitol grounds to turn South or North.
		Traffic Control	traffic control in this area could also alleviate speeding violations.
		Traffic Control	There should be no left turns to go north on State for vehicles leaving the capitol. All the bad motor vehicle collisions have been as result of drivers trying to turn left. The state has REFUSED to anything and probably wont until someone is killed unfo
		Traffic Control	This intersection is highly congested and used. Currently unsafe and is prohibiting efficient traffic control.
		Traffic Control	There should be yield or stop signs at the intersections in this entire area. The unprotected intersections do not work. People do not look or slow down at these intersections and there are so many accidents because not many people know what they're su
		Signal Timing	Traffic gets backed up certain times of the day creating dangerous situations for pedestrians
		Signal Timing	I wish the light at 7th and Main was on the same timer as the previous lights when traveling on 7th. You make it through all the previous lights, then get stopped at Main.
		Signal Timing	The signal at this intersection is incorrectly timed with the intersection of Expressway/Washington. If you turn off Expressway WB to Washington SB, you most likely are stopped at this light as it immediately turns red. Likewise if you are traveling on
		Signal Timing	I drive main street several times a week going East to West. 90 percent of the time I will be stopped at this intersection for the duration of the GREEN light. Only place in the state that you have to stop on a GREEN light.
		Traffic Control	South Washington from drainage ditch to burleigh Avenue needs to be widened. 4 lanes or at least left turn lanes...that area continues to develop and Grow but keeping the same infrastructure makes it a nightmare to navigate at times...it will only get wo
		Traffic Control	Completely agree with this statement!
		Other	Parking on the west side makes it impossible to pass more than one vehicle through the street at a time. Especially in winter when someone parked a little too far into the street can make it so you are barely scraping by.
		Other	The houses on the west side have private drives. Making that side no parking wouldnâ€™t be unreasonable. Just waiting for a head on collision with a bus or a child trying to cross traffic.
		Traffic Control	This intersection is poorly conceived. The traffic should have been push to expressway instead of washington.
		Traffic Control	Please build a round about at this intersection. It will move traffic without the delays of lights.
		Traffic Control	This intersection needs a traffic light
		Signal Timing	This light should be synchronized with the 12th street light. It is very rare to hit both green and it is pretty annoying having to stop every block.
		Traffic Control	A round about would work great at this intersection, when leaving the complex after an event this intersection is so busy.
		Traffic Control	Round-abouts do NOT work when there is a lot of traffic. It just causes more confusion honestly.
		Traffic Control	Left turn light
		Turn Lanes	Heading east on Expressway and turning left (North) onto Washington is a nightmare because the left turn signal only lasts 0.002 seconds. It gets super backed up, which causes people to run the red light well into the timeframe of the westbound Expresswa

Name	ID_1	Type	Comment
		Traffic Control	This intersection needs a traffic light! I've seen too many close calls here because its always too busy and no one really pays attention or knows when it's their turn to go.
		Traffic Control	This intersection would be much safer with a roundabout.
		Signal Timing	Timing of the signals should be longer. You barely have enough time to get through the intersection before it turns red.
		Traffic Control	Something has to be done SOON! This intersection to too busy and too many have no idea how to operate a 4 way stop sign with turning lanes, someone is going to get hurt before they start the project in 2021. I prefer a stop light, but the city has alread
		Traffic Control	Put a traffic light here. By the time people try to decide who is there first, you could just as well have a light.
		Traffic Control	Explain to me how a round about will relieve the traffic problems at this intersection. If a roundabout is in place, those traveling south on 1806 or east on old red trail will not be able to enter the roundabout after an event at the starion facility.
		Traffic Control	I avoid this area as much as I can around 330pm and from about 430pm to 600pm because traffic gets so backed up. I'm a delivery driver so timing is everything. I think a roundabout would be ideal here because there should be no confusion as to who has th
		Turn Lanes	Heading eastbound from the freeway the two lanes turn into a left turn, 3 lanes, and a right turn but after crossing the intersection the 3 lanes immediately turns back into 2 lanes. Completely unnecessary. One of those lanes could be transformed into a
		Turn Lanes	Right turn lights should be put up on each side of the intersection so that people turning right follow the rule of not turning when the left turn arrows are green. Many people have turned right ignoring the no turn when red sign and gotten close to caus
		Traffic Control	The problem with this intersection is you have NS lanes with only one lane on each side of the yellow line while the EW lanes have either left/right turn lanes at the stoplight. This means you have 6 people stopped and needing to view 5 other cars. Tradi
		Other	Please, for the love of sanity, just repaint the lines in EVERY part of the town (both towns) that need to be repainted. Seeing old lines and new lines all faded together creates confusion, and this area in particular shows it.
		Traffic Control	This intersection needs a stop light. I don't see how a roundabout will work given the existing infrastructure, terrain, and truck traffic.
		Signal Timing	Turning left (south) onto 19th, from Century Ave is an absolute nightmare in the morning school commute. Light needs to stay green longer to allow more vehicles through. Or have both the green light and green arrow, etc. Traffic can be backed up to the
		Traffic Control	Roundabout---let's spend more money to realign the bike path, move high-voltage power lines, move a pipeline compressor station (and pipeline), re-grade 1806 north out of mandan and it's sideslopes because it comes out underneath an overpass and is below
		Traffic Control	Currently, you can only turn left when a green arrow is presented. Make the light so left turn protected on green but then yield to oncoming traffic with a solid green. There are many times the left turning vehicles just sit at a red when there is no a
		Traffic Control	The solution for this section of road has been to lower speed limits and slow down traffic. If we want to be traffic efficient we need to take a page out of cities that do things right. If pedestrian traffic is the issue, build walking bridge to protect
		Traffic Control	Toughest place to turn left in the morning
		Traffic Control	This is a mess! There either needs to be a stop sign on all 4 sides or Culverâ€™s needs one in their lot.
		Other	Parking is horrendous during school and events at wachter. You cannot see when coming off Lansing or Columbia and are risking an accident each time. Parking should either be eliminated or 4 way stops put up at the intersections.
		Bicycle and Pedestrian	No sidewalks so pedestrians and bicyclists walk on dangerous two lane road. There are also no street lights on road which make it much more dangerous at night.
		Bicycle and Pedestrian	Agree with the sidewalks ending!!!!! If you want to walk or ride bike east of stonewall, it is very dangerous! There is a tiny section of path from lafayett to british, but it is on the south side of the road, where the path from Centennial to Stonewall
		Other	It wold be great if Greensboro Dr connected with Penns pl road as there are currently only Century and 43rd st to leave the development.
		Other	This would also greatly assist with the congestion on Century Ave.
		Signal Timing	I can not believe how much this backs up every morning around 8am. This is a very busy intersections with people trying to get to work and school. The light needs better timing to allow more flow.
		Signal Timing	I have stopped as far back as Mapleton multiple times 7:40-8 am.
		Traffic Control	There should be a stop sign on Calgary because too many vehicles speed through this intersection without even yielding while kids are walking to and from school.
		Bicycle and Pedestrian	Need a street light or preferably a cross walk signal for kids to push that will let cars know someone wants to cross so the can stop safely. Too many large trees block the little light there is and it's hard to see kids crossing for school.
		Signal Timing	All lights on main need to be timed
		Other	Poorly lit crosswalks in front of school. In the mornings, it is difficult to see pedestrians going to and from school due to poor lighting. Also, drivers are going far over posted limit.
		Bicycle and Pedestrian	Traffic rarely stops for pedestrians at these two points crossing 4th, but it's not easy for drivers to notice pedestrians waiting to cross unless they're already in the street. Maybe a pedestrian controlled flashing light at these crosswalks to make the
		Traffic Control	Eliminate the blinking arrow for left-turns in this intersection. It is very difficult to see, when making a left-turn, if oncoming traffic is coming, and whether you need to race through in order to turn onto Expressway. It seems as if it only blinks
		Traffic Control	Add a turning late toward s 12th
		Traffic Control	....need left turn protection turning both north and south from expressway onto 12th street
		Traffic Control	If you are going to funnel traffic to 3 lanes heading west do the transition between 9th and 7th St. You could have two lanes turning south on 7th and have the outside lane continuing west on main. Don't start the transition before 9th street
		Traffic Control	I think you need to make main St 5 lanes all the way through. It is the only decent east west route through central town.
		Signal Timing	If you make one light on a one-way, doing the speed limit, you should make them all. The light at Front and at Main turn red at the same time while going north. Shouldn't happen that way.
		Turn Lanes	There needs to be a right turn lane from Front onto 7th.
		Traffic Control	This is an uncontrolled intersection right outside St. Anne School. Students are frequently crossing the street here. There is also a fair amount of cars during drop off/pick up and no stop signs to control the flow. Have seen multiple accidents happen.

Name	ID_1	Type	Comment
		Other	One-Way signs are very faded and not very visible at this intersection. They should be replaced.
		Traffic Control	Needs something. Some mornings it's 20 to 30 minutes to be able to travel north on Washington from my home at Tatley Meadows trailer Park. This is due to north south Washington traffic becoming overwhelmingly busy and the traffic from the housing develo
		Signal Timing	The new turn light is great, but needs to be slightly longer for safety
		Signal Timing	It needs to have turn lanes, nobody has a clue that it is only one lane and you must wait for traffic
		Other	After school this is extremely congested. For the safety of the kids there should be a pickup only lane added where parents can park, there is no parking here and people park anyways and cause major issues going either way. The street is not wide enough
		Traffic Calming	need wider road
		Traffic Calming	Today this is a safety issue
		Other	This section of I-94 eastbound between the Main St. on-ramp and the 194 on-ramp is abysmally designed. People try to rush onto 94 where the lane ends. People on 94 are trying to get over to the left at the same time that people from 94 are trying to get
		Traffic Control	Making a left turn on this intersection is very difficult certain times of the day. Especially with their being a school and heavy residential area here I feel a light would be very beneficial.
		Traffic Control	Residents attempting to leave the Century Park area onto Century Ave in the morning can HARDLY and very UNSAFELY enter onto Century Ave due the amount of uncontrolled vehicle traffic coming from the east in addition to the speeding violations. Consider
		Traffic Control	perhaps a round about may be a highly beneficial option here.
		Traffic Control	In the morning and evening this is a very difficult intersection to navigate, it is extremely hard to take a left turn on to get onto 1806
		Traffic Control	Very busy intersection, especially in the mornings and evenings. Making a left turn onto 1806 has become increasingly difficult. The residential area has grown considerably in the area, and Fort Lincoln school traffic with the other commuters gets to be
		Traffic Calming	Need wider road
		Traffic Calming	Today this is a safety issue
		Traffic Control	Traffic turning south from westbound Main onto 12th needs an arrow.
		Traffic Control	This intersection gets to be a bit congested in the mornings and after school. Especially with bus traffic trying to get on and off Divide. It also can be confusing as people are stopping short to allow vehicles to go south at the same time kids are at
		Traffic Control	Agree. This is usually very congested. I have to drive west a few blocks in order to get on Divide to head east and then get into the left turn lane for 19th as there is no getting out at 19th. And there are always cars that leave a gap in the left turn
		Traffic Control	People trying to turn to go to Simile cause so many issues on Divide. This is a hill and in the winter it can be icy. I have seen many people get stuck because they have turned from 19th on to Divide and a car is stopped right there trying to turn left.
		Traffic Control	Agree. The people turning south on 19th from Divide can back up the intersection as they are waiting to turn left. Some people stop and leave a gap when the light is red but some don't. There is definitely more traffic on 20th now with the new entrance t
		Traffic Control	There needs to be a light here that only clicks when someone is coming out of the Capitol. Too much traffic backing up at peak times, and turning left out of the Capitol is dicey.
		Traffic Calming	Need to put in a crosswalk here, there used to be one about five years ago. Traffic goes way to fast in this area and can't see around the corner.
		Traffic Control	Add on and off ramp would be a good idea
		Traffic Calming	Need Wider road
		Traffic Calming	Today this is a safety issue
		Traffic Control	Put a light here. This intersection has limited visibility from all sides, and traffic on Turnpike likes to try to run across 4th and doesn't always notice there are cars coming. Have had several close calls here.
		Other	Many of the turn signals are protected, but become red after the protected light. Some should be a flashing yellow, so people can still turn after traffic clears. This would be especially helpful during winter months, when snow blocks the line and people
		Traffic Control	Can get very busy and congested. A light would be nice
		Traffic Calming	Speed in this area of river road/arbor ave especially in summer is way too fast. It is marked at 25 but I am guessing the average is 40 minimum, this includes many city busses and Park & Rec employee trucks. There are many kids who live and play/ride bik
		Turn Lanes	Turning lanes would be very helpful along divide between 26th Street and 19th street. The traffic during school drop off and pick-up is very congested and vehicles are passing cars waiting to turn off of divide.
		Turn Lanes	I believe this is already the planned after the repaving of Divide this summer.
		Traffic Control	There is lots of traffic turning onto Rosser in the morning, blocking the left lane of memorial hwy, then the right lane ends. Roundabout? Currently seems like a lot of pavement to maintain that is suboptimally functioning. Maybe could improve the park a
		Traffic Control	Add entrance lights similar to larger cities to control entering traffic volume and timing
		Traffic Control	Misread this. Ignore my previous comment. Stoplight and turn lane longer. NOBODY STOPS AT THIS STOP SIGN. I wait sometime for 5 minutes on Bell street to enter because people just tailgate the person in front of them going onto Rosser.
		Signal Timing	This light is necessary for sure. It is traffic controlled, which is good. But it constantly defaults to green on 4th, red on Interstate. When traffic on Interstate gets to the sensors, it takes too long for the light to respond, then it only stays green
		Other	This â€œright turn onlyâ€ exit doesnâ€™t work well. Iâ€™ve seen people turn half a U turn to go left. And also go into CVS the wrong way. Seal it up and force traffic to the back entrance.
		Other	I agree something needs to be done here - a great deal of the problem is the dealership across from CVS. However, directly all traffic to the back down 14th isn't really an option anymore with the 2 new buildings between the CVS parking lot and 14th (no
		Other	Add yield signs to Cody Drive. Most people assume Daytona has the right of way, which often causes confusion.
		Traffic Control	Add a YIELD sign on Thompson St. Using this intersection all the time, we know it's VERY difficult to see traffic coming from the left. People drive well over the limit on Turnpike, and the homeowner on that corner has shrubs that get more obstructive ev
		Traffic Control	A light would be good.

