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ALLIANT PROJ. NO. 118-0184.0

SRC MEETING AGENDA

DATE/TIME: Tuesday February 19, 2019 2:00 p.m.

LOC ATION: East Grand Forks City Hall

PROJECT: Mn 220 N Corridor Study

PURPOSE: **Study Review Committee Meeting 3 –** Alternatives Analysis

AGENDA BY: Mike Anderson, Alliant Project Manager; (612-767-9340)

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1) Introduction
2) Overview of Key System Needs
3) Overview of Alternatives

4) Intersection Alternatives Evaluation
    a. Evaluation Metrics
5) Intersection Alternatives
    a. 17th Street
    b. 14th Street
    c. US 2
    d. 23rd Street
    e. 20th Street
    f. 15th Street
    g. 10th Street

6) Segment Alternatives
    a. 17th Street to 23rd Street
    b. 23rd Street to 140th Street SW

7) Pedestrian Connections
8) Next Steps
    a. Preferred Alternatives / Prioritization – SRC Meeting 4 (Early April)

9) Other Discussion

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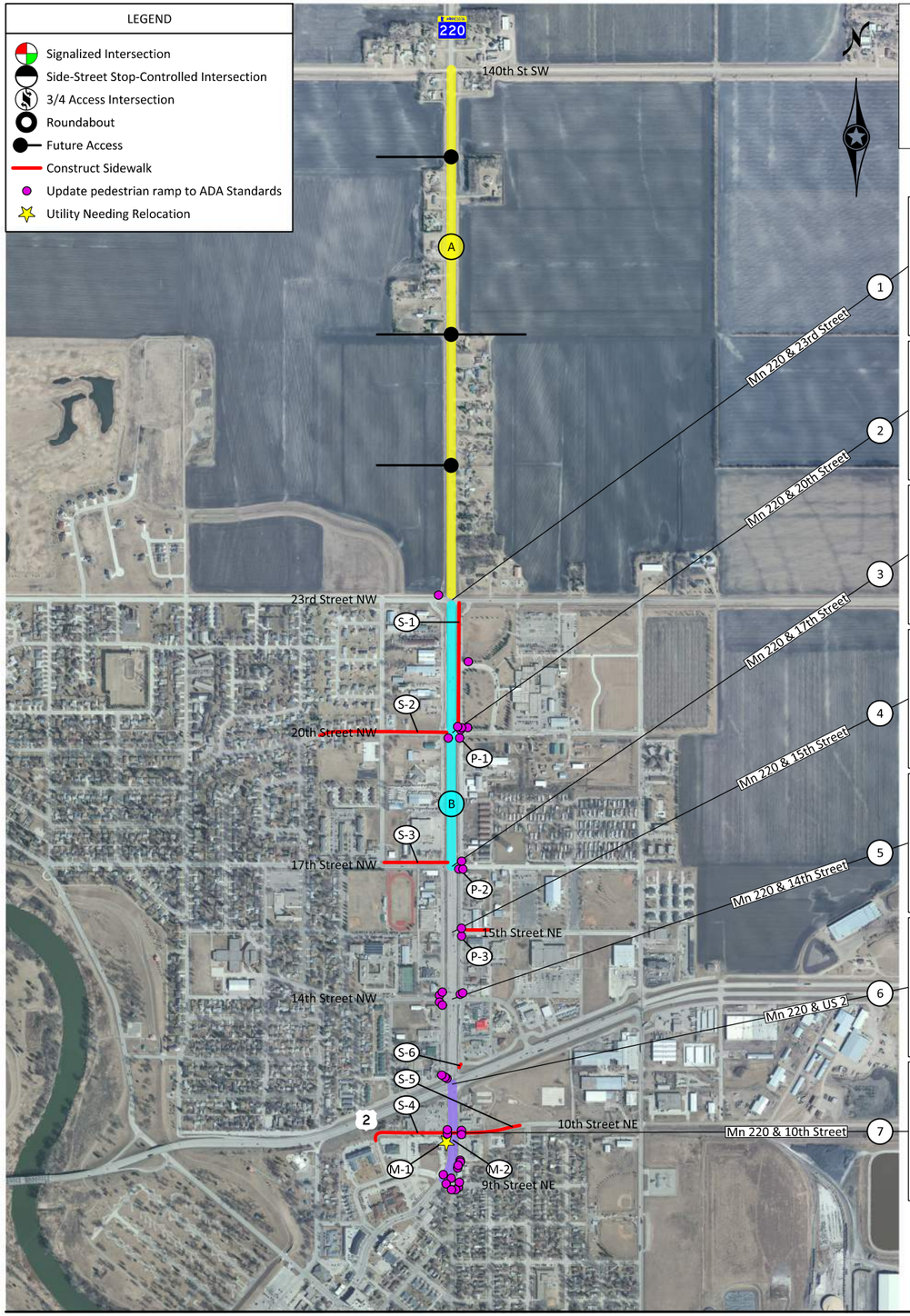
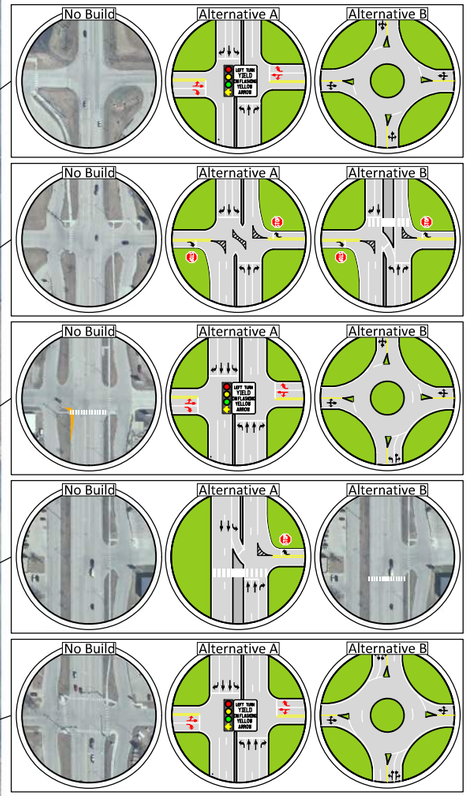


A 23rd Street - 140th Street Segment Alternatives

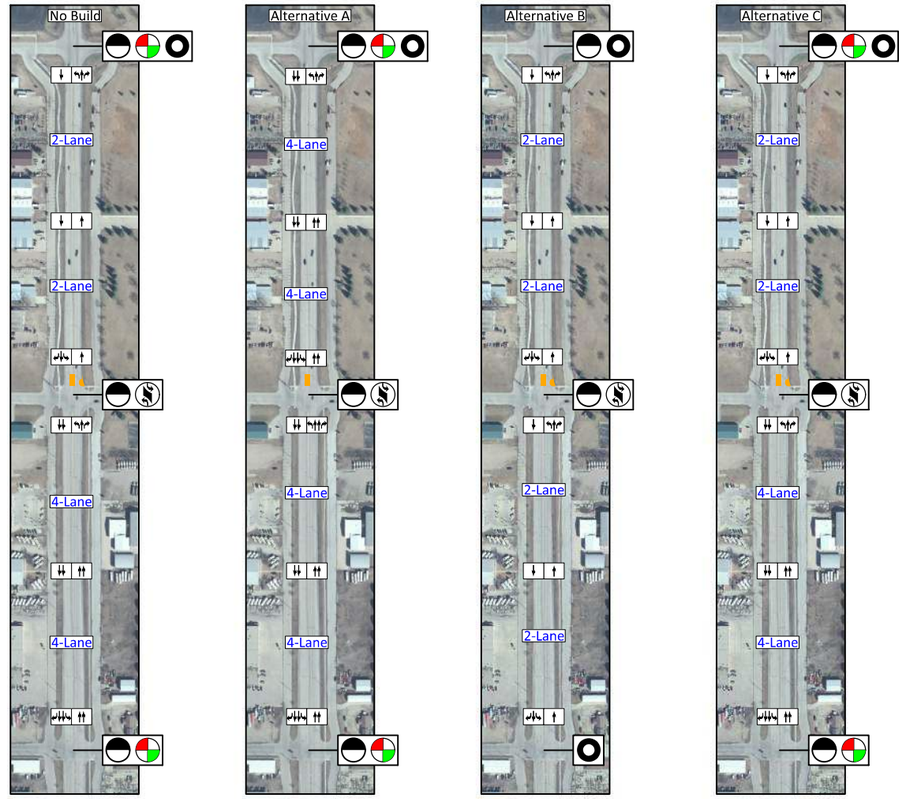
No Build

Alternative A 2-Lane with Left Turn Lanes

Alternative B 3-Lane with Two-Way Center Left Turn Lane



B 17th Street - 23rd Street Segment Alternatives



Sidewalks

- S-1 Mn 220 - E Side (20th St to 23rd St)
- S-2 20th Street NW - Both Sides (5th Ave NW to Mn 220)
- S-3 17th Street NW - North Side (3rd Ave NW to Mn 220)
- S-4 10th Street NW - Both Sides (Terrace Dr to Mn 220)
- S-5 10th Street NE - Both Sides (Mn 220 to 2nd Ave NE)
- S-6 Mn 220 & US 2 - NW Corner (to Frontage Road

Pedestrian Cossing Improvements

- P-1 Improve Pedestrian Crossing
  (see Intersection 2 Alternatives A and B)
- P-2 Improve Pedestrian Corssing
  - Add curb extension
  - Upgrade ped pamps with ADA compliant directional ramps
- P-3 Improve Pedestrian Crossing
  (see Intersection 4 Alternatives A and B)

Miscellaneous

- M-1 Relocate utilities to improve sightlines
- M-2 Restripe lane drop and turn lane between 10th Street and 9th Street

Mn 220 N Corridor Study

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Figure 5-1
Intersection and Segment Alternatives Overview

Mn 220 at 17th Street

No Build: Improve Pedestrian Crossing

Description	Options and Considerations	Pros and Cons	Comparison Summary
Maintain existing through stop control and improve the existing pedestrian crosswalk on the south leg of intersection	•Construct curb extension on the southwest corner to narrow crosswalk exposure •Construct ADA compliant directional pedestrian ramps on both the southwest and southeast corners of the intersection •Reconstruct median nose to provide pedestrian crosswalk pass-through •Install high visibility continental pedestrian crosswalk markings and pedestrian crossing signs	Pros 1. Low cost 2. Improves pedestrian crosswalk, visibility and pedestrian exposure 3. Establishes and ADA compliant crossing of Mn 220 Cons 1. Short term intersection solution 2. Does not address long term intersection mobility or existing intersection safety concerns	**Cost:** Approximately $50,000 **Mobility**: LOS F (2045) **Safety:** No Change **R/W:** None **20-year Traffic Operation Benefit:** No Change **20-year Safety Benefit:** No Change **Benefit/Cost:** 0