Name	ID_1	Type	Comment
		Signal Timing	I travel through this intersection on University drive on the way to and from work each day. It is rare to make it through this intersection without stopped. In my opinion the duration of green light on the University drive portion should be increased.
		Signal Timing	I agree. This intersection along with Wachter/University and Airport Rd/University should all by synchronized with each other.
		Other	Allow "turn on red" or remove turn indicator, possibly make the farthest right lane only for off interstate traffic.
		Signal Timing	Light timing for turning is not appropriate for the size of intersection and amount of traffic through the intersection.
		Traffic Control	Divide St. light crossing State is way too short during commuting times. This is a major road with a lot of commuter traffic and the light to cross State stays green for only about 10 seconds. Eastbound backed up to the gas station (10 cars+) in the morn
		Traffic Control	State St and Divide is DANGEROUS!! Far far too many people running red lights, especially the left-turn light. There are too many lanes of traffic going north and south with little control - accidents and near-misses on the daily. Additionally, the turn
		Other	Burleigh Avenue needs a reconstruction project to increase the corridor to a 3-lane or 4-lane roadway. The roadway is narrow and becoming unsafe for oncoming traffic and snow events make traveling the road difficult due to not being able to see the imme
		Other	This statement is very true. Burleigh avenue is now a heavily traveled roadway and with the growth in south Bismarck, it will only continue to be traveled more. If left untouched now, the problems will only worsen.
		Traffic Control	There is a left turn lane on 4th street going north, waiting to turn left onto Divide, but no left turn signal, so during busy times traffic gets backed up a long way. Some days during rush hour I've idled in that line for over 15 minutes and the line go
		Traffic Control	The green light for east-west bound traffic needs to allow more than 2-3 cars to go through. I travel this road every weekday at 8:00 am, and we just start to get going and the light turns red right away, only allowing 2 or 3 cars.
		Traffic Control	Agree. It is ridiculously short as this is a very very wide street to cross when you are on Divide.
		Traffic Calming	Not sure why this road was redone & not made 5 lanes, traffic is ridiculous during peak driving times. People racing to pass other people to beat them to the lane reduction going north.
		Traffic Calming	The northbound lanes narrowing from 2 to 1 here are a mess. Too many drivers either try to abuse it to get around slow traffic on the left or don't understand the lane is ending and then nearly cause an accident while just sitting there. If you're going
		Turn Lanes	Please add a left turn signal for those turning left from 4th onto Divide (both ways). It's hard to see around the cars in the opposite turn lanes, so I've nearly turned into oncoming traffic multiple times here.
		Signal Timing	The left turn light is about 3 seconds and sometimes skips those who are waiting to drive in the intersection.
		Other	There are no street lights here making it difficult to see at night. Deer and other critters frequent this location making it a hazard.
		Turn Lanes	A right turning lane for traffic heading north and south on 4th Street would again flow traffic better.
		Traffic Control	This intersection needs to be reconfigured. The straight/turn lanes on 26th don't line up with each other.
		Traffic Control	Give expressway traffic turning onto 26th street green turn arrows instead of flashing yellow arrows.
		Turn Lanes	Turning lanes for State Street north and southbound traffic necessary.
		Turn Lanes	This whole road needs to be upgraded to 4 lanes with turnining lanes
		Traffic Control	Either this road needs to be expanded past this intersection or it needs to have a tapering lane after the intersection. The far right lane heading northbound suddenly ends in a mandatory right turn and most people somehow manage to miss the signs pointi
		Turn Lanes	Clarification - the turning lanes are necessary for traffic turning right.
		Traffic Control	Traffic often gets backed up and it is stressful turning here
		Traffic Control	On 26th Street, the lanes do not line up with the lanes on the other side of the intersection. The left turn lane going northbound lines up with the lane going straight on the southbound side. This causes many near collisions and confusion
		Signal Timing	The Green Light timing for Divide should be increased at peak times of traffic. At morning, noon & evening rush hours the light allows 4-5 vehicles to pass. I've seen traffic backed up over a block each way blocking side street traffic from crossing Divi
		Turn Lanes	Left Turn Signals a must!
		Traffic Control	South bound the green light lasts such a short amount of time that the traffic can never all get across expressway. From the north they have a green left turn arrow and green light for way more than adequate time.
		Turn Lanes	By allowing people that want to turn right to get in their own lane, traffic wouldnâ€™t back up so much for ones wanting to go straight so the line isnâ€™t as long for both right turn and straight drivers
		Other	Make the 14th intersection to not allow eastbound turns and force them to 15th with a traffic signal, or place a traffic signal at 14th. Too much traffic tries to turn left and with the State Street intersection so close it is hard to turn west because
		Turn Lanes	Needs a left turn signal going from 43rd onto state street from both sides. Can sit through 3-4 light changes before being able to turn during rush hour. Often only 1-2 cars can turn before the light changes.
		Turn Lanes	Light timing needs to be addressed and a left turn signal from 43rd on to 83. The light is so short only a fraction of the cars can get through and only 1 car can make a left turn. And thatâ€™s if they pull out into the intersection and end up making the
		Turn Lanes	Yes! Desperately! The left turn cars can only go when the light is yellow to red.
		Turn Lanes	I agree completely! It is very frustrating to try and turn at this light. Most cars run the red light. It also causes a hazard if there are cars lined up in the intersection and an emergency vehicle would have to get through.
		Traffic Control	There needs to be a left turn arrow installed at this intersection. In the morning it is very difficult to make a left turn coming from the east and most vehicles just run the red light in order to make the turn.
		Turn Lanes	Turn signals are necessary for those turning on to State Street from Calgary.
		Turn Lanes	I totally agree left turn signals and add separate lanes for crossing 43rd and turning right
		Turn Lanes	Agreed
		Traffic Control	Need a left hand turn signal. Too much traffic to not have a green turn arrow.
		Traffic Control	Absolutely agree with adding left turn arrows from Calgary to State Street.
		Traffic Control	This should be a roundabout
		Traffic Control	Round abouts are not safe.

Name	ID_1	Type	Comment
		Traffic Control	How is it possible that you do not have turn signals? With heavy traffic during 7:30 am-6:30 am and 4:30 pm-6 pm it is virtually impossible to turn during 1 light cycle and at times it takes 2-3 cycles.
		Turn Lanes	Right turning lanes for State Street north and southbound traffic necessary. Traffic would flow so much better to get the people turning off of the main road.
		Traffic Control	There are times where drivers attempting a left turn at State and Interchange/N12th impeded by stopped traffic on State Street.
		Traffic Control	Get rid of the ability to cross State Street here and limit the frontage road access to those vehicles traveling South on State Street.
		Traffic Control	Add left turn arrow
		Signal Timing	It is not uncommon to wait for this light to cycle 2-3 times before being able to turn left.
		Traffic Control	Left turns are impossible East or west bound onto State from 43rd. With legacy school and traffic increase it can take multiple cycles to get through
		Traffic Control	I agree turning on this road is only getting worse and the light is way too short. Allow flashing turn arrows after fixing existing turn signal to be more sensitive to changes in traffic
		Traffic Control	Dangerous interchange for turning vehicles. There's turning lanes, but no left turn arrows. Constantly cars running red lights to make the turn. Traffic backs up during busy times and even more cars will run red lights.
		Traffic Control	I agree
		Turn Lanes	Having a protected left turn going from Calgary onto highway 83, especially during peak drive times, would help ease congestion during those times.
		Traffic Control	This corner is too close to all of the interstate traffic. A stop light would regulate it and make left turns much safer
		Traffic Control	Left turns from N 12th St onto State St should not be allowed. It is dangerous and there is hardly ever an available opportunity to do so safely.
		Traffic Control	This is a bad intersection. With talk of widening this road the intersection really needs to be addressed. It is very difficult to see traffic coming from the east. When they were working in the Pointe this Fall this was the only way in and out and it
		Traffic Calming	Signs to not block the intersection would be useful in this general area. Washington St. traffic backs up a lot during peak areas making it difficult to turn in and out of the neighborhood streets. There are plenty of times when one could turn safely,
		Traffic Control	This intersection needs a left turn signal badly I don't even bother try turning left off of Calgary onto state street because if I'm the 4th or 5th car in line it takes me 2-3 light cycles just to turn it's ridiculous
		Traffic Control	The left turn lanes when turning from Calgary onto State need an advance green signal. There is too much traffic going straight for cars turning left to be able to turn while the light is green, so they end up turning after the light turns red.
		Traffic Control	Needs a light
		Turn Lanes	A turn arrow needs to be added for turning onto state street from both East and west 43rd or for sure the the west intersection. Itâ€™s very frustrating when only 1 or 2 cars can make a turn at a time and the rest run the red to make through.
		Turn Lanes	This intersection is so busy, why do we not have a right turn lane and one going straight? I don't know how many times I have almost been hit because the person in front of me is turning right and I'm going straight and someone from oncoming traffic doe
		Traffic Control	This light needs a left turn signal. Many cars want to turn left to get to businesses to the north and since there is signal, the traffic can back up on Calgary. With the businesses right by this light, it should be common sense to have turn lights to he
		Traffic Control	I agree
		Turn Lanes	Please add a turn light. The only way to turn left is to run the red light. Usually 3 cars go through the red to get to turn. This is even at non-busy times.
		Turn Lanes	Please add a left turn signal. It is very hard to get to turn. The two options - 43rd and State and Calgary and State both back up and are very hard to get to turn left.
		Turn Lanes	There are multiple red lights ran due to rarely having a chance to turn left safely on either side of the Calgary/state street intersection.
		Turn Lanes	A right turning lane would sure be nice here. Again slows the flow of traffic.
		Other	Just a random comment. Why donâ€™t all traffic lights have the option to turn left if there is no oncoming traffic? Flashing left turn signal instead of just green or red left turn signal? It would speed up the flow of traffic as sometimes no cars are co
		Other	I completely agree.
		Other	I agree. There are many corners where users are crossing multiple lanes of traffic to make left turns. Allowing flashing turning lanes is no different and would seriously help with all is these intersections. All corners with dedicated turning should hav
		Other	Agreed. Offer protected green left turn, then flashing yellow. There are intersections like this in town. Century & Washington used to be this way. Then they changed it. Now that intersection is far worse.
		Other	Yes! I agree it would be absolutely fantastic to have flashing yellow arrows at all intersections. I mean at least for the 20ish hours a day that doesn't have the before and after work rush hour traffic. So from like 7-9am and 4-6 pm or whatever, sure I
		Other	This point has two lanes but one of them is a right turn only but the only sign warning of this is when you are in the turning lane. More signs need to be posted before arriving to that lane as many people get in the lane then have to try and move over.
		Other	The drop off between pavement and shoulder/ditch is dangerous here.
		Other	When heading West on Century and turning South on Washington. Should have at least a flashing turn signal to be able to turn when there is no oncoming traffic.
		Traffic Control	This should be right turn only. The stop light at the corner and oncoming traffic makes turning left very difficult especially when the light is red and cars are backed up at the light
		Traffic Control	I feel like people would then use the Pizza Hut lot to turn around.
		Signal Timing	Left turn lane at 5 pm going from East on Century to North on Washington does not allow adequate traffic. Left lane turners get stuck in the main traffic lane going East. The cars traveling East go into South most lane to avoid backed up traffic causing
		Traffic Control	The Easts and West bound traffic turning left onto either North or South Washington only have a green arrow. There are many times that there is no oncoming traffic yet the light is red for the left hand turn. Make this a left turn protected on green ar
		Signal Timing	Those traveling from State Street to Washington get seriously backed up when school gets out at Century Highschool. The traffic can be backed up all the way to JC park. I've personally waited 15-20 minutes to just get to Washington Street at that time of
		Turn Lanes	A right turning lane for traffic headed west would flow traffic better.
		Other	The east /west bound lights, around 7:40am are ridiculous. They turn green barely long enough for one vehicle to get through the light. Often times it is already turning yellow before the first car can accelerate fast enough to get thru the intersection
		Turn Lanes	Please add right turning lane. Slows down flow of traffic on this busy road with no turning lane.