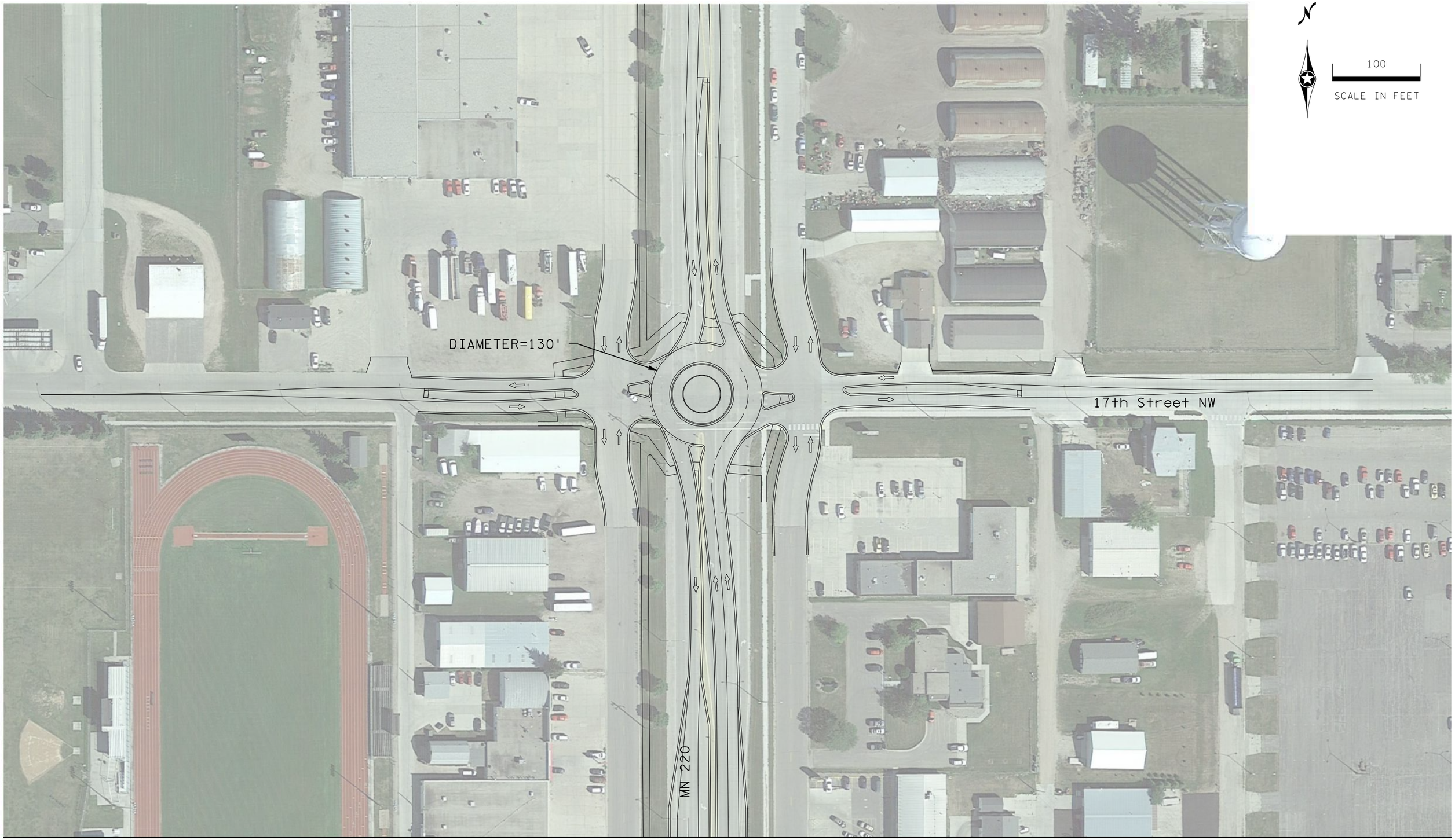
Alternative A: Install Traffic Signal System

Description	Options and Considerations	Pros and Cons	Comparison Summary

Install traffic signal system	• Install FYA on all approaches
	  ○ During AM and PM peak periods, operate westbound, northbound and southbound prot/perm (operate eastbound permissive only)
	  ○ Outside of peak periods, both eastbound/westbound operate permissive only
	• Provide pedestrian crossing countdown timers, crosswalks and intersection lighting
	• Provide signal communication and operate coordinated with 14th Street
	• Install lane eastbound/westbound lane designation and pavement markings (1-TH/LT, 1-RT)
		Pros
		1. Can be designed with minor impact to street width and curbs
		2. Improves left turn access onto Mn 220
		3. FYA can improve motorist safety and flexibility for intersection operation, including FYA omit funcationality with pedestrian actuation
		4. Familiarity
		5. Compatible with long term needs of TH 220 north of 23rd Street NW
		6. Efficient off peak traffic operations (low delays)
		7. Compatible with current 2045 MTP
		8. Expected to result in a reduction in total number of intersection crashes (reduced crash rate) and crash severity.
		
		Cons
		1. Ongoing operation, maintenance, and electricity costs
		2. Signal warrants not met until 2045 (2030 with 3/4 access configuration at 20th Street NW)
		3. Expected to increase the overall intersection delay under existing conditions and provide slightly improved delays under 2045 conditions.
		4. Inefficient intersection operation during off peak periods
			Cost: Approximately $500,000 with ADA Improvements and Signal Communication
			Mobility: LOS B (2045)
			Safety: 18% reduction in crash rate and severity rate
			R/W: None
			20-year Traffic Operation Benefit: (-$1,777,272)
			20-year Safety Benefit: $219,027
			Benefit/Cost: <0

Alternative B: Install Single Lane Roundabout

Description	Options and Considerations	Pros and Cons	Comparison Summary
Construct single lane roundabout	• Single lane is expected to operate acceptably through 2045 forecast • Special attention would be required in design for trucks and agricultural vehicles • Spacing to adjacent frontage roads may be problematic • Will eliminate the need to expand Mn 220 roadway width to the north and provides for more effective right turn lane design at 20th • Could consider R/W acquisition on the east side of the east frontage road to increase frontage road spacing with Mn 220 • North/South pedestrian accommodations are difficult due to narrow spacing between Mn 220 and Frontage Road. May require median closure of the frontage roads, or routing pedestrian crossings on the far east and far west sides of the frontage roads resulting in less direct travel path.	Pros 1. Greatly improves access to Mn 220 2. Provides continuous flow of traffic and improves efficiency 3. Provides traffic calming 4. Improves pedestrian crossing (reduced exposure, improved sightline) 5. Reduces overall intersection crash rate and intersection crash severity 6. Aesthetics 7. Compatible with long term needs of TH 220 north of 23rd Street NW 8. Intersection operations and delays are expectd to improve and provides the most overall efficient 24 hour operation. Cons 1. More expensive to install than a traffic signal (but may be less in long run) 2. Requires more space at intersection (but less space along road) 3. Familiarity 4. To accommodate the two northbound lanes on Mn 220 and to not introduce a lane drop, the ideal northbound lane configuration is a 2-lane approach (1-left turn, 1-through/right). All other approaches would be 1 lane entry.	**Cost:** Approximately $2,600,000 **Mobility**: LOS A (2045) **Safety:** 55% reduction in crash rate and severity rate. **R/W:** None **20-year Traffic Operation Benefit:** $1,487,692 **20-year Safety Benefit:** $647,421 **Benefit/Cost:** 1.18



MN 220 Corridor Study

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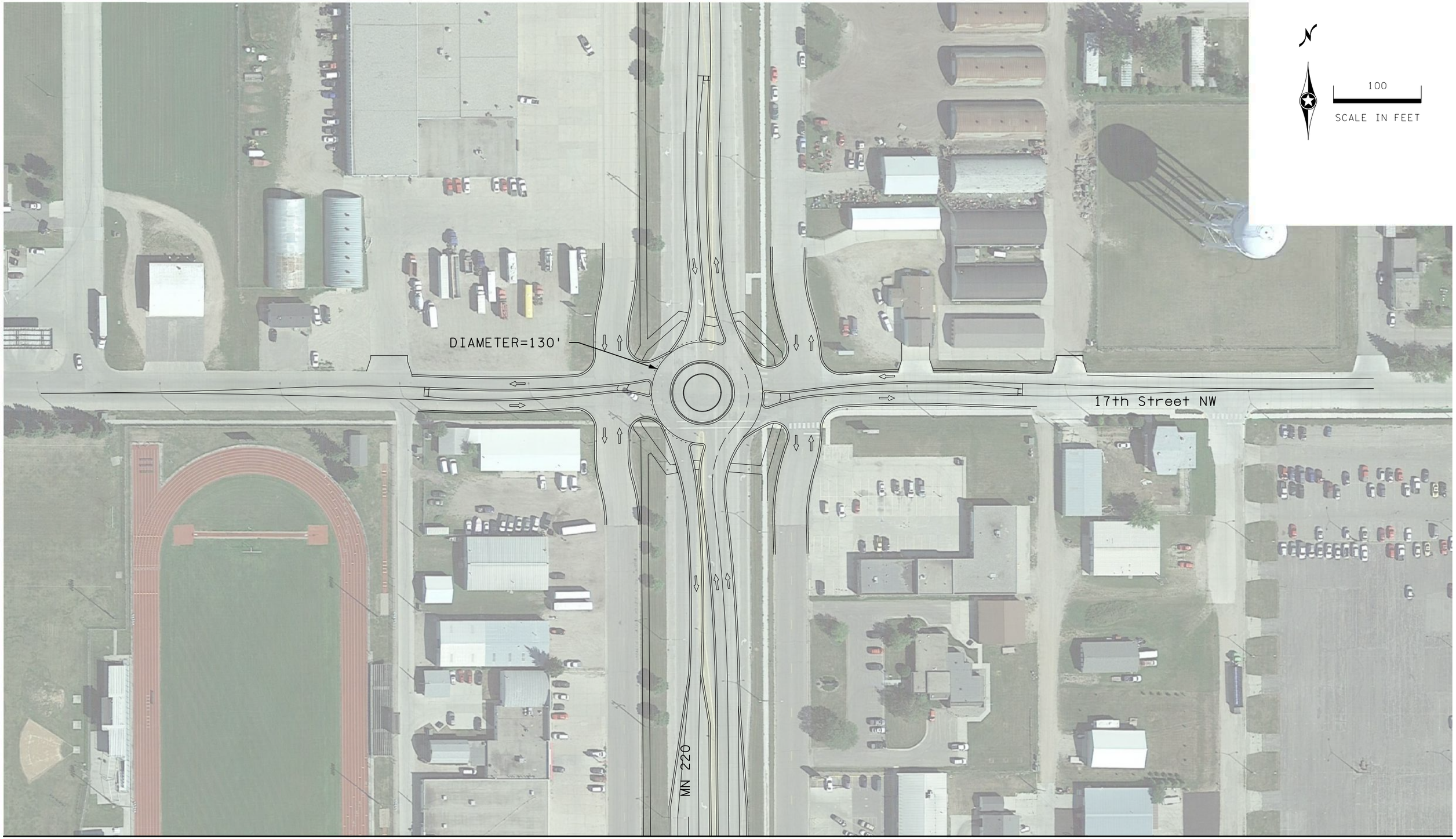
MN 220/17th Street NW
Alternate B - Roundabout
Median Open



MN 220 Corridor Study

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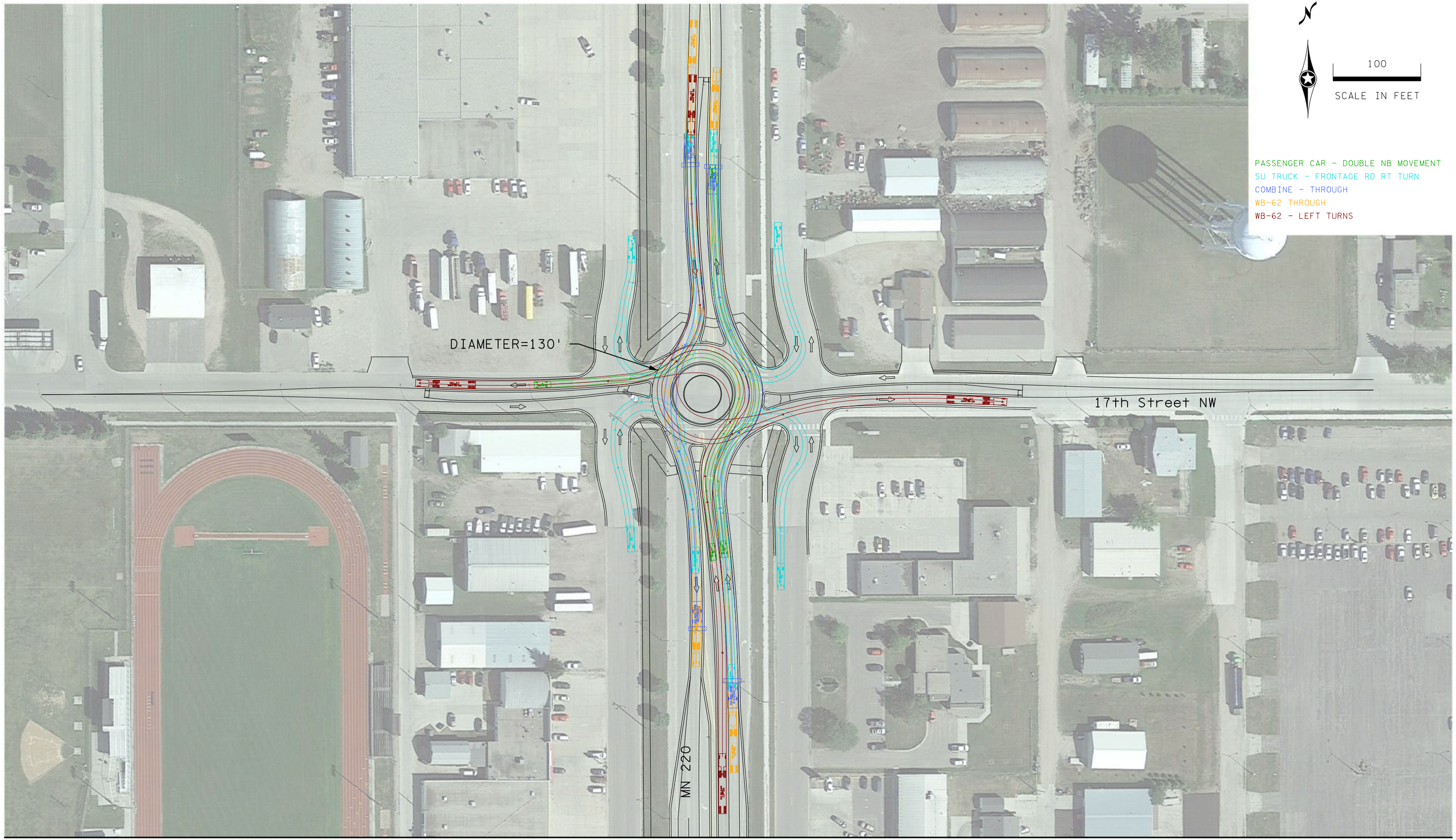
MN 220/17th Street NW
Alternate B - Roundabout
Median Closed



MN 220 Corridor Study

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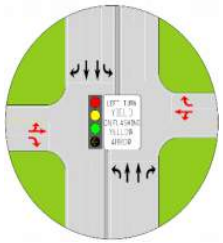
MN 220/17th Street NW
Alternate B - Roundabout
Turning Movements

Mn 220 at 14th Street

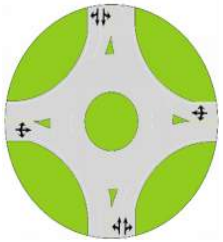
Alternative A: Rebuild Signal System



Description	Options and Considerations	Pros and Cons	Comparison Summary

Rebuild the existing traffic signal system to current design standards	• Install FYA on all approaches
	  ○ During AM and PM peak periods, operate westbound, northbound and southbound protected/permissive (operate eastbound permissive only)
	  ○ Outside of peak periods, operate both eastbound/westbound permissive only
	• Install signal communication and coordinated signal timing with US 2
	• Install pedestrian countdown timers
	• Update the pedestrian and vehicle clearance intervals
	• Install eastbound/westbound lane designation signs and pavement markings (1-TH/LT, 1-RT)
		Pros
		1. Can be designed with minor to no impact to street width and curbs
		2. The addition of FYA and the westbound left turn arrow Improves left turn access onto Mn 220 and separates the conflicts which is expected to result in a reduction of intersection crashes
		3. Signal coordination is expected to greatly reduce the potential for rear end crashes and improve overall corridor operation
		3. FYA can improve motorist safety and intersection operation and provides flexibility to change left turn operation to improve safety
		4. Pedestrian countdown timers can provide pedestrian safety
		5. Familiarity
		
		Cons
		1. Ongoing operation, maintenance, and electricity costs
		2. Overall is not the most efficient intersection operation over a full 24-hour day (higher off peak delays)
			Cost: Approximately $300,000 with Traffic Signal Interconnection to US 2
			Mobility: LOS B (2045)
			Safety: 29% reduction in crash rate and 33% reduction in crash severity rate.
			R/W: None
			20-year Traffic Operation Benefit: $371,482
			20-year Safety Benefit: $1,955,479
			Benefit/Cost: 9.50

Alternative B: Install Multilane (2 x 1) Roundabout



Description	Options and Considerations	Pros and Cons	Comparison Summary
Construct a Multilane (hybrid 2 mainline by 1 cross-street entry) roundabout	• Multilane roundabout is expected necessary to accommodate existing and forecast 2045 traffic demands • Special attention would be required in design for trucks and agricultural vehicles • Spacing to adjacent frontage roads will likely be problematic with a multilane roundabout footprint	Pros 1. Provides continuous flow of traffic and improves efficiency 2. Provides traffic calming 3. Improves pedestrian crossing (reduced exposure, improved sightline) 4. Reduces intersection crash severity 5. Aesthetics 6. Overall most efficient intersection operations during both the AM and PM peak periods and off peak traffic operations (low delays) Cons 1. Overall crash rate is expected to increase and will be much higher than compared to the rebuilt traffic signal system. However, the crash severity is expected to be less making the safety consideration fairly comparable. 2. More expensive to install than rebuilding the traffic signal 3. Requires more space at intersection (but less space along road) 4. Familiarity 5. May not be feasible due to the spacing of the frontage roads and desitination access of motorists needing to make a U-turn onto the frontage roads.	**Cost:** Approximately $3,000,000 **Mobility**: LOS A (2045) **Safety:** 9% increase in crash rate. 1% reduction in crash severity rate (large reduction in Type A, Type B) **R/W:** None **20-year Traffic Operation Benefit:** $8,805,855 **20-year Safety Benefit:** $1,803,378 **Benefit/Cost:** 5.20

Mn 220 at US 2

Alternative A: Rebuild Signal System

Description	Options and Considerations	Pros and Cons	Comparison Summary

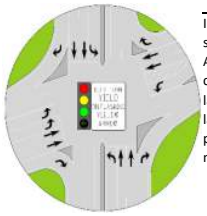
Rebuild the traffic signal system to current standards. Alternative assumes no changes to the intersection geometric design. All safety and capacity improvements are operational or signal system related.	• Install FYA on all approaches
	  ○ Operate eastbound/westbound protected only 11 am to 6 pm and northbound protected/permissive all day
	  ○ Implement FYA Omit logic for pedestrian actuations
	• Install communication and coordinate signal timing with 14th Street NW and 5th Avenue NE
	• Implement a southbound right turn overlap (concurrent with the eastbound left turn)
	• Install pedestrian countdown timers
	• Update the pedestrian and vehicle clearance intervals to current standards
	• Add an additional overhead signal indication for each approach to improve visibility and provide yellow backplate for FYA left turn indications
		Pros
		1. Can be designed with no impact to street width and curbs
		2. Improves left turn access onto Mn 220
		3. FYA provides operational flexibility and is expected to improve motorist safety and intersection operation
		4. Low cost
		5. Familiarity
		6. Expected to reduce the overall intersection crash rate and provide an improvement to the overall intersection crash severity
		
		Cons
		1. Ongoing operation, maintenance, and electricity costs
		2. Operational improvement is minimal. LOS D is expected in 2045
		3. Does not address the right turn related crashes or pedestrian comfort of crossing the intersection.
			Cost: Approximately $350,000 including communication to US 2/5th Avenue NE
			Mobility: LOS D (2045)
			Safety: 25% decrease in crash rate. 23% decrease in severity rate.
			R/W: None
			20-year Traffic Operation Benefit: (-$1,922,257)
			20-year Safety Benefit: $2,111,426
			Benefit/Cost: 0.66