Name	ID_1	Type	Comment
		Signal Timing	Red-light running noted many times on left-turn signal, both east and west directions on Century Ave.
		Signal Timing	This intersection is horrible. The first car to get the arrow has barely made it through the large intersection to turn before it already turns red. The timing for this arrow needs to be increased to allow more traffic to turn.
		Signal Timing	This is one of my least favorite intersections to cross State eastbound, because someone is always trying to run the light turning south as I'm crossing legally with the right of way. I've had several close calls. The southbound arrow needs to be longer
		Signal Timing	A terrible intersection. This is a very large intersection. I see at least one car run a red here every weekday. The turn signals need to be longer. Only 3 cars get through legally in the winter. Iâ€™ve also seen several close calls with pedestrians cro
		Signal Timing	The reason people are still in the intersection when the light turns green is because the yellow doesnâ€™t stay long enough to get through the intersection (people can only go so fast while they are turning) and there is no delay before the other light t
		Traffic Control	This turning light is horrible and needs to account for more cars to turn. Also since it's a single turning lane allow for flashing yellow arrow so people can still yield and turn.
		Turn Lanes	Agreed that the time allowed for left turns from Weiss onto State should be longer. On a good day two cars might be able to make it through.
		Traffic Control	Either Calgary or Jericho and Centennial needs some traffic control. Turning right onto centennial can take over 5 minutes coming from the high school. As a bus driver, we are assigned these tight turns onto centennial at the busiest time of the day. Not
		Signal Timing	This area is ridiculous during the morning commute. Lots of red light running because it takes way too long to get from the Exxon gas station area southbound to get on I94. Around 7:40 am is the worst. Traffic is too backed up.
		Signal Timing	In addition to other comments made on this intersection, it would be in the interest of safety to add time between the end of the green/yellow arrows and the cross traffic getting the green light. It's far, far too common to get the green light to trave
		Traffic Calming	School drop off and crossing is here. People driving on this road are often going 30-35MPH and as the hill crests, visibility for small children is limited.
		Traffic Control	Add a light here? Traffic coming off of Country West can wait a long time to make a left onto Century, and there's no other way to get out of these neighborhoods quickly if you're going east.
		Traffic Control	I believe this intersection has modified it's signaling to where the northbound traffic, and traffic turning west goes FIRST. Then north traffic stops, and traffic heading south or turning east goes SECOND. I really think this is a good idea on multiple
		Signal Timing	This intersection is horrible. The first car to get the arrow has barely made it through the large intersection to turn before it already turns red. The timing for this arrow needs to be increased to allow more traffic to turn.
		Signal Timing	Widen intersection to include dual turn lanes for all directions and increase length of turn arrows.
		Signal Timing	The reason people are still in the intersection when the light turns green is because the yellow doesnâ€™t stay long enough to get through the intersection (people can only go so fast while they are turning) and there is no delay before the other light t
		Signal Timing	Actually make the turning Lanes traffic sensitive so they can run longer when more people turning and less when traffic is light. I agree this turning light is way too short which causes constant red light turns by multiple cars almost every time.
		Signal Timing	The timing is so lengthy and out would be nice if it ran on censors. You'll sit there forever waiting for the left turn light and it is opposite of any other in town... You can go straight and then the left turn light turns on. Usually other way around.
		Traffic Calming	The stretch of Century b/w 19th and Centennial is posted as 35mph, but traffic is consistently moving much faster than that. Consider raising limit for that stretch since north/south bound intersections are minimal.
		Traffic Control	There needs to be sidewalks here.
		Other	The stretch of road from Washington all the way to Centennial Road needs to be widened and have paved shoulders.
		Traffic Control	This intersection needs a light ... lots of people are coming out of the parking lots for Dan's and the other businesses in that area, and it's always full of drivers coming off the highway going 35+. It's hard to find enough room to turn onto Divide.
		Traffic Control	It would also be helpful for the Dan's and Cenex to redo their respective driveways off of Turnpike. At the moment they are just slightly offset and it is difficult to turn left in the driveways.
		Traffic Control	A traffic light would be good here.
		Other	19th Street needs to be built out further North and be connected to East LaSalle Dr. and Brookside Ln.
		Other	Might as well continue it up to 57th Ave.
		Traffic Calming	Need to add a flashing light for crosswalk indicator. Speed limit is 25 mph here but traffic does not abide. Nearly every time someone crosses at the walk, there is a near miss - cars go around the stopping vehicle endangering the pedestrian and on comin
		Traffic Control	This intersection is very hard to get out on. If I need to turn left, I go down to Calgary. It's very frustrating in winter because it is on an incline and easy to slip. It's hard to turn right because the traffic backs up to past this Lockport on busy t
		Traffic Control	I won't even attempt to make a left turn here anymore it is such a nightmare. I live just east on 43rd, but I will go all the way to Lasalle to get on State Street and use the left turn signal to get home it I got to Cashwise or the CHI Urgent care clini
		Traffic Control	A light or roundabout
		Traffic Control	Large back ups at this intersection in the morning before school and in the evening when work let's out. Little to no breaks in traffic for long stretches of time.
		Traffic Control	A traffic signal is imperative at this intersection.
		Traffic Control	This is always a gamble for drivers from all directions.
		Other	Calgary needs to be completed to go to Centennial and then a traffic light needs to go at that intersection. Jericho was never meant to get so much traffic.
		Turn Lanes	Right turn lane would be beneficial.
		Traffic Control	This light across Century only changes when it detects a car stopped on Ithica. Most of the cars coming off Ithica except during school times are turning right on red, but the sensor still clicks and then stops traffic on Century for a car that isn't the
		Turn Lanes	The same turn lane is utilized for 2 separate entrances (one that leads to the businesses near Sleep Number, AT&T, and Panchero's and one that enters the parking lot access to the remainder of the businesses. I have encountered many near misses here beca

Name	ID_1	Type	Comment
		Turn Lanes	A left turn lane signal needs to be added at centennial and Ithica. With centennial elementary right there it is a safety hazard since many pull forward into the lane to turn left and children are walking/crossing the street.
		Turn Lanes	Add turn late going south here
		Other	This area is a mess at the end of school hours between busses and parents trying to pick up kids and kids walking.
		Turn Lanes	Right turn lanes needed for north and south bound traffic.
		Traffic Control	a flashing yellow turn arrow is needed. There is no sight obstructions and limited traffic flow. This signal needs to be updated. Right turn lanes are also needed.
		Other	Finish this part of East Calgary so it connects to Centennial. Legacy construction was finished 5 years ago already - this needs to be completed.
		Turn Lanes	Due to the limited size of the road it may not be possible, but a right turning lane, especially headed north would move traffic at a better pace.
		Traffic Control	Should be a light here for school months. Traffic is awful before & after school hours.
		Signal Timing	The timing for this light seems to favor Airport Road over University even though it seems University seems to have more traffic. I cross this intersection 4 times a day on University and it seems the light is red almost every time I approach the interse
		Traffic Control	This intersection needs to have arrow signals added on the 4th Street side. They can be the blinking yellow ones except at peak times.
		Traffic Control	Turning left out of the Sunrise development in the mornings has become harder and harder over the last few years as there seems to be more traffic coming from east of this intersection. This is more difficult during winter conditions when it is dark and
		Turn Lanes	A right turning lane for going south on College Dr would flow traffic on Divide better.
		Bicycle and Pedestrian	Airport Road needs a sidewalk/bike path. I see so many pedestrians on this road and there is no safe place for them to walk - especially in the winter.
		Bicycle and Pedestrian	Agreed!!
		Traffic Control	This light and intersection needs different timing as school gets out. The traffic pattern is completely different when school is letting out or starting. Busses are forced to make unsafe turns around heavy traffic and kids.
		Traffic Control	Perhaps at the entrance further west to avoid back-ups in front of the school entrance itself.
		Signal Timing	Both stop lights that connect the on/off ramps with Expressway should be synchronized to allow better traffic flow. There is no reason to hit one green and then hit the next red.
		Traffic Calming	43rd from Washington to Centennial needs to be at least 3 lanes. If there's going to be more shopes going in this needs to be upgraded before the shopes are built. Probably would be best to make 5 lanes 3 years ago.
		Traffic Control	Morning congestion gets very backed up coming from the south and heading north, especially while trying to turn left onto I-94 Westbound. Many times the left turn lane is not long enough and it jams up traffic flow north
		Traffic Control	Traffic coming south needs a dedicated turn lane to head west onto the interstate. This would alleviate a lot of congestion.
		Traffic Control	Not sure why there aren't any lights here, traffic is awful during school & any events then add rush hour traffic.
		Traffic Control	Need a light here bad
		Traffic Control	This whole area needs some major work. Let north and south bound lanes flow freely rather than stopping at every light. Especially north bound evening rush hour backs up ridiculously bad. The south bound turn lane onto I94 needs a turn signal. RV's and s
		Traffic Control	Absolutely the left turn from centennial onto the east bound I94 ramp needs a turn signal.
		Traffic Control	A clover leaf would be great here and timing the lights better, adding longer light times for those turning.
		Traffic Control	Where to start... Traffic backs up horribly because the lights are timed piss poor. Let traffic flow through this area instead of stopping traffic at every light on north and south bound lanes, especially north bound evening rush hour. South bound turn
		Bicycle and Pedestrian	it is not uncommon for people to be walking in the street from the jail into town creating safety issues for pedestrians and motorists a path/sidewalk should be considered
		Traffic Calming	A stop light needs to be installed and needs to operate to help traffic's get in and out of school.
		Traffic Calming	Perhaps at the entrance further west to avoid back-ups in front of the school entrance.
		Traffic Control	Turning left here any time between 7:50 and 8:10am and again between 4:45 and 5:15 is a nightmare. I now go down to LaSalle to get on to State Street, by Tires Plus
		Other	Repaint the lines, please!
		Traffic Control	Traffic control measures are needed here. The timing and volume of traffic on 43rd does not allow for traffic from either direction on Coleman St to enter or cross the roadway safely.
		Traffic Control	I work near here and many times itâ€™s faster for me to go up to LaSalle, to go east on 43rd. I see several accidents there and itâ€™s even a worse headache to get onto 43rd in the winter. Something, anything, is needed at this intersection badly!
		Bicycle and Pedestrian	Dangerous for bicycles. No shoulder and fast moving vehicles.
		Traffic Control	This area is in significant need of improvements to maintain north south traffic and traffic entering and exiting from I94.
		Turn Lanes	This exit would greatly benefit by adding a right hand roundabout exit to the west. At rush hour it is such a cluster trying to get traffic through a left hand turn to the west
		Traffic Calming	Washington between 43rd and Century can be dangerous, especially at peak times and at night, and with no turn lane into the older neighborhoods. Excessive speeding is a serious issue here. I've lived in this area since before the street was widened and f
		Bicycle and Pedestrian	The trails by legacy, leading into pebble creek are great, but there is no access to them from the sunrise development. Walking/riding on 43rd to get to them and while crossing centennial is dangerous. There could be better access to Legacy high school f
		Signal Timing	I am not sure if I ever see a green left turn signal going west on 43rd onto Centennial. Always flashing left turn even if there are cars or no cars oncoming to start the light. Seems like the left turn arrow isnâ€™t set correctly.
		Traffic Control	A horrible intersection in the morning. Driving school bus, it is very hard to make a left turn on to Century. We hav sat and waited here +10 min, and a regular basis trying to safely turn left. When the sun is coming up it makes it even harder to see o
		Traffic Calming	Getting onto Century Ave from Nebraska Ave is quite difficult when vehicles are far exceeding 35mph. Also dangerous because you cannot always see the cars coming over the hill.
		Traffic Calming	I agree the speed either needs to be reduced on that road or add some stoplights in that area.
		Turn Lanes	Washington between Calgary and Century needs a left turn lane all the way down. If you live in one of these neighborhoods, you have to sit in the left lane and pray no one rear ends you, or go a roundabout route to get home. People drive crazy on this ro