Alternative A-0: Rebuild Signal System with Offset EB/WB Left Turn Lanes

Description	Options and Considerations	Pros and Cons	Comparison Summary

In addition to rebuilding the signal system as described in Alternative A, Alternative A-0 involves the realignment of left turn lanes on US 2 to provide a positive lateral offset for improved motorist sight lines and visibility.	• Turn lanes may be tapered or parallel
	• Can be achieved with striping a buffer if no new median is desired
	• A pedestrian refuge could be provided if roadway is widened significantly
	• Implement a southbound right turn overlap (concurrent with the eastbound left turn)
	• Install FYA on all approaches
	  ○ Operate eastbound/westbound protected only 11 am to 6 pm and northbound prot/perm all day
	  ○ Implement FYA Omit logic for pedestrian actuations
	• Install communication and coordinate signal timing with 14th Street NW and 5th Avenue NE
	• Install pedestrian countdown timers
	• Update the pedestrian and vehicle clearance intervals to current standards
	• Add an additional overhead signal indication for each approach to improve visibility and provide yellow backplate for FYA left turn indications
		Pros
		1. Can be designed with minor impact to street width and curbs
		2. Improves left turn access onto Mn 220
		3. FYA provides operational flexibility and with the offset left turn lanes is expected to improve motorist safety and intersection operation
		4. Low cost
		5. Familiarity
		6. Expected to reduce the overall intersection crash rate and provide an improvement to the overall intersection crash severity
		
		Cons
		1. Ongoing operation, maintenance, and electricity costs
		2. Operational improvement is minimal. LOS D is expected in 2045
		3. Does not address the right turn related crashes or pedestrian comfort of crossing the intersection.
			Cost: Approximately $2,350,000
			Mobility: LOS D (2045)
			Safety: 31% decrease in crash rate. 28% decrease in severity rate.
			R/W: None
			20-year Traffic Operation Benefit: (-$1,922,257)
			20-year Safety Benefit: $2,721,822
			Benefit/Cost: 0.48

Alternative A-1: Rebuild Signal System with Dual EB Left Turn Lanes



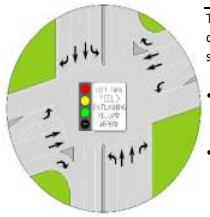
Description	Options and Considerations	Pros and Cons	Comparison Summary

In addition to rebuilding the signal system as described in Alternative A, Alternative A-1 involves the construction of dual eastbound left turn lanes on US 2. The westbound left turn lane would be offset to provide a positive lateral offset for improved motorist sight lines and visibility.	• A pedestrian refuge could be provided if roadway is widened significantly
	• Install FYA on all approaches
	  ○ Operate eastbound/westbound protected only 6 am to 10 pm and northbound prot/perm all day
	  ○ Implement FYA Omit logic for pedestrian actuations
	• Install communication and coordinate signal timing with 14th Street NW and 5th Avenue NE
	• Implement a southbound right turn overlap (concurrent with the eastbound left turn)
	• Install pedestrian countdown timers
	• Update the pedestrian and vehicle clearance intervals to current standards
	• Add an additional overhead signal indication for each approach to improve visibility and provide yellow backplate for FYA left turn indications
		Pros
		1. Expected to operate at a LOS C in year 2045. Provides the greatest operational benefit while maintaining the signalized intersection control
		2. Expected to provide sufficient capacity to minimize the need for the 5th Avenue NW full access intersection with US 2
		3. FYA provides operational flexibility and with the offset left turn lanes is expected to improve motorist safety and intersection operation
		4. Familiarity
		5. Expected to reduce the overall intersection crash rate and provide an improvement to the overall intersection crash severity
		
		Cons
		1. Vehicles may not evenly distribute between lanes
		2. Requires additional roadway width
		3. Dual lanes tend to result in increased crashes as the intersection becomes wider
		4. Does not address the right turn related crashes or pedestrian comfort of crossing the intersection.
			Cost: Approximately $2,350,000
			Mobility: LOS C (2045) or LOS D if No Connection at 5th Ave
			Safety: 27% decrease in crash rate. 25% decrease in severity rate.
			R/W: None
			20-year Traffic Operation Benefit: $5,095,230
			20-year Safety Benefit: $2,363,174
			Benefit/Cost: 4.47

Alternative A-2: Rebuild Signal System with Right Turn Channelization Improvements

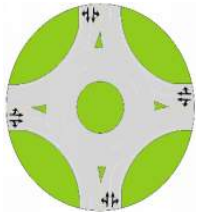
Description	Options and Considerations	Pros and Cons	Comparison Summary
In addition to rebuilding the signal system as described in Alternative A, Alternative A-2 involves the reconstruction of the northwest and southeast corners to remove the channelized right turn pork chop islands. Providing traditional right turn lane design will improve the intersection skew and vehicle angle of approach to the intersection resulting in better visibility.	• Install FYA on all approaches o Operate eastbound/westbound protected only 11 am to 6 pm and northbound prot/perm all day o Implement FYA Omit logic for pedestrian actuations • Implement a southbound right turn overlap (concurrent with the eastbound left turn) • Install communication and coordinate signal timing with 14th Street NW and 5th Avenue NE • Install pedestrian countdown timers • Update the pedestrian and vehicle clearance intervals to current standards • Add an additional overhead signal indication for each approach to improve visibility and provide yellow backplate for FYA left turn indications	Pros 1. Can be designed with overall minor impact to street width and curbs 2. FYA provides operational flexibility and with the offset left turn lanes is expected to improve motorist safety and intersection operation 3. Moderate cost 4. Improved right turn sightlines is expected to improve the intersection safety and pedestrian crossing safety 5. Familiarity 6. Expected to reduce the overall intersection crash rate and provide an improvement to the overall intersection crash severity Cons 1. Ongoing operation, maintenance, and electricity costs 2. Operational improvement is minimal. LOS D is expected in 2045	**Cost:** Approximately $875,000 **Mobility**: LOS D (2045) **Safety:** 26% decrease in crash rate. 23% reduction in severity rate. **R/W:** None **20-year Traffic Operation Benefit:** (-$2,038,918) **20-year Safety Benefit:** $2,085,539 **Benefit/Cost:** 0.07

Alternative A-3: Rebuild Signal System with Offset Eastbound/Westbound Left Turn Lanes and Right Turn Channelization Improvements



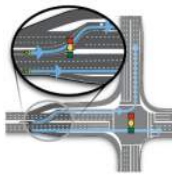
Description	Options and Considerations	Pros and Cons	Comparison Summary
This alternative involves the combination of previously mentioned strategies: • Rebuild Signal System, with Offset Left Turn Lanes - Alternative A-0 • Rebuild Signal System, with Right Turn Channelization Improvements - Alternative A-2	Refer to previously mentioned strategies	Pros 1. Can be designed with overall minor impact to street width and curbs 2. FYA provides operational flexibility and with the offset left turn lanes is expected to improve motorist safety and intersection operation 3. Moderate/High cost 4. Improved right turn sightlines is expected to improve the intersection safety and pedestrian crossing safety 5. Familiarity 6. Expected to reduce the overall intersection crash rate and provide an improvement to the overall intersection crash severity Cons 1. Ongoing operation, maintenance, and electricity costs 2. Operational improvement is minimal. LOS C/D is expected in 2045	**Cost:** Approximately $2,650,000 **Mobility**: LOS D (2045) or LOS E if No Connection at 5th Ave **Safety:** 32% decrease in crash rate. 29% reduction in severity rate. **R/W:** None **20-year Traffic Operation Benefit:** (-$2,038,918) **20-year Safety Benefit:** $2,746,728 **Benefit/Cost:** 0.38

Alternative B: Install Roundabout



Description	Options and Considerations	Pros and Cons	Comparison Summary
Construct full multilane roundabout with two-lane entry on all four approaches	• Multilane roundabout is expected necessary to accommodate existing and forecast 2045 traffic demands • Special attention would be required in design for trucks and agricultural vehicles	Pros 1. Provides continuous flow of traffic and improves efficiency 2. Provides traffic calming 3. Improves pedestrian crossing (reduced exposure, improved sightline) 4. Greatly reduces crash severity 5. Aesthetics 6. Most efficient traffic operations during both AM and PM peak periods, and the off peak periods (low delays) 7. Overall intersection size is not expected to increase due to size of current pavement area. Fits within R/W and current intersection footprint Cons 1. Multilane roundabouts have high crash rates (3 times that of a traditional signalized intersection control) and severity rate. Increased crashes are expected; however the percentage of injury crashes is expected to be significantly reduced resulting in an overall best expected safety benefit. 2. More expensive to install than rebuilding the traffic signal as all four approaches will require full reconstruction. 3. Requires more space at intersection (but less space along road) 4. Familiarity	**Cost:** Approximately $3,600,000 **Mobility**: LOS A (2045) or LOS C if No Connection at 5th Ave **Safety:** 71% increase in crash rate. 35% increase in severity rate. **R/W:** None **20-year Traffic Operation Benefit:** $38,510,513 **20-year Safety Benefit:** $4,255,888 **Benefit/Cost:** 17.34

Alternative C: Displaced EB Left Turn



Description	Options and Considerations	Pros and Cons	Comparison Summary
A displaced left turn (DLT) will move the eastbound left-turn movement from US 2/Mn 220 to an upstream signalized location. Traffic that would turn left at Mn 220 in a conventional design now has to cross opposing through lanes at a signal-controlled intersection several hundred feet upstream and then travel on a new roadway parallel to the opposing lanes. This traffic is now able to execute the left turn simultaneously with the westbound through traffic at the US 2/Mn 220 intersection.	• Overall roadway typical section width is expected to impact the frontage road. • An additional traffic signal system located approximately mid way between Mn 220 and 5th Avenue is needed to facilitate the displaced left turn cross over. The traffic signal systems will need to be coordinated • Eastbound left turn storage length needs to balanced to ensure compatibility for a potential future 5th Avenue 3/4 or full access intersection • The southbound right turn lane would need to be designed as a free operating movement to avoid conflicting at the intersection with the displaced left turn.	Pros 1. Improves intersection capacity by removing a high volume conflicting movement at the US 2/Mn 220 intersection 2. FYA provides operational flexibility and with the offset left turn lanes is expected to improve motorist safety and intersection operation 3. Expected to improve intersection safety by improving sightlines and providing an improved level of left turn control. Anticipated the crash performance will be similar to Alternative A-0. Cons 1. Ongoing operation, maintenance, and electricity costs. Snow removal will be much more difficult 2. High construction cost 3. Adds an additional traffic signal system to the network 4. Requires substantial cross-sectional roadway space, adds effectively 1 more travel lane and 2 more raised median islands. Expected to have R/W and frontage road impacts 5. Familiarity. Likely result in motorist confusion	**Cost:** Approximately $2,900,000 **Mobility:** LOS C (2045) **Safety:** 25% decrease in crash rate. 23% reduction in severity rate. **R/W:** Frontage Road Impact **20-year Traffic Operation Benefit:** $9,010,428 **20-year Safety Benefit:** $2,111,426 **Benefit/Cost:** 5.41

Alternative D: Grade Separated Tight Diamond Interchange

Description	Options and Considerations	Pros and Cons	Comparison Summary
A compressed diamond interchange with either US 2 or Mn 220 grade separated over the top	• Traffic signals would be provided at the ramp terminal intersections • Traffic signal coordination will be required • Tight diamond interchanges require significant retaining wall construction to reduce space and R/W acquisition footprint. This however, greatly increases the construction cost	Pros: 1. Effectively separates volumes from conflicting movements 2. Provide long term efficient traffic operation 3. Reduces vehicle conflicts and is expected to improve overall intersection safety Cons: 1. Significant cost and Right of Way acquisition 2. Will impact businesses and local resident properties 3. Will disrupt the frontage road connections 4. May require closure or reroute of neighboring roads 5. Significant cost and impacts for comparable benefit to other alternatives 6. A grade separated interchange will significantly impact the visibility and presence of remaining businesses near this intersection.	**Cost:** High. > $15,000,000 to 20M excluding R/W and property acquisition costs **Mobility:** NA **Safety:** NA **R/W:** Significant Impact **20-year Traffic Operation Benefit:** NA **20-year Safety Benefit:** NA **Benefit/Cost:** NA

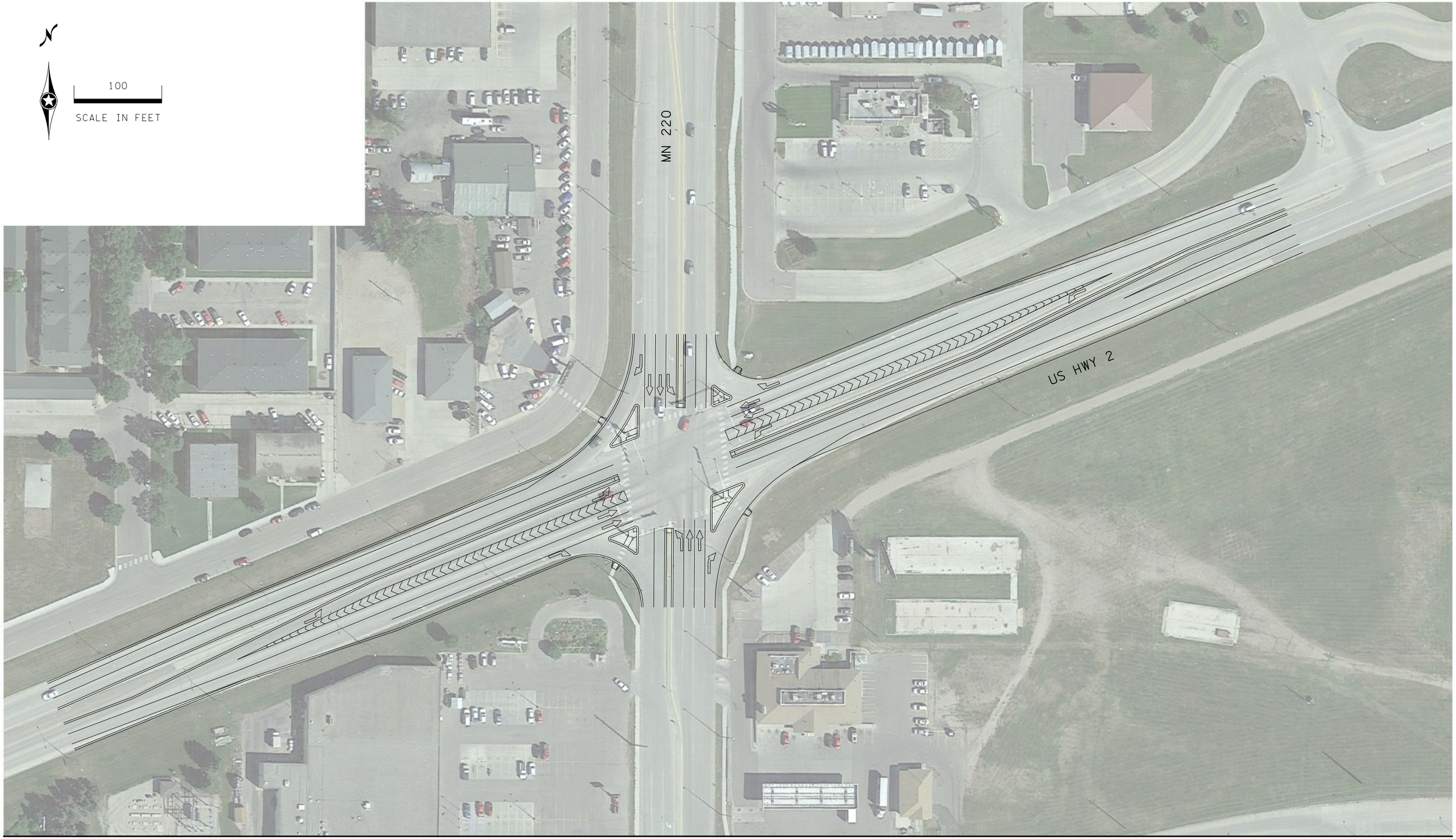
Alternative E: System Improvements - 5th Avenue NW Access

Description	Options and Considerations	Pros and Cons	Comparison Summary
The current 2045 MTP identifies a full access signalized intersection at the US 2/5th Avenue NW intersection (Currently RI/RO on the south side). Full access will provide additional connectivity to the neighborhood reducing traffic demand at the US 2/Mn 220 intersection. Alternative E-1: Couple with Alt A-1 Alternative E-2: Couple with Alt A-3 Alternative E-3: Couple with Alt B	• Provide full access intersection with traffic signal system operating in coordination with the US 2/Mn 220 intersection • Maintaining the existing 5th Avenue NW intersection configuration results in an approximate 1,900 ADT increase to Mn 220 • Streetlight Origin-Destination analysis found the existing eastbound left turn at the US 2/Mn 220 intersection would decrease by 95 (33%) and 50 (18%) vehicles during the AM and PM peak hours, respectively • North of 14th Street, a marginal change in overall ADT on Mn 220 is expected.	Pros: 1. Provides improved access to the neighborhood 2. Reduces vehicle demand at the US 2/Mn 220 intersection 3. Can be designed to provide acceptable safety and traffic operations into forecast year 2045 Cons: 1. High cost 2. Will impact businesses and local resident properties and will increase traffic circulating on neighborhood streets that currently experience low traffic volumes 3. May not be funded or approved for construction **Key Conclusion:** 1. 3/4 Access or full access signalized intersection overall provides a positive benefit to the transportation system and should be considered a viable long term alternative 2. Without the 5th Avenue NW access, the single eastbound left turn lane alternatives at US 2/Mn 220 may not be feasible alternatives due to intersection capacity constraint	NA

N

100

SCALE IN FEET



MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/US HWY 2
Alternative A-0 - Offset Left Turn Lanes

N

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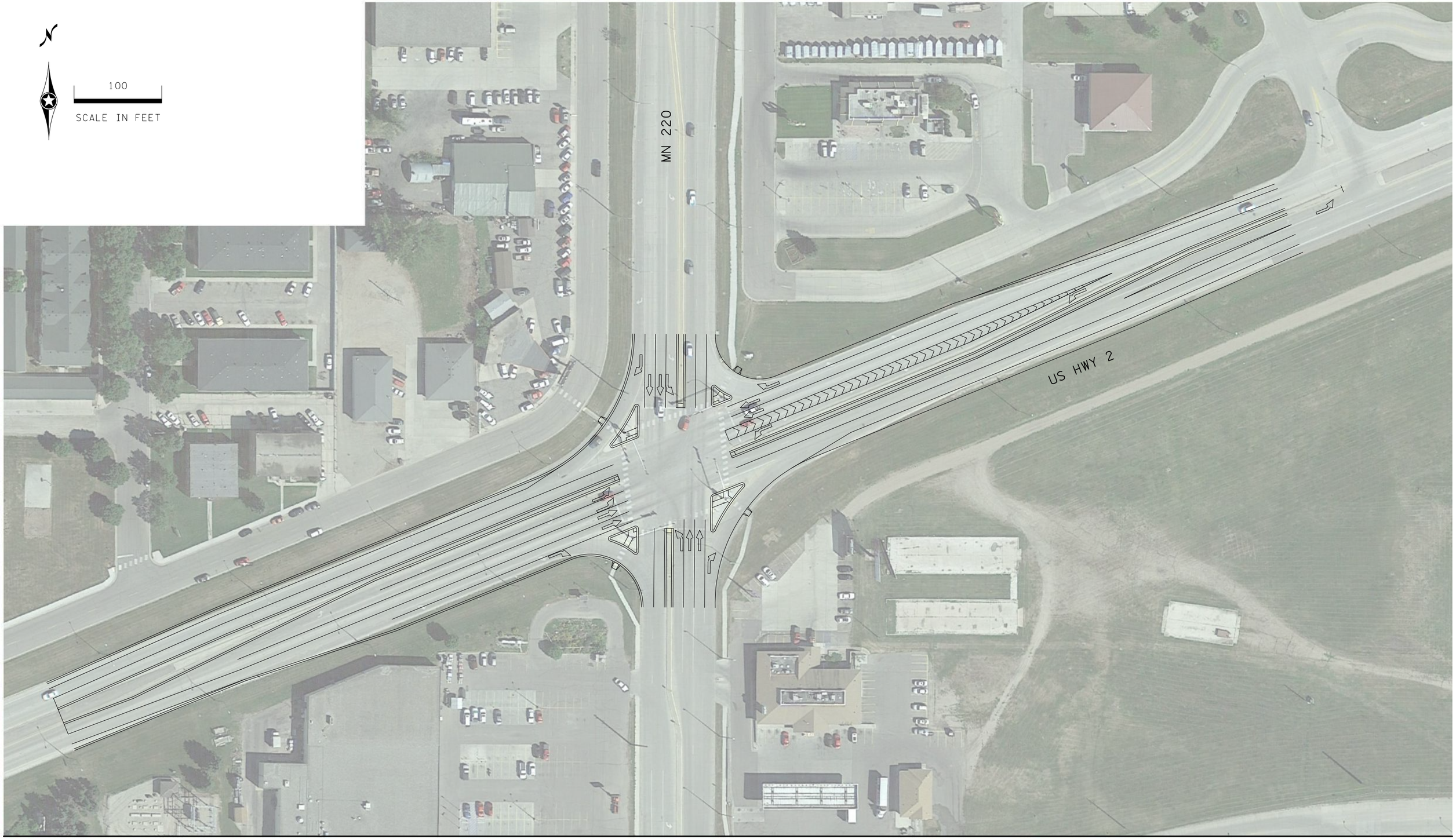
SCALE IN FEET



MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/US HWY 2
Alternative A-1 - Dual EB Left Turn Lanes