Name	ID_1	Type	Comment
		Traffic Control	This needs a left turn signal extremely bad, has for some time already.
		Other	Street lights should be installed on the Bismarck Expressway from E Main Ave to yegan RD. It is too dark at night and hard to see animals, people etc. along the roadside.
		Turn Lanes	Trucks trying to get to the travel plaza often turn from the right most lane to switch over to the left most lane on the road. It's dangerous and would be avoided with one wider right turn lane or a truck route to get to the travel plaza.
		Turn Lanes	Why not copy the first exit going into moorhead mn where the traffic lanes criss cross before the overpass so that people do not have to make left turns against traffic which helps keep traffic moving.
		Other	Having a stop sign here for coulee is not helpful. So many times I've had close calls because I can't see around the curve of highland acres going out of the development. Either make highland stop or put a 4 way in.
		Traffic Control	There needs to be a yield sign for traffic on Brandon Dr. turning onto Montreal St.
		Other	Such a slow area to drive
		Other	Finish building Brunswick Drive. It's ridiculous that it doesn't connect.
		Turn Lanes	Why does the left turn light when turning on to Rosser hardly ever gives a green arrow. You sit 3 cars deep waiting for the light to turn green and it just goes to a flashing yellow arrow. This is one of the reasons that people run red lights as that is
		Turn Lanes	Need a right turning lane at this intersection as drivers are going in the ditch to drive around stopped cars so they can turn on a red light. Also dangerous having to suddenly brake on a 50 mph road to avoid hitting someone trying to turn right. Others
		Traffic Control	Bismarck is only growing, so adding a round about at S 12th/Burleigh would be a good idea before this 4-way stop turns into a bigger issue with people never stopping.
		Traffic Control	Need a light to make it easier to get onto Washington from Calgary.
		Traffic Control	I agree. Putting a light here would also help calm traffic between Century and 43rd so they don't get up to quite such ridiculous speeds as is current.
		Turn Lanes	Why would you not have turn lanes to go from an â€œExpresswayâ€ onto a â€œMain Streetâ€? When heading south on Expressway during the 8 AM hustle of traffic the lack of a west bound turn lane sure does slow up the flow of traffic. Same situation during
		Signal Timing	A longer left turn green arrow from expressway to east bound on 10 is needed during the evening commute. The left turn lane to get on 10 gets backed up and often extends into the left lane of southbound traffic on expressway.
		Signal Timing	Also, use the left turn green light for north bound traffic turning left onto Main Ave. I have never seen the green arrow light up. It is always a flashing yellow!
		Other	There needs to be better snow removal where the roadway narrows at Calgary. People do not realize the roadway narrows to begin with and they have to shift, and then if there is a foot or two of compacted snow along the curb it is even worse.
		Traffic Control	How about a left turn arrow for west bound from south expressway onto Miriam Avenue... That area is so congested at times it becomes difficult and dangerous to make that turn...especially when icy...
		Traffic Control	Yes, this needs a left turn arrow for west bound from south expressway onto Miriam Avenue. As stated above, that turn is dangerous from the blinking yellow. Traffic is hard to see because it could be up to 50 mph, accelerating and coming over a hill, a
		Traffic Control	Traffic light would be good. It gets pretty hard to turn south onto Washington from westbound Calgary.
		Traffic Control	There needs to be a light or some other traffic control at the entrance to Horizon Middle School. When school starts and ends, there are too many people fighting traffic to turn left in all directions and traffic on Ash Coulee coming from the neighborhoo
		Traffic Control	With the increased traffic from St. Maryâ€™s High school and the additional businesses in addition to the new Costco a stop light with turn signals is needed.
		Traffic Control	I believe Costco and the city are partnering to put in a traffic light as the store opens for business.
		Bicycle and Pedestrian	It is very dangerous for pedestrians to walk/bike along this area. Being that the Keidel development is so close to the school their should be a safe way to walk/bike.
		Other	This road needs major improvement
		Other	How about extend 57th to the bypass. It would alleviate traffic on state going to Costco and st Mary. Do a frontage road from Hay Creek to Costco.
		Other	And extending 19th Street north to connect to the extend 57th Ave.
		Other	The Yield Control at this intersection is ineffective and seems backwards. Yields should be in place for Crocus Ave traffic instead, as 33rd St is becoming a more used thoroughfare street between Divide Ave and Rosser Ave. A secondary option would be an
		Other	A four way stop would be good. It's very hard to see here and most traffic is going faster than speed limit.
		Other	Yield seems backwards. Hard to view with hills.
		Other	Widen Colt ASAP. There is too much traffic and new development on this road for it to be as narrow as it is, and it will be even worse once the plaza on the corner goes in.
		Other	Slow moving heavy equipment like tractors and backhoes should be banned from this road. The speed limit and congestion is too high for this to be safe.
		Traffic Calming	A digital speed check could be added here. Seen many a car hit 50+ on this stretch!
		Other	Needs 4 lanes plus turning to centennial
		Traffic Control	Maybe this intersection needs a light? I've seen a lot of people trying to turn left onto southbound Washington or left onto northbound Washington having to wait a very long time, and if two cars get to the intersection at once from opposite sides of Was
		Signal Timing	Why are there left-turn only signals and not any "left turn yield on green"? At 5 oclock in the morning, with absolutely no traffic, you have to wait for the left turn signals because there is not a left turn yield signal.
		Bicycle and Pedestrian	There are no safe bike lanes between Washington and Centennial for pedestrian or bike traffic. The road is too narrow to travel safely on bike or by foot.
		Traffic Control	This intersection has so many accidents. There needs to be a longer turn signal coming off of Divide turning North onto Expressway. During peak travel times the turning lane can extend far past Industrial Dr.
		Signal Timing	When going northbound, the left turn signal only allows approx 3 cars to make the turn per cycle. There is ample "yellow" time but the traffic from the other direction is so heavy that one can not safely make the turn. The "green" time is so short t
		Traffic Control	Never fails.. between 7 and 8 am and 4-6 pm this light always turns red north and southbound with no cars to the east or west. Reduce the number of light changes to improve north and south traffic
		Traffic Control	Lose the stop signs on 66th street. Only have Apple Creek traffic stop.
		Traffic Control	This could be a round about
		Traffic Control	Yield signs on Basalt would be nice. Most people think LaSalle has the right away, and it gets confusing for people during school start and stop times when itâ€™s busy.

Name	ID_1	Type	Comment
		Traffic Control	Burleigh Avenue needs to be widened in this area to assist traffic to flow freely. A traffic signal should be installed with dedicated left-turn indicators to help increase safety. This intersection has had two fatal crashes in 4 years. Reconstruction
		Traffic Control	A traffic control signal (traffic light) needs to be installed. During peak traffic flow times, it is difficult to turn north (left) onto University Dr from eastbound burleigh ave.
		Traffic Control	Add an on and off ramp would help a lot with traffic
		Traffic Control	Roundabout
		Traffic Control	Yegen Rd and Lincoln Rd. Vehicles heading into town in the morning hours for work (which is most of Lincoln) experience long waiting times turning both left and right onto Yegen Rd. Cars have been backed up all the way to the city of Lincoln at times. No
		Bicycle and Pedestrian	Bike path....
		Signal Timing	The protected arrows that allow north and southbound traffic to turn east or west need to be replaced with blinking arrow lights to allow you to yield oncoming traffic. I would say that during "non-busy" traffic times, 90% of the time I could turn wit
		Traffic Control	This intersection is dangerous and could benefit from turn lanes or round about.
		Other	This intersection needs to be lit up....at night it is difficult to see when turning from university onto Yegen.....
		Traffic Control	Yegen Rd and University is extremely busy during the morning commute hours. Vehicles attempting to turn right with oncoming traffic going 55 mph really builds up to the point that traffic is backed up to army base entrance sometimes. A right turn/merge l
		Traffic Control	I agree. To add to that, traffic trying to turn left, form Yegen on to University, especially in the mornings, can be nearly impossible. Winter creates a more challenging window of opportunity to make the left turn.
		Traffic Control	This might be outside your study area, but the curve at 71st and Centennial is tough to get onto from 71st from the East and Rooster Road on the west. And with 71st supposedly becoming more of a truck route, something needs to be done here eventually. Ma
		Traffic Control	Need to get rid of this roundabout.
		Traffic Control	Add an on and off ramp would be a good idea
		Traffic Control	Need to remove roundabout
		Traffic Control	Add on and off ramp would be a good idea.
		Traffic Control	Add a bridge and on and off ramps

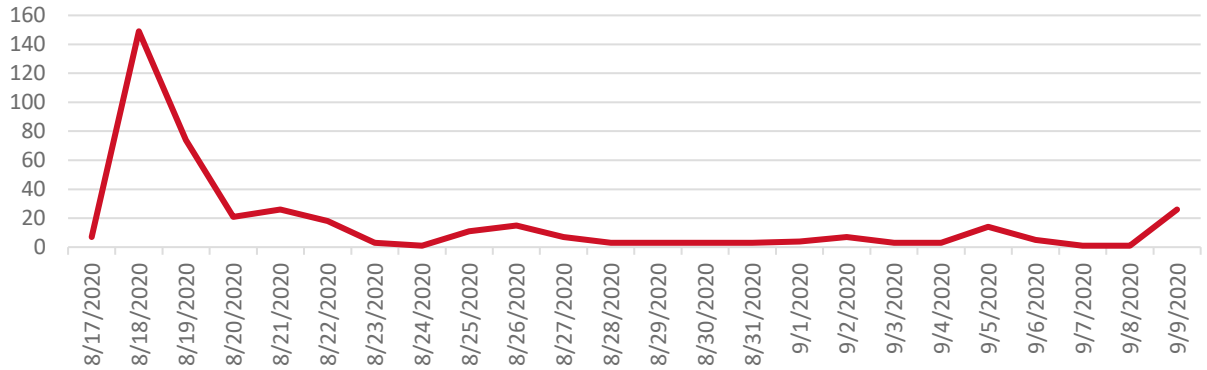
Public Input Meeting #2 Summary

Between August 17th and September 9th, 2020 a virtual open house was held for the Bismarck-Mandan Intersection Analysis Study. This engagement opportunity was entirely online due to the COVID-19 pandemic.