N

100

SCALE IN FEET

MN 220

US HWY 2

MN 220 Corridor Study

ALLIANT ENGINEERING

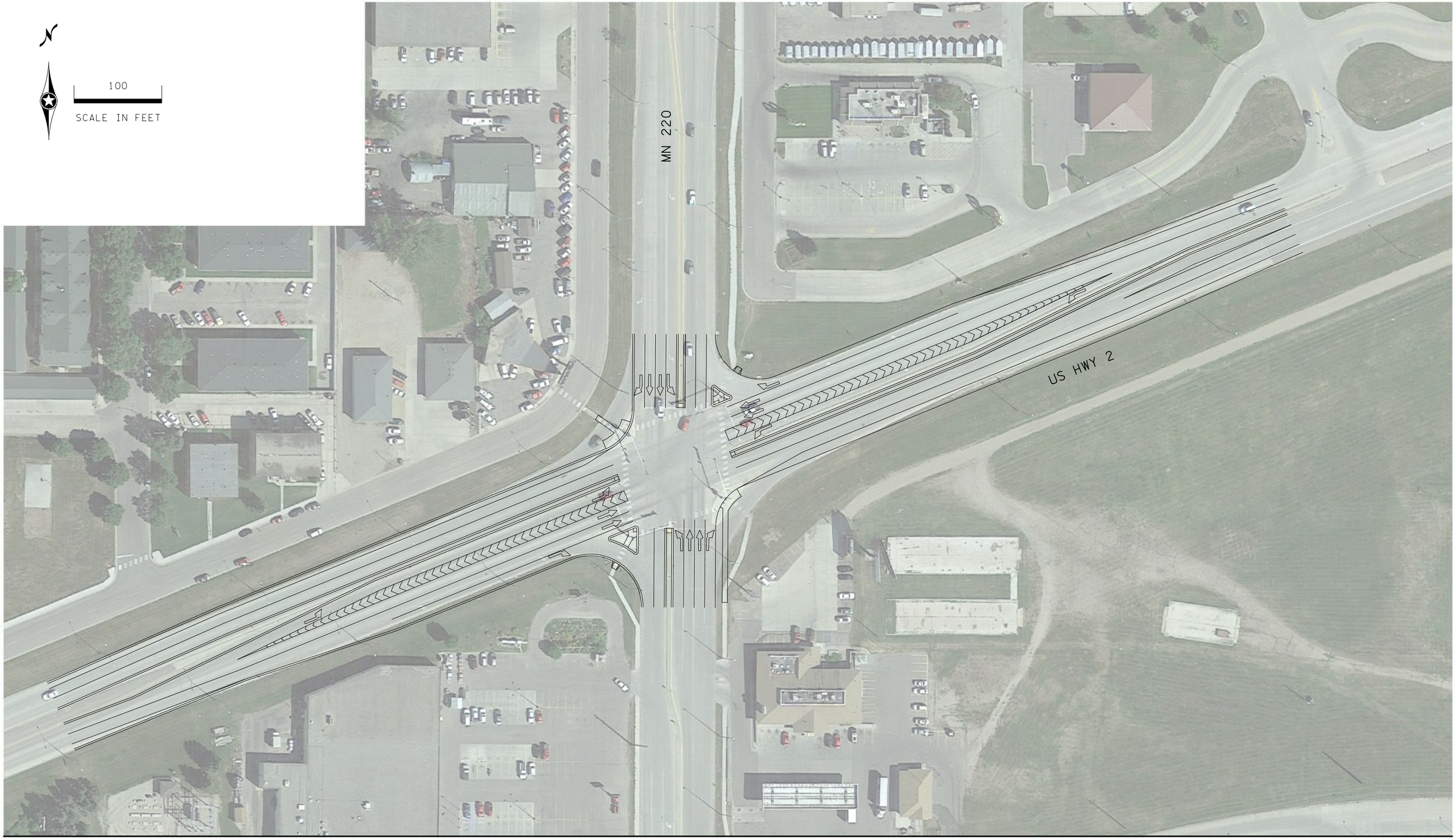
MN 220/US HWY 2

Alternative A-2 - Right Turn Lane Improvements

N

100

SCALE IN FEET



MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/US HWY 2

Alternative A-3 Offset Left Turn Lanes & Right Turn Lane Improvements

N

100

SCALE IN FEET

MN 220

DIAMETER=180'

US HWY 2

MN 220 Corridor Study

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MN 220/US HWY 2
Alternative B - Multilane Roundabout

N

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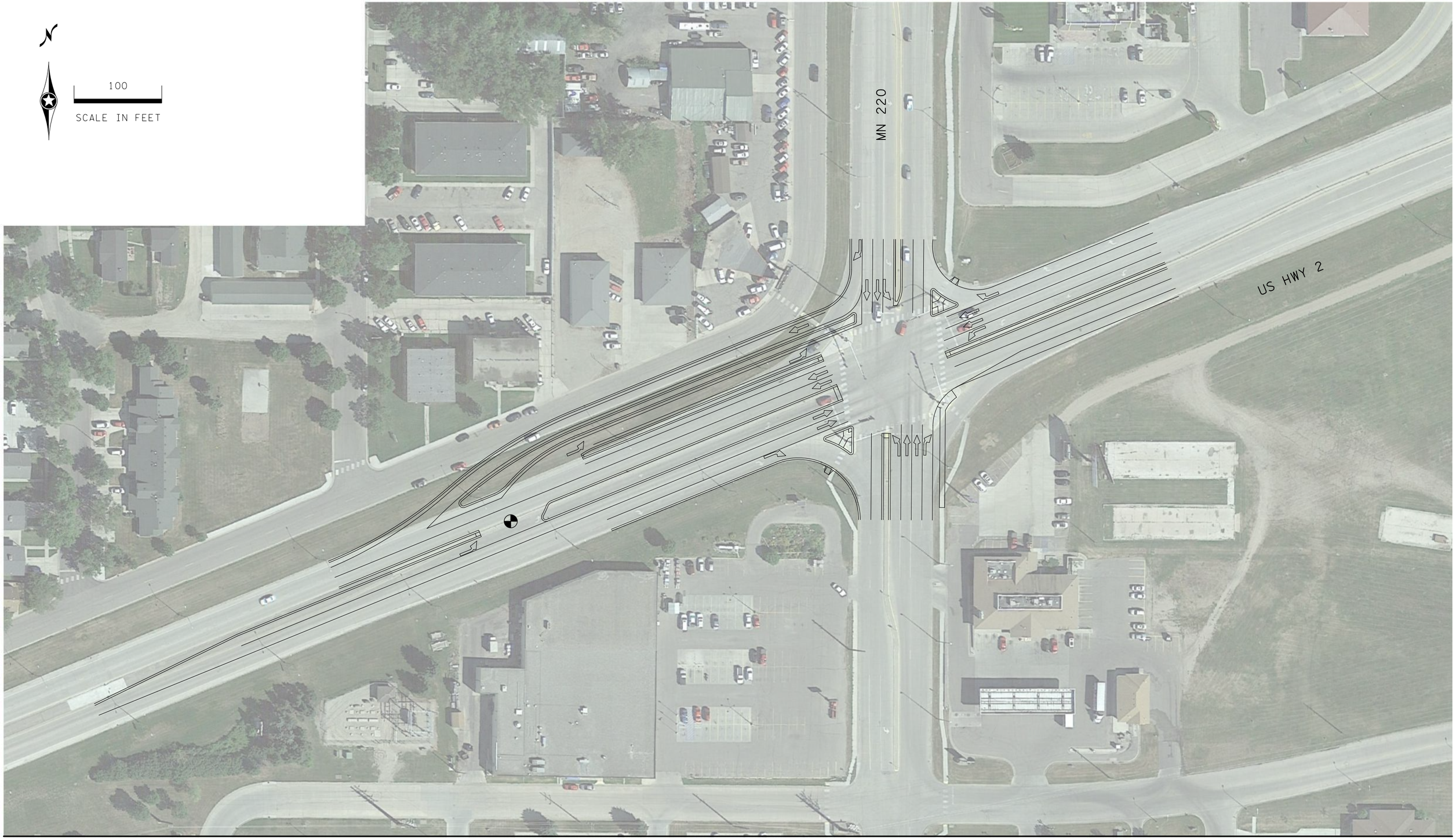
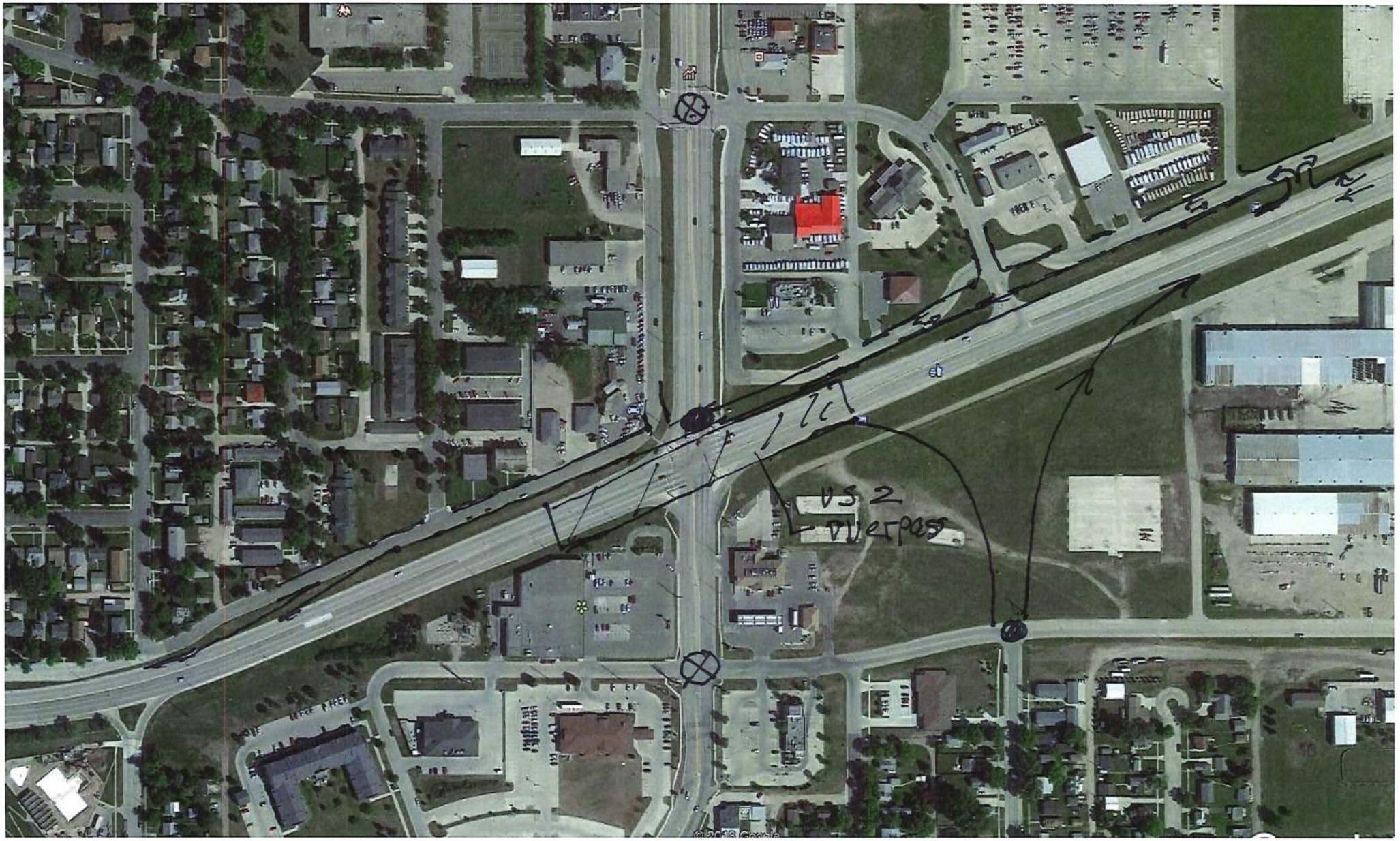
SCALE IN FEET