The meetings were advertised through a variety of channels including an ad in the Bismarck Tribune, press release with news stories before and after the meeting, social media posts on the Bismarck-Mandan MPO Facebook page and shared by local partners, a radio advertisement on Dakota Access Media, a rotating advertisement on Dakota Access Media, and a newsletter mailed to the MPO's interested parties list.

The virtual open house included multiple activities to solicit feedback including reviewing project documents and quick videos, a map based survey for the 65 study intersections, and a live Q&A with the project team on September 1st, 2020. While only two members of the public participated in the live Q&A, there were more than 360 surveys completed, 47 comments left, and 49 views of the overview video. In total, 408 people attended the open house.

Figure 1: Unique Visitors by Day



Demographics of Participants

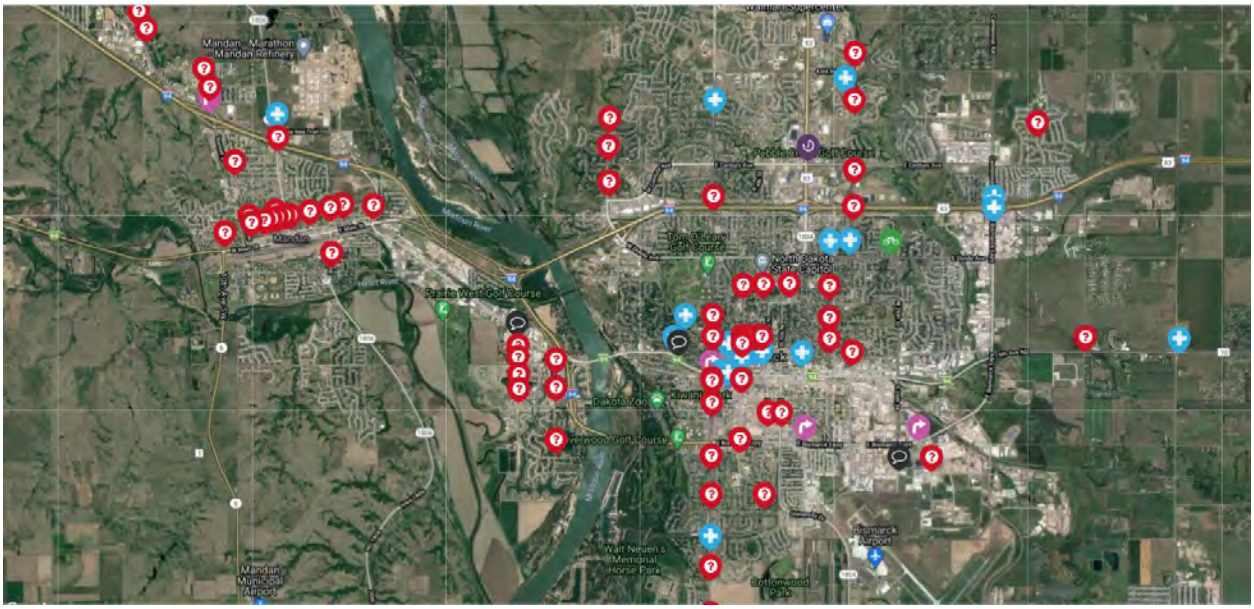
As part of the open house, the NDDOT Title VI demographics survey was made available to those who participated. Only eight participants elected to complete the demographics survey. All eight were white, spoke English, did not have a disability, and were not on public assistance. Figure 2 displays the age and sex make up of the open house participants.

Figure 2: Age and Sex of Open House Participants

Summary of Comments

Each of the study intersection with improvement alternatives identified included a survey for the public to complete. Each survey included a summary of the improvement alternatives, a question to select their preferred alternative, and space to leave any specific comments. More than 360 surveys were completed. This does not mean that each intersection received 360 responses. The maximum number of responses for one study intersection was 16 and the minimum was one.

Figure 3: Screenshot of Study Intersection Surveys



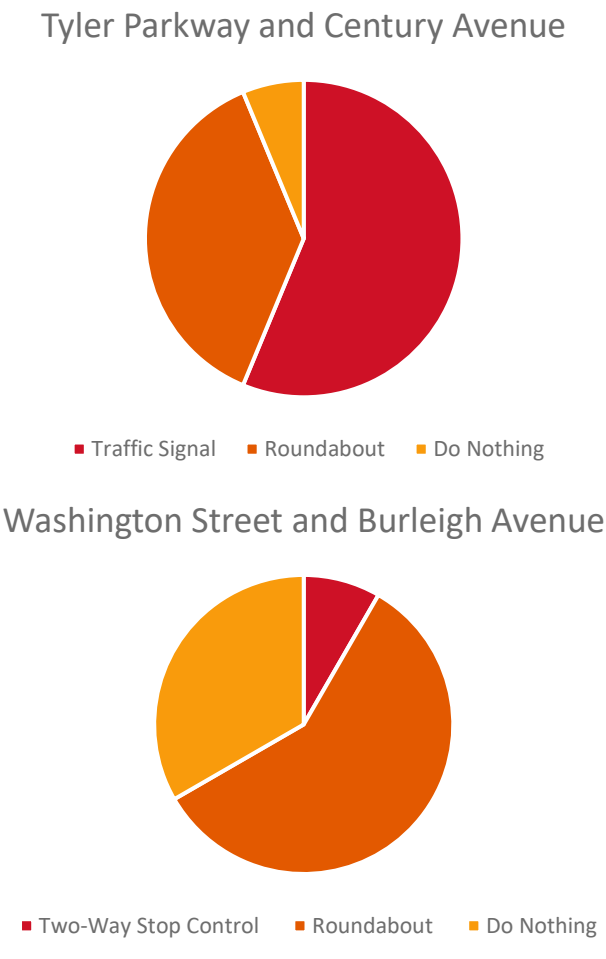
Eight intersections received 10 or more survey responses. Those will be discussed in the most detail here, with the summary of the responses listed below as well as the following pie charts. Survey respondents could select all the alternatives they preferred, however nearly all respondents selected only one response. The remainder of the intersection results are shown in Table 1, with the written comments received following.

- Tyler Parkway and Century Avenue (B). There were three alternatives available at the Tyler Parkway and Century Avenue intersection: traffic signal, roundabout, and do nothing. Sixteen responses were received. Over half (56 percent) preferred the traffic signal alternative, while 38 percent preferred the roundabout, and just six percent said do nothing.
- Washington Street and Burleigh Avenue (B). There were three alternatives available at the Washington Street and Burleigh Avenue intersection: two-way stop control, roundabout, and do nothing. Twelve responses were received. Over half (58 percent) preferred the roundabout alternative, while 33 percent said do nothing, and just eight percent said two-way stop control.
- Washington Street and Turnpike Avenue (B). There were three alternatives available at Washington Street and Turnpike Avenue: dedicated eastbound left turn lane, southbound protected/permitted left turn phasing, and do nothing. Eleven responses were received. Nearly two-thirds (64 percent) preferred dedicated eastbound left turn lane, 27 percent preferred southbound protected/permitted left turn phasing, and just nine percent said do nothing. Both alternatives could be implemented, with 91 percent saying they preferred a build option.
- 3rd Street and Wachter Avenue (B). There were three alternatives available at 3rd Street and Wachter Avenue: northbound/southbound two-way stop control with bump-outs, mini-roundabout, and do

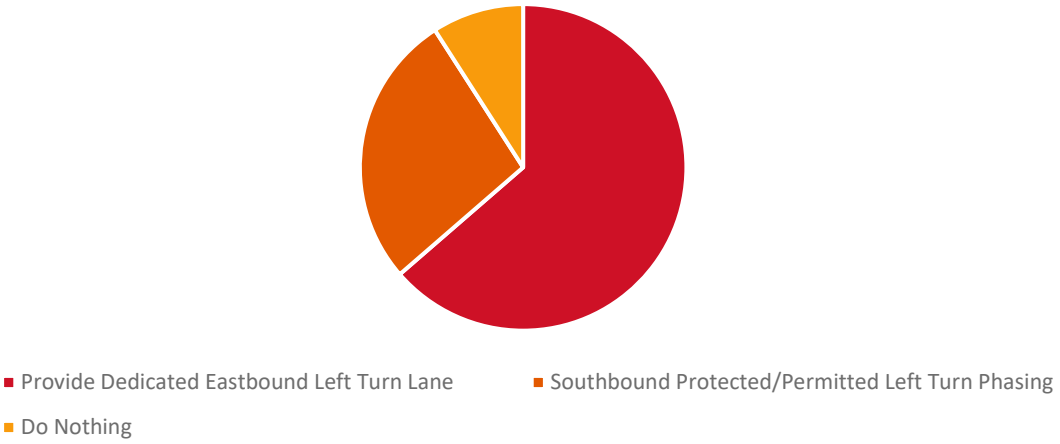
nothing. Eleven responses were received. Just 45 percent preferred the mini-roundabout, 36 percent preferred do nothing, and 18 percent said two-way stop control and bump-outs.

- 10th Avenue and Main Street (M). There were three alternatives available at 10th and Main Street: roundabout, all-way stop control, and do nothing. Eleven responses were received. Both the roundabout and all-way stop control received 45 percent of the responses, while just nine percent said do nothing.
- 19th Street and Capital Avenue (B). There were three alternatives available at 19th Street and Capital Avenue: protected/permitted northbound and southbound left turn phasing, eastbound and westbound left turn lanes, and do nothing. There were 10 responses received. Sixty percent preferred the protected/permitted northbound and southbound left turn phasing, 30 percent preferred eastbound and westbound left turn lanes, and just 10 percent said do nothing. Both alternatives could be implemented, with 90 percent saying they preferred a build option.
- State Street and Boulevard Avenue (B). There were three alternatives available at State Street and Boulevard Avenue: reduced conflict intersection, continuous green-T intersection, and do nothing. Ten responses were received. Forty percent preferred the continuous green-T intersection, while both reduced conflict intersection and do nothing each received 30 percent support.
- Washington Street and Avenue C (B). There were three alternatives available at Washington Street and Avenue C: northbound left turn phasing, northbound and southbound left turn phasing, and do nothing. There were 10 responses received. Eighty percent preferred the northbound and southbound left turn phasing while 20 percent said to do nothing.