MN 220 Corridor Study

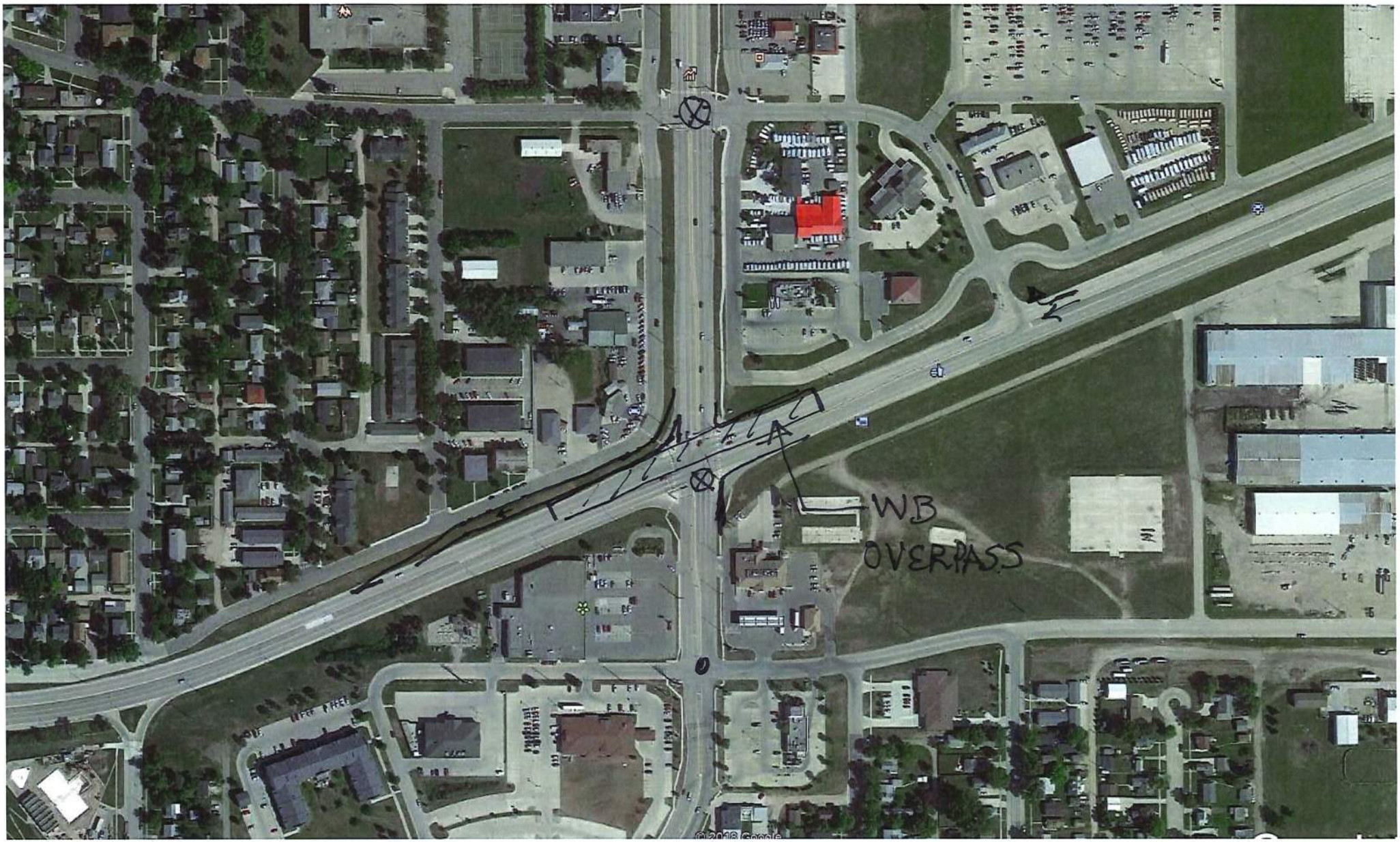
ALLIANT ENGINEERING

MN 220/US HWY 2
Alternative C - Displaced Left Turn lane



⊗ Signal

◎ Thru-Stop



⊗ Traffic Signal

⊗ Thru - Stop

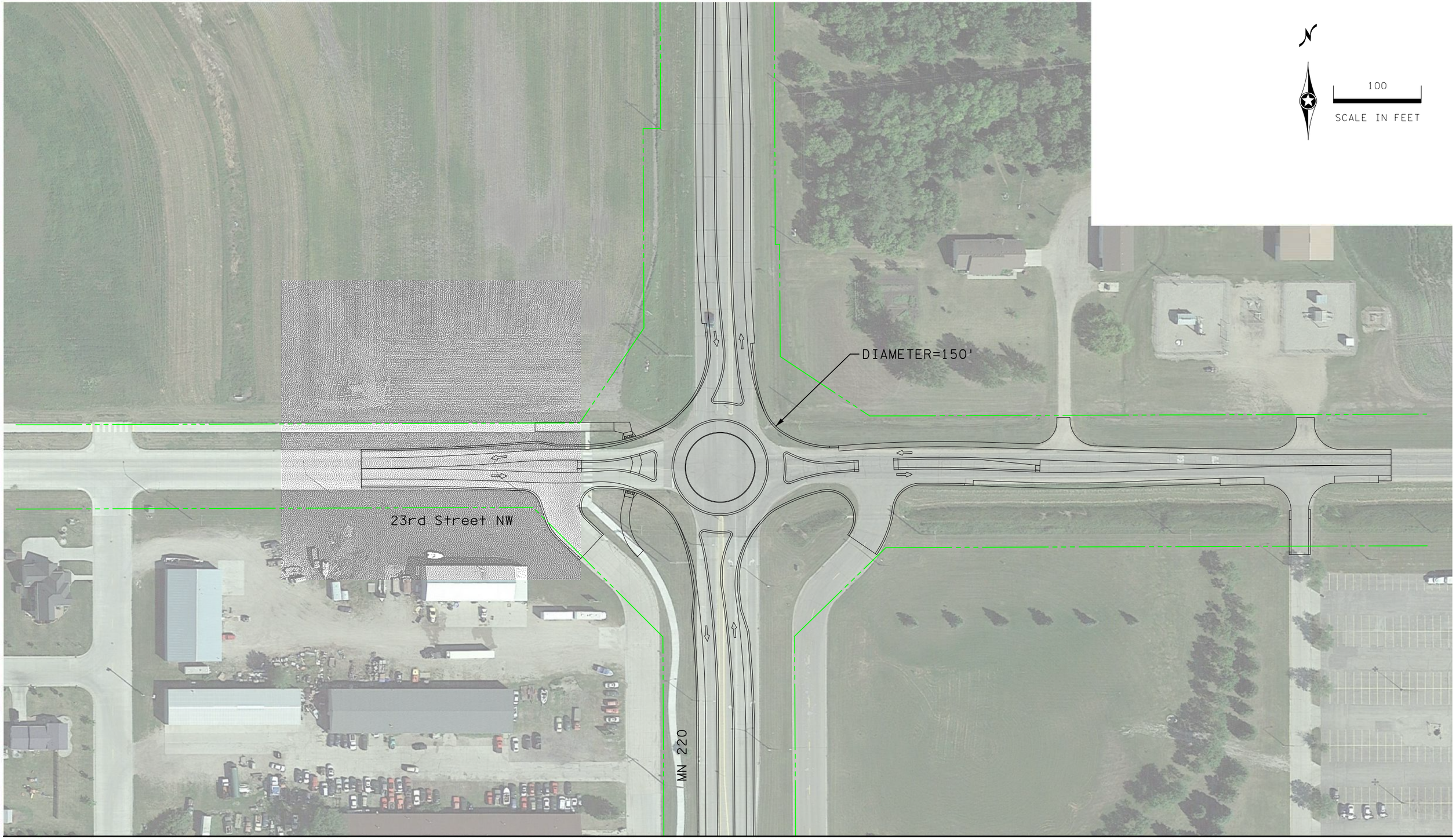
Mn 220 at 23rd Street

Alternative A: Install Traffic Signal System

Description	Options and Considerations	Pros and Cons	Comparison Summary
Install traffic signal system	• Install FYA on all approaches ○ During AM and PM peak periods, operate westbound, northbound and southbound prot/perm (operate eastbound permissive only) ○ Outside of peak periods, both eastbound/westbound operate permissive only • Provide pedestrian crossing countdown timers, crosswalks and intersection lighting •Install lane eastbound/westbound lane designation and pavement markings (1-TH/LT, 1-RT)	Pros 1. Can be designed with minor impact to street width and curbs 2. Improves left turn access onto Mn 220 3. FYA can improve motorist safety and flexibility for intersection operation, including FYA omit funcationality with pedestrian actuation 4. Familiarity 5. Compatible with long term needs of TH 220 north of 23rd Street NW 6. Compatible with current 2045 MTP Cons 1. Ongoing operation, maintenance, and electricity costs 2. Signal warrants not met until 2045 (2030 with 3/4 access configuration at 20th) 3. Expected to increase the overall intersection delay and increase the overall intersecton crash rate. Statewide average severity rate indicates a potential increase in crash severity 4. Inefficient intersection operation during off peak periods	**Cost:** Approximately $500,000 with ADA Improvements **Mobility**: LOS B (2045) **Safety:** 10% Increase in crash and severity rate **R/W:** None **20-year Traffic Operation Benefit:** (-$3,050,616) **20-year Safety Benefit:** (-$171,503) **Benefit/Cost:** <0