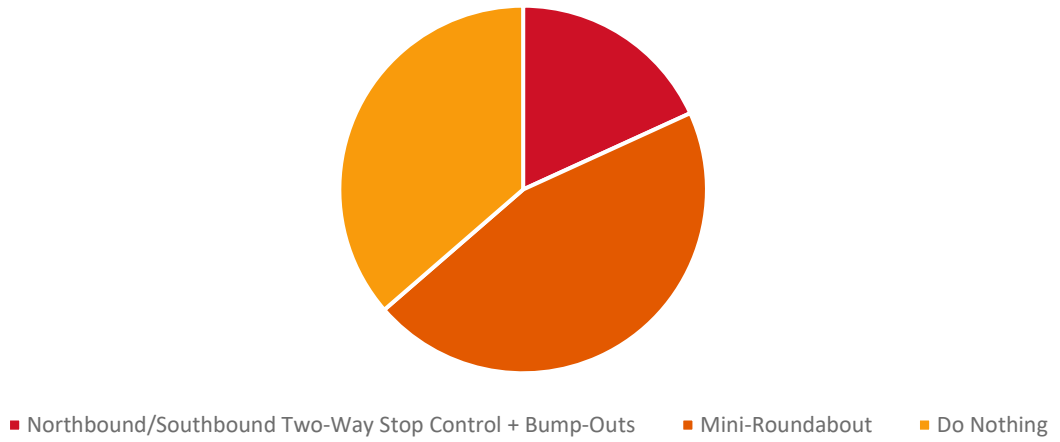
Figure 4: Survey Responses by Intersection (Top Locations)



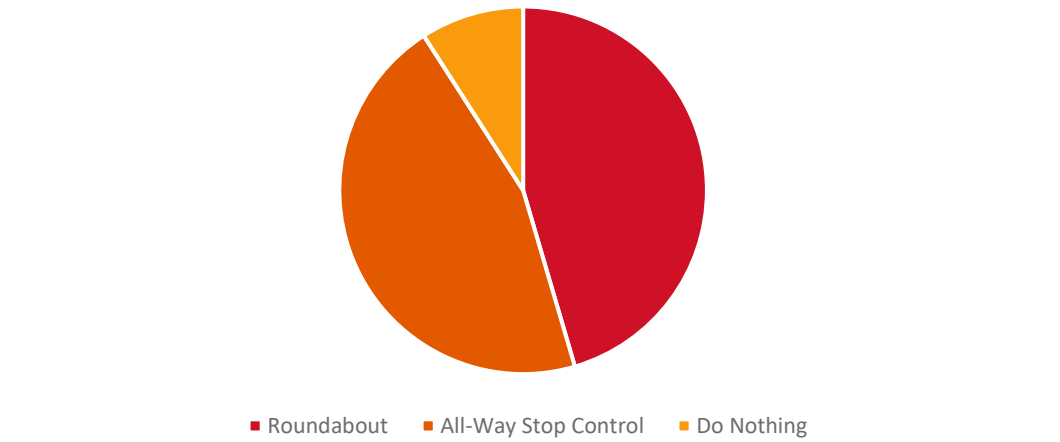
Washington Street and Turnpike Avenue



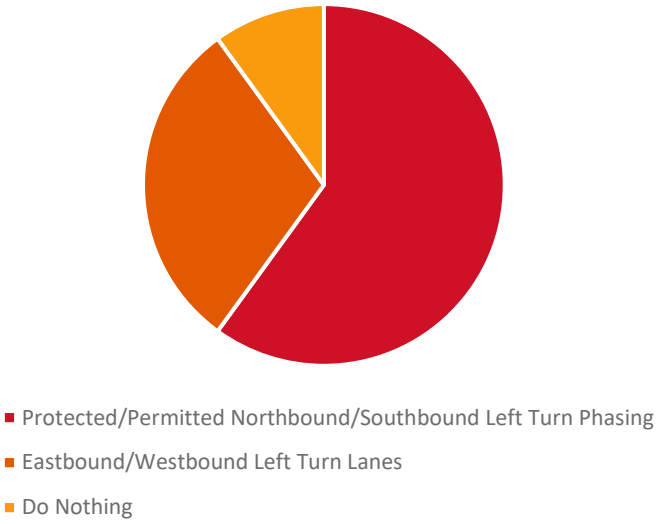
3rd Street and Wachter Avenue



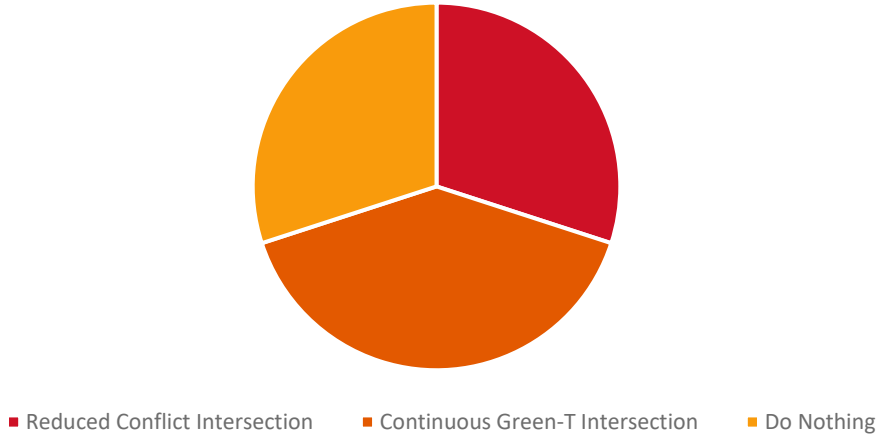
10th Avenue and Main Street



19th Street and Capital Avenue



State Street and Boulevard Avenue



Washington Street and Avenue C

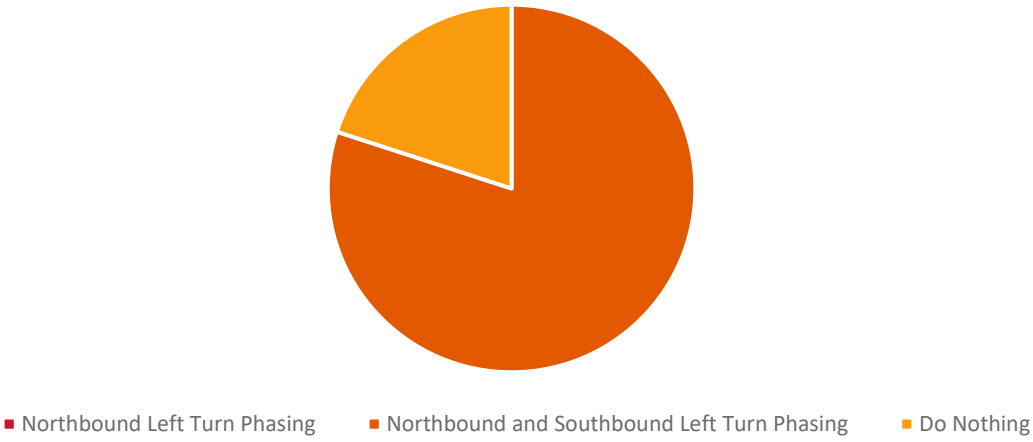


Figure 5: Bismarck Study Intersections by Comment Types and Frequency

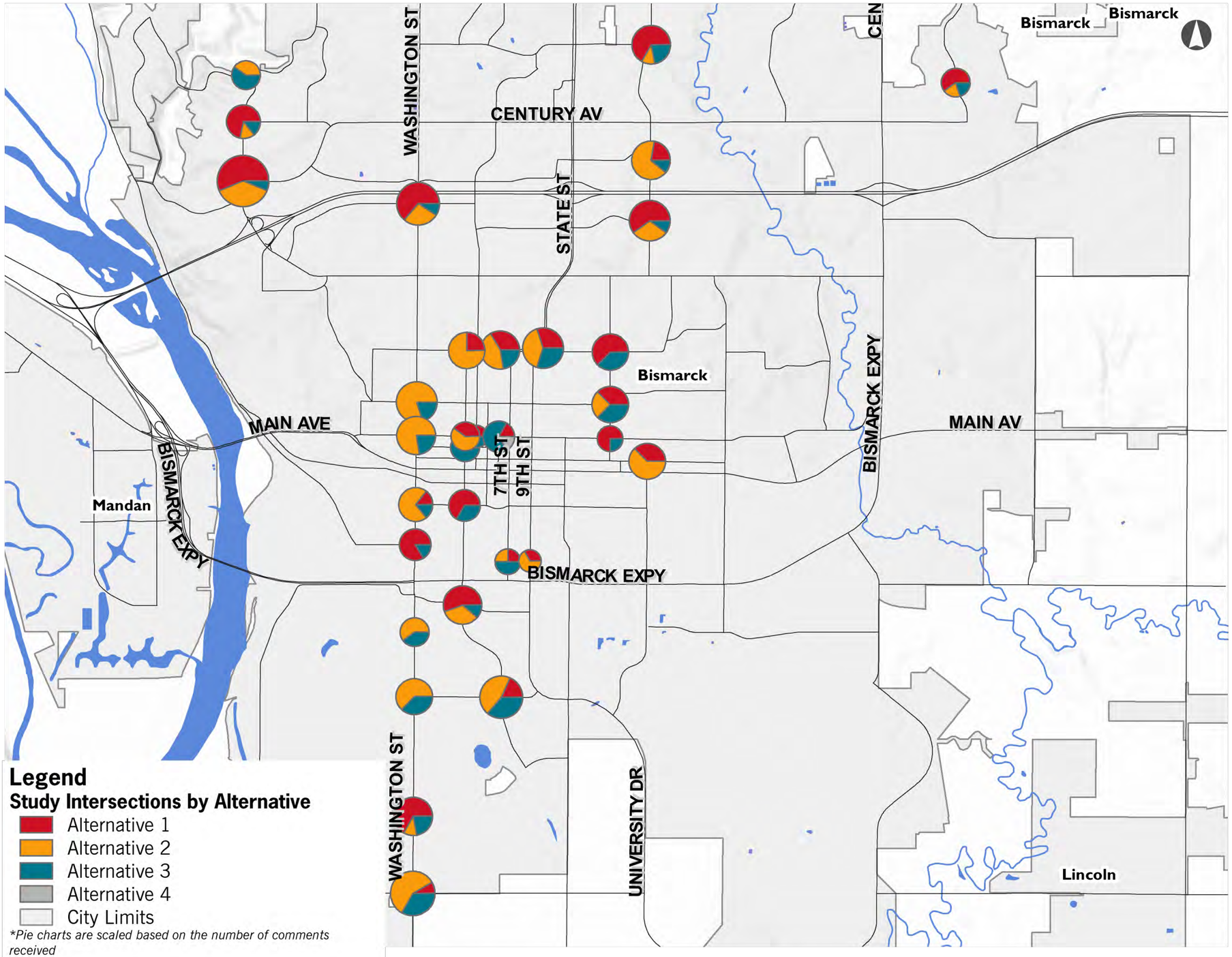


Figure 6: Mandan Study Intersections by Comment Types and Frequency

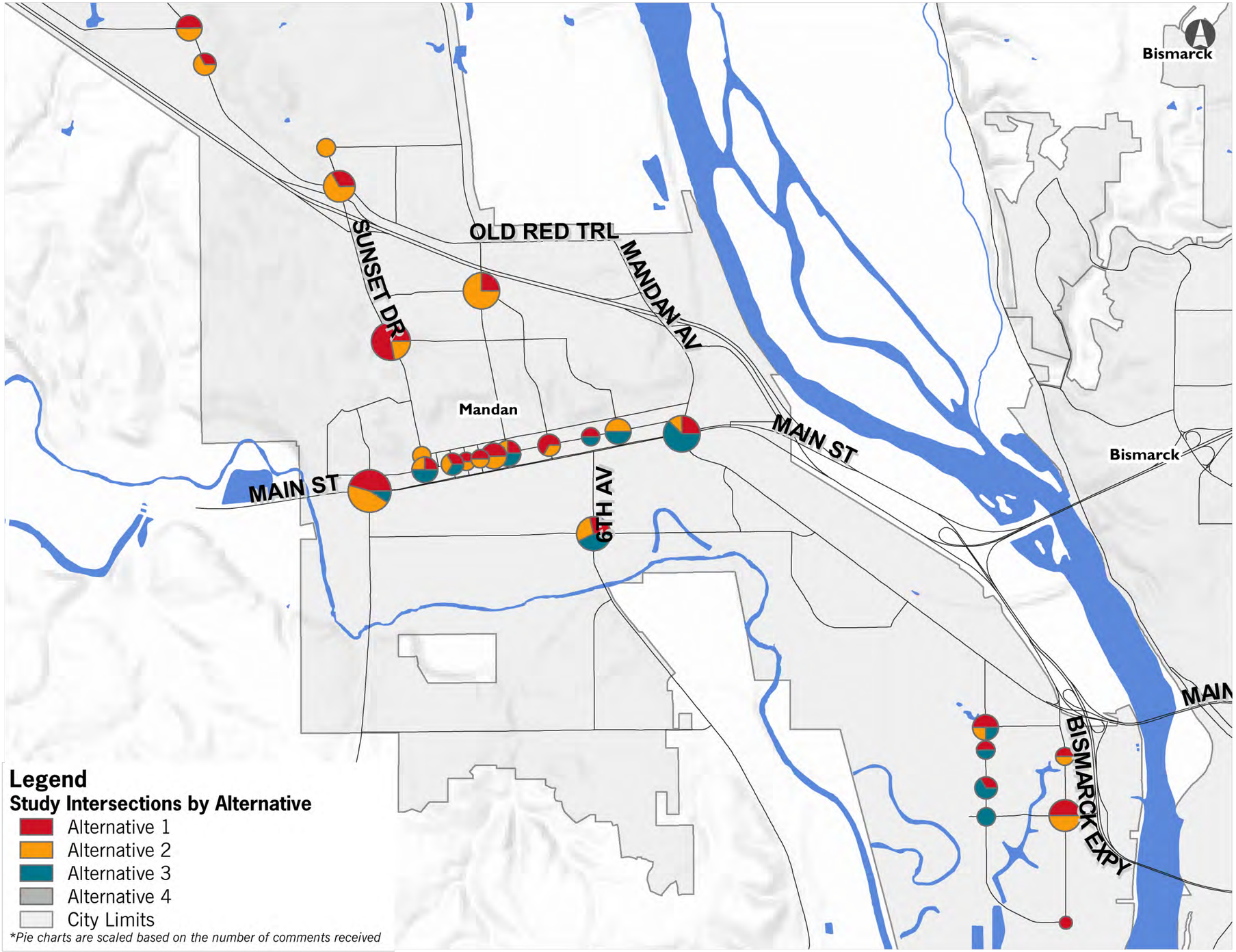


Table 1: Summary of Survey Responses

ID	Intersection	Alternative 1	Votes	Alternative 2	Votes	Alternative 3	Votes	Alternative 4	Votes	Total Votes	Number of Comments
11	Tyler Pkway & Century Ave	Traffic Signal	9	Roundabout	6	Do Nothing	1	-	-	16	2
34	Washington St & Burleigh Ave	Two-Way Stop Control	1	Roundabout	7	Do Nothing	4	-	-	12	1
14	Washington St & Turnpike Ave	Provide Dedicated Eastbound Left Turn Lane	7	Southbound Protected/Permitted Left Turn Phasing	3	Do Nothing	1	-	-	11	2
30	3rd St & Wachter Ave	Northbound/Southbound Two-Way Stop Control + Bump-Outs	2	Mini-Roundabout	5	Do Nothing	4	-	-	11	0
39	10th Ave & Main St	Roundabout	5	All-Way Stop Control	5	Do Nothing	1	-	-	11	3
10	19th St & Capital Ave	Protected/Permitted Northbound/Southbound Left Turn Phasing	6	Eastbound/Westbound Left Turn Lanes	3	Do Nothing	1	-	-	10	2
22	State St & Boulevard Ave	Reduced Conflict Intersection	3	Continuous Green-T Intersection	4	Do Nothing	3	-	-	10	2
31	Washington St & Ave C	Northbound Left Turn Phasing	0	Northbound and Southbound Left Turn Phasing	8	Do Nothing	2	-	-	10	2
5	6th St & Boulevard Ave	Single Lane Roundabout	3	Two-Way Stop Control	4	Do Nothing	2	-	-	9	0
9	19th St & Calgary Ave	Add Two-Way Left Turn Lane on 19th Street	6	Roundabout	1	Do Nothing	2	-	-	9	3
29	3rd St & Denver Ave	Mini-Roundabout	5	All-Way Stop Control	3	Do Nothing	1	-	-	9	0
32	Washington St & Rosser Ave	Leading Pedestrian Interval	0	Northbound/Southbound Left-Turn Phasing	7	Do Nothing	2	-	-	9	1
33	Washington St & London Ave	Add Northbound/Southbound Left Turn Lanes	6	Roundabout	1	Do Nothing	2	-	-	9	2
37	19th St & Shiloh Dr	Create a Single Intersection with Basin Electric Access Realigned	2	Roundabout with Basin Electric Realignment	6	Do Nothing	1	-	-	9	4
46	Sunset Dr & Division St	Add Turn Lanes	7	Conflict Warning System for Southbound Steep Grade	2	Do Nothing	0	-	-	9	0
12	3rd St & Boulevard Ave	Two-Way Stop Control	2	Do Nothing	6	-	-	-	-	8	1
16	Washington St & Wachter Ave	Eastbound/Westbound Stop Control	0	Three-lane Roadway	5	Do Nothing	3	-	-	8	2
17	Airport Rd & Broadway Ave	Two-Way Stop Control + Bump-Outs	3	Do Nothing	5	-	-	-	-	8	0
26	16th St & Boulevard Ave	Mini-Roundabout	5	Do Nothing	3	-	-	-	-	8	0
27	16th St & E Ave C	Mini-Roundabout	3	Two Way Stop Control + Bump-Outs	2	Do Nothing	3	-	-	8	0
47	Collins Ave & 14th St	Two-Way Stop Control	2	Roundabout	6	Do Nothing	0	-	-	8	0
58	Memorial Hwy & Main St	Remove Porkchop and Reconfigure Lanes	2	Northbound and Southbound Advance Warning Flashers	1	Do Nothing	5	-	-	8	0
2	Washington St & Bowen Ave (N)	Remove Signal	1	Remove Signal and Realignment	5	Do Nothing	1	-	-	7	1
24	Tyler Pkwy & Country West Rd	Eastbound/Westbound Stop Control	5	Mini-Roundabout	1	Do Nothing	1	-	-	7	0
59	6th Ave & 3rd St	Bike Lanes	2	Parking with Bump-Outs	2	Do Nothing	3	-	-	7	3
1	3rd St & Bowen Ave	Southbound Protected/Permitted Left-Turn Phasing	4	Eastbound/Westbound Two-Way Stop Control	0	Do Nothing	2	-	-	6	1
4	Washington St & Arbor Ave	Add Protected/Permitted Northbound Left Turn Phasing + Leading Pedestrian Interval	5	Convert to Two-Way Stop Control	0	Do Nothing	1	-	-	6	2
21	6th St & Rosser Ave	Leading Pedestrian Interval and Signal Progression	1	Two-Way Stop Control	0	NB/SB Left-turn Lanes	4	Do Nothing	1	6	1
41	46th Ave & McKenzie Dr	Roundabout	3	Do Nothing	3	-	-	-	-	6	1
45	Sunset Dr & Old Red Tr	Dedicated Westbound Left Turn Lane + Left Turn Phasing	2	Remove Porkchops and Revise Lane Configuration	4	Do Nothing	0	-	-	6	3

ID	Intersection	Alternative 1	Votes	Alternative 2	Votes	Alternative 3	Votes	Alternative 4	Votes	Total Votes	Number of Comments
13	3rd St & Thayer Ave	Eastbound/Westbound Two Way Stop Control + Bump-outs	1	Eastbound/Westbound Two Way Stop Control and Install Pedestrian Beacons	1	Do Nothing	3	-	-	5	0
15	Washington St & Reno Ave	Eastbound/Westbound Stop Control	0	Three-lane Roadway	3	Do Nothing	2	-	-	5	2
18	3rd St & Rosser Ave	Leading Pedestrian Interval and Signal Progression	2	Do Nothing	3	-	-	-	-	5	0
23	Tyler Pkwy & Valley Dr	Stop Control on Tyler Parkway	0	Mini-Roundabout	2	Do Nothing	3	-	-	5	1
25	Roosevelt Dr & Hitchcock Dr	Eastbound/Westbound Yield Control	3	Mini-Roundabout	1	Do Nothing	1	-	-	5	0
6	7th St & Arbor Ave	Traffic Calming via Lane Reconfiguration	1	Remove Signal and Provide Pedestrian Beacon on 7th Street	1	Do Nothing	2	-	-	4	1
20	5th St & Rosser Ave	Leading Pedestrian Interval and Signal Progression	1	Two-Way Stop Control	0	NB/SB Left-Turn Lanes	2	Do Nothing	1	4	0
28	16th St & Rosser Ave	Mini-Roundabout	3	Signal	0	Do Nothing	1	-	-	4	1
38	Collins Ave & 1st St NW	Eastbound/Westbound Two-Way Stop Control	1	Mini-Roundabout	1	Do Nothing	2	-	-	4	0
42	37th St & Old Red Tr	Striped Turn Lanes on 37th Street	2	Do Nothing	2	-	-	-	-	4	0
50	Sunset Dr & 1st St	Mini-Roundabout	1	Two-Way Stop Control, Pedestrian Bump-Outs, and Parking Removal	1	Do Nothing	2	-	-	4	1
54	1st Ave & 1st St NW	Remove Parking	2	Do Nothing	2	-	-	-	-	4	0
57	9th Ave & 1st St NE	Bump-Outs	0	Three-Lane Section	2	Do Nothing	2	-	-	4	0
60	40th Ave & 19th St	ree-Lane Section Bump-Out and Refuge Isla	2	Bump-Out and Refuge Island	1	Do Nothing	1	-	-	4	0
7	9th St & Arbor Ave	Traffic Calming via Lane Reconfiguration	1	Do Nothing	2	-	-	-	-	3	0
19	4th St & Rosser Ave	ling Pedestrian Interval and Signal Coordina	1	NB/SB Left-Turn Lanes	1	Do Nothing	1	-	-	3	0
43	Old Red Tr & 34th St	d Diet on Old Red Trail with Striped Side Str	1	Do Nothing	2	-	-	-	-	3	0
51	4th Ave & 1st St NW	Mini-Roundabout	1	Two-Way Stop Control, Pedestrian Bump-Outs, and Parking Removal	1	Do Nothing	1	-	-	3	0
55	3rd Ave & 1st St NE	Three-Lane Section	2	Bump-Outs	1	Do Nothing	0	-	-	3	0
62	40th Ave & Shoal Lp	e-Lane Section with Parallel Parking on One	1	Bump-Outs	0	Do Nothing	2	-	-	3	0
44	Sunset Dr & 27th St	Striped Turn Lanes	0	Roundabout	2	Do Nothing	0	-	-	2	0
48	Sunset Dr & 2nd St	Two-Way Stop Control	0	Two-Way Stop Control with Pedestrian Crossing Amenities	2	Do Nothing	0	-	-	2	0
52	3rd Ave & 1st St NW	Remove Parking	1	Pedestrian Bump-Outs	1	Do Nothing	0	-	-	2	0
53	2nd Ave & 1st St NW	Mini-Roundabout	1	Two-Way Stop Control, Pedestrian Bump-Outs, and Parking Removal	1	Do Nothing	0	-	-	2	0
56	6th Ave & 1st St NE	Roundabout	1	Raised Intersection	0	Do Nothing	1	-	-	2	0
61	40th Ave & 21st St	ection with Parallel Parking on One Side an	1	Bump-Outs	0	Do Nothing	1	-	-	2	0
63	40th Ave & McKenzie Dr	e-Lane Section with Parallel Parking on One	0	Bump-Outs	0	Do Nothing	2	-	-	2	0
64	46th Ave & 21st St	Side Street Turn Lanes	1	Pedestrian Refuge Island	1	Do Nothing	0	-	-	2	0
65	46th Ave & South Bay Dr	Change Stop Sign Direction	1	Do Nothing	0	-	-	-	-	1	0
3	Washington St & Bowen Ave (S)	Combined with Washington Street & Bowen Ave (N)									
8	19th St & 43rd Ave	Omitted due to Corridor Study/Reconstruction									
35	52nd St & Main Ave	No Alternatives Considered									
36	Burlington Dr & Morrison Dr	No Alternatives Considered									
49	2nd Ave & 2nd St	No Alternatives Considered									

Written Comments

Below is the written comments received by study intersection. Only intersections that received written comments are included in this section. No formatting or editing to the comments was made.

- 19th Street & Calgary Ave
  - Any roundabout design must take into account the ability to remove snow in heavier event as to small of a diameter would prevent snow plow from pushing snow efficiently.
  - Two way left turn lane.
  - make it a red light/green light intersection
- 19th Street & Capitol Ave
  - There is a light pole on the south side of Capitol Ave. as you are sitting at the west side of the intersection facing east which looks like all the ground underneath has washed away and could be a fall hazard.
  - NB and SB protected left turn phase.
- 19th Street & Shiloh Dr
  - I think the roundabout at Interstate Ave. makes more sense as there will be many people turning into Shiloh as well as many leaving and unless the roundabout has separate lanes showing who is turning and who is continuing on in the roundabout, it will be a guessing game. There will be less traffic going into/exiting the golf dome. I dislike realigning Basin with Shiloh Dr. unless there is a light provided - that would just make it worse having to also fight the traffic straight across in addition to the north/south traffic.
  - Roundabout with Basin and Shiloh aligned.
  - NO ROUNDABOUT
  - Interstate Ave roundabout with turn lane restrictions
- 1st Avenue & 1st Street NE
  - A 4 way stop sign would be best at this intersection since the city removes the light on 1st & main. There is currently no safe way to exit this block.
- 3rd Street & Boulevard Avenue
  - I believe a 4-way stop would be safer than 2-way at this intersection. There is nearly the same amount of volume of traffic moving north/south on 3rd St as Boulevard Ave.
- 3rd Street & Bowen Avenue
  - I strongly support the addition of a protected left turn at this intersection and several others within Bismarck. The yellow turn arrows that were added around the city in recent years are a waste of money and should be used as protected arrows, which are common in other cities in the country.
- 10th Avenue and Main Street
  - We drive this intersection daily. During periods of high traffic, it is challenging to take a left turn onto Main. A roundabout seems appropriate, albeit the initial learning curve, so long as there is sufficient space in this area for a roundabout that adequately accommodates the truck traffic this area sees.
  - needs to be a 4 way light contro, cars going east/west going to fast
  - It can't stay like it is. Everyone is still confused because it used to have traffic lights all ways which haven't been removed. There are issues here nearly every time I am at this intersection.
- 16th Street and Rosser Avenue
  - Put lights

- 19th Street and 43rd Avenue
    - This area is also very dangerous for pedestrians and bicyclists attempting to cross from the north to access paved trails.
    - I would recommend traffic lights at this intersection
    - At the very least, this intersection needs to be realigned - possibly opportunity for a roundabout?
    - A light is need as noted. Hopefully the 43 improvement and restudy doesn't take 5 years.
    - Prefer roundabout.
    - Text is too small to read. I've tried both on mobile and computer. If you can fix this you will get much more feedback.
    - LIGHTS
    - make it an overpass/underpass
- 46th Avenue and McKenzie Drive
    - I'd like to see additional measures considered for pedestrians, signs, painted or textured walkways all four ways. A beautifying effect(ie Mandan welcome sign, or Lakewood/Missouri river sign) in the middle of roundabout would be great for attracting businesses and residents.
      Thanks!
- 52nd Street and Main Avenue
    - LIGHTS
- 5th Street and Rosser Avenue
    - No Comments
- 6th Avenue and 1st Street NE
    - No Comments
- 6th Avenue and 3rd Street
    - Did the consultants for this project actually visit the site more than once, did you only look at the aerial view map. I hope you made lots of money for this worthless list of options. The only option is do nothing, any of the other options will only make traffic more congested and cause additional road rage. These options will make it safer except for bicyclists because the traffic will be at a stand still. North and south traffic will be backed up for a mile in both directions. the only real improvement to this intersection is to add left turn lanes and not by removing a driving lane for north south traffic. Mandan planning at its best develop first then worry about how to put a band aid on the problems you caused with poor planning during the initial stage of development.
    - needs better signals and turn lanes
    - If I understand this correctly, nothing will be done to 3rd Street? That's not good. The east side of this intersection is a huge problem. Too many people try to turn left into the Little Cesar's parking lot, which backs up traffic into the intersection. Cars are parked along the south side of the street, next to the mobile home park, too close to the intersection. The left turn from 3rd going south on 6th should be protected, at least during peak times.
- 6th Street and Rosser Avenue
    - I was almost run over by someone turning left onto Rosser from the North on 6th St. Clerks at the gas station witnessed it and said they thought I would be killed. Left turners are so focused on their turn, they don't pay attention to pedestrians. can you fix this?
- 7th Street and Arbor Avenue
    - Not sure what the best alternative is however this intersection as currently exists is very uninviting and intimidating to pedestrians. There are retail establishments on either side of 7th which are attractions and leads to individuals who may wish to cross at this location.

- State Street and Boulevard Avenue
    - No sidewalks here to consider unless west side of LSS(R Meier's) is slated to build. Many avoid left turn movements now so if improve may need to adjust future traffic volumes to account for changes to existing then make projection in volume.
    - Alt 2 or nothing.
- Sunset Drive and 1st Street
    - Teach people how to use a 4 way atop sign
- Sunset Drive and Old Red Trail
    - If you live here and are familiar with how this intersection works, it can flow smoothly. For people who have never seen this intersection, having two west-bound turn lanes is confusing, especially when the white arrows painted on the pavement have faded to the point of not being visible or when traffic is backed up and you can't see those arrows on the lanes. I once was on northbound Sunset, in the easternmost of the west turn lanes. A truck was in the westernmost west turn lane. I started turning west and to my disbelief I realized the truck was going to continue straight through the intersection/straight on Sunset. If I had not noticed immediately and gunned it through the turn, he would have T-boned me. This is a terrible intersection and very confusing for newcomers. I suggest not only the improvements in the alternative presented, but also a very important improvement would be to add signage for vehicles coming off the interstate ramp (as well as on northbound Sunset in advance of the intersection) that alerts drivers to the fact that they must choose their lane ahead of time because by the time they reach the light their path through the intersection is already set.
    - This intersection, as well as from Old Red Trail to the east bound onramp, needs a major overhaul. It's incredibly confusing and just doesn't work.
    - What consideration was given to incorporating the road diet to a middle turn lane on old red trail going west from sunset drive to 37th. Seem like having 4- for just this section of Old Red Trail is creating the problems
- Tyler Parkway and Century Avenue
    - There are enough signals on Century, Tyler Parkway, and Divide. Too many signals everywhere in Bismarck.
    - This intersection is terrible! Southbound traffic turning left should yield to oncoming traffic but everyone treats it as an all way stop. People are always waving each other through.
- Tyler Parkway and Valley Drive
    - Should Tyler Parkway be constructed to north in future the intersection should be considered for full roundabout.
- Washington Street and Arbor Avenue
    - Protected left turn from the South would make traffic flow much faster
    - Through observation this intersection experiences a high concentration of bicycle and pedestrian movements. It is very intimidating to cross as a pedestrian or a cyclist.
- Washington Street and Avenue C
    - Have recently made a habit out of turning left at Avenue B when a gap occurs in Washington St. southbound traffic to avoid the intersection with Avenue C and it’s congestion, thereby subjecting residential street to increased traffic . Add the protected permissive left turn signals at the signalized intersection ASAP
    - Please replace as many yellow turn arrows as possible with green phasing arrows around the city.

- Washington Street and Bowen Avenue N
    - I strongly support removing this signaled intersection. Washington Street has a difficult enough time moving traffic and stopping for this light to wait for one vehicle to cross adds additional stress to drivers.
- Washington Street and Burleigh Avenue
    - Would be nice to have maybe a 5 Lane road on Washington down to the next stop sign south of Washington and Burleigh.
- Washington Street and London Avenue
    - Northbound and Southbound turning lanes are not the issue in these intersections along S Washington. The issue is Eastbound and Westbound traffic getting onto S Washington. This occurs all the way from Burleigh Avenue up to Billings Drive. There are not really any alternative routes for these housing areas along S Washington to take as there are no other alternative roads other than S Washington for them to exit to. Traffic has gotten much worse the last 10 years and is only going to get worse as more houses are built in the south. In the winter cars end up in the ditches almost daily. This is from trying to merge into 40mph traffic onto icy roads when you only have a few car lengths to get in due to constant North and Southbound traffic flow. I am assuming that going in the ditch is not counted as a traffic accident, but it happens on almost a daily basis in the winter. A 4 way stop or traffic lights somewhere along these routes would help neighborhoods on both sides of S Washington as most of these areas can access London Avenue and Santa Fe Avenue. And it would slow traffic enough to hopefully allow other cars to turn onto the 40mph road easier.
    - Washington should be 5 lanes south of the expressway all the way down past Burleigh ave
- Washington Street and Reno Avenue
    - We have lived west of S. Washington St. for 35 years, during which time period vehicular traffic on S. Washington has increased dramatically. During AM peak period traffic eastbound traffic at this intersection can back up beyond Eastwood St, effectively blocking access from Eastwood to Reno Avenue.

      I believe the Alternative 1 would be a disastrous disservice for hundreds of residents living rest of Washington St.

      Assuming your traffic simulation model for Alternative 2 has adequately allowed retiming of this traffic signal at this intersection to accommodate both the vehicular and pedestrian needs (which can be significant during the summer for access to the Wachter pool) for eastbound to northbound and eastbound though traffic without unreasonable delays I could possibly be convinced that the Alt 2 could work. I remain quite concerned about the 3 lane conversion of S . Washington street and the impact that will present upon access from those unsignalized side intersections along the corridor not represented as part of this study such as Easy Street, Augsburg Avenue , and particularly Munich Drive, which is heavily utilized during school periods. At a minimum if S. Washington is converted to a 3 lane section, each of these side streets should have turn lanes striped on them at Washington in order to facilitate left and right turning vehicular movements.
    - Washington really needs to be 5 lanes with the traffic volume.
- Washington Street and Rosser Avenue
    - I live three houses away from this intersection and there is an absolute need for N/S bound protected left turn lanes at this intersection to clear traffic during peak hours. There should also be an improvement that pedestrians can call a protected interval (not a set interval before the light turns, but upon request/pushing a button). That would make the intersection MUCH better and safer.

- Washington Street and Turnpike Avenue
    - Rip up some curbs and make three options for east and west bound lanes. Dedicated lane each for right turn, straight, and left turn.
    - Eastbound turn lane needs a dedicated left. During rush hour and school year, this intersection is a nightmare with traffic significantly backed up on Turnpike
    - Washington Street and Wachter Avenue
    - Have experienced lots of weaving traffic upstream from this intersection, so perhaps if 3 lane section can handle all of the traffic while providing adequate gaps for side traffic a 3lane section could work.
    - Washington really needs to be 5 lanes with the volume of traffic.