Alternative B: Install Single Lane Roundabout

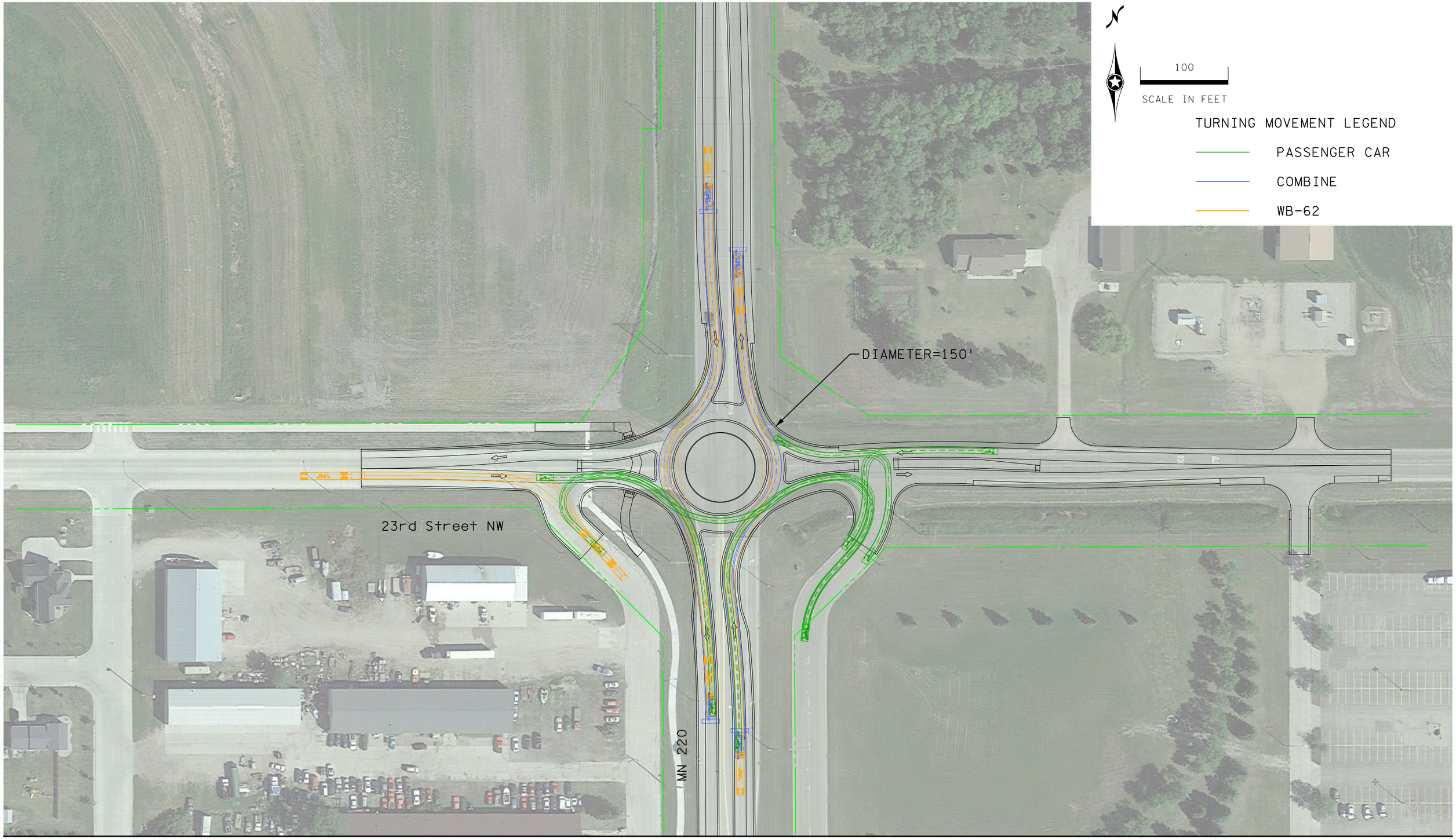
Description	Options and Considerations	Pros and Cons	Comparison Summary
Construct single lane roundabout	• Single lane is expected to operate acceptably through 2045 forecast • Special attention would be required in design for trucks and agricultural vehicles • Spacing to adjacent frontage roads may present design and/or operation challenges • Existing ditches, drainage design and storm sewer system needs	Pros 1. Greatly improves access to Mn 220 2. Provides continuous flow of traffic and improves efficiency 3. Provides traffic calming 4. Improves pedestrian crossing (reduced exposure, improved sightline) 5. Reduces overall intersection crash rate and intersection crash severity 6. Aesthetics 7. Compatible with long term needs of TH 220 north of 23rd Street NW 8. Intersection operations and delays are expectd to improve and provides the most overall efficient 24 hour operation. Cons 1. More expensive to install than a traffic signal (but may be less in long run) 2. Requires more space at intersection (but less space along road) 3. Familiarity	**Cost:** Approximately $2,950,000 **Mobility**: LOS A (2045) **Safety:** 41% reduction in crash rate. 48% reduction in severity rate **R/W:** None **20-year Traffic Operation Benefit:** $1,026,765 **20-year Safety Benefit:** $990,747 **Benefit/Cost:** 0.98



MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/23rd Street NW
Alternative B - Single Lane Roundabout



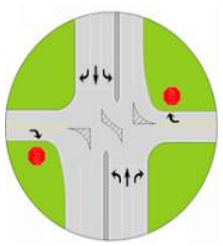
MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/23rd Street NW
Alternative B - Single Lane Roundabout
Turning Movements

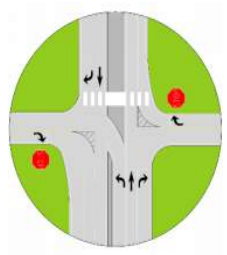
Mn 220 at 20th Street

Alternative A: Convert to 3/4 Access

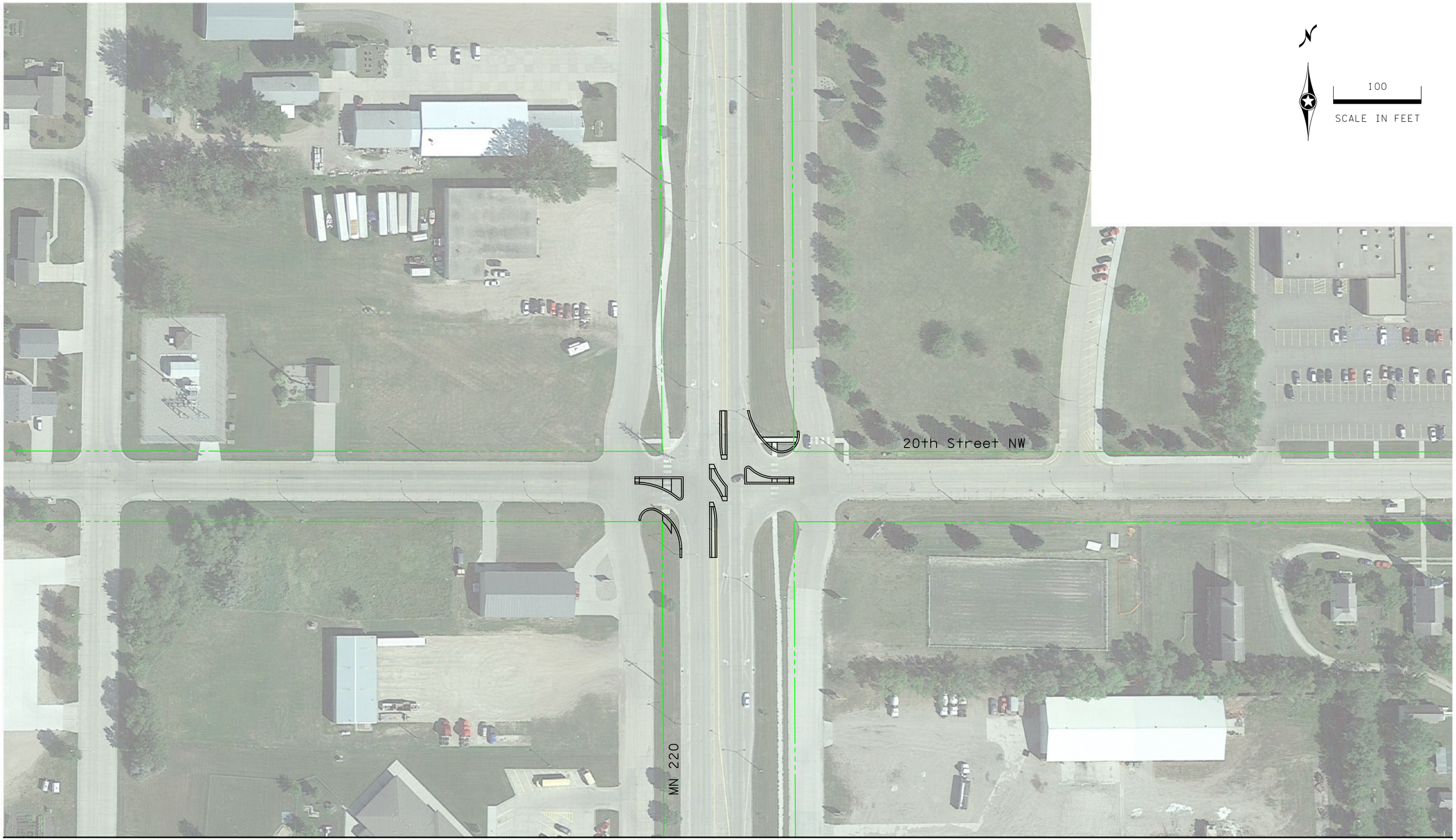


Description	Options and Considerations	Pros and Cons	Comparison Summary
Reconstruct to a 3/4 access configuration. Three-quarter intersections are an access management technique that limits cross street movements through an intersection. A median is installed in the middle of the intersection that permits all mainline through and turning movements but prevents cross-traffic through and left turn movements. **Options: Improve crosswalk on north side of intersection with markings and signing; or remove crosswalk with construction of sidewalk on east side of Mn 220 between 20th and 23rd**	• Minimal impact/inconvenience to travel routes/destinations due to connectedness of the urban network and the presence of frontage roads. • Consider curb extensions to minimize pedestrian crosswalk distance on the north leg • Consider installation of a sidewalk on the east side of Mn 220 to reduce need for pedestrians to cross at this intersection to continue north/south (could remove north leg crosswalk) • Redistributed left/through movements help satisfy traffic signal warrants at 23rd Street NW and 17th Street NW	Pros 1. Will improve safety by decreasing conflict points and removing right angle type crash occurrences currently being experienced 2. All work can be done within the existing ROW 3. Minimal ongoing maintenance 4. Improves overall quality of access along Mn 220 5. Expected to provide LOS A operation through forecast 2045 conditions Cons 1. Will increase the utilization of the frontage road system and could unnecessarily increase traffic volumes and turning movements on other minor roads 2. Public/business perception of reduced access	**Cost:** Approximately $350,000 **Mobility**: LOS A **Safety**: Reduced Crash Rate (Reduces Right Angle Crashes) **R/W:** None **20-year Traffic Operation Benefit:** NA **20-year Safety Benefit:** NA **Benefit/Cost:** NA

Alternative B: Convert to 3/4 Access and also Prohibit Southbound Left Turns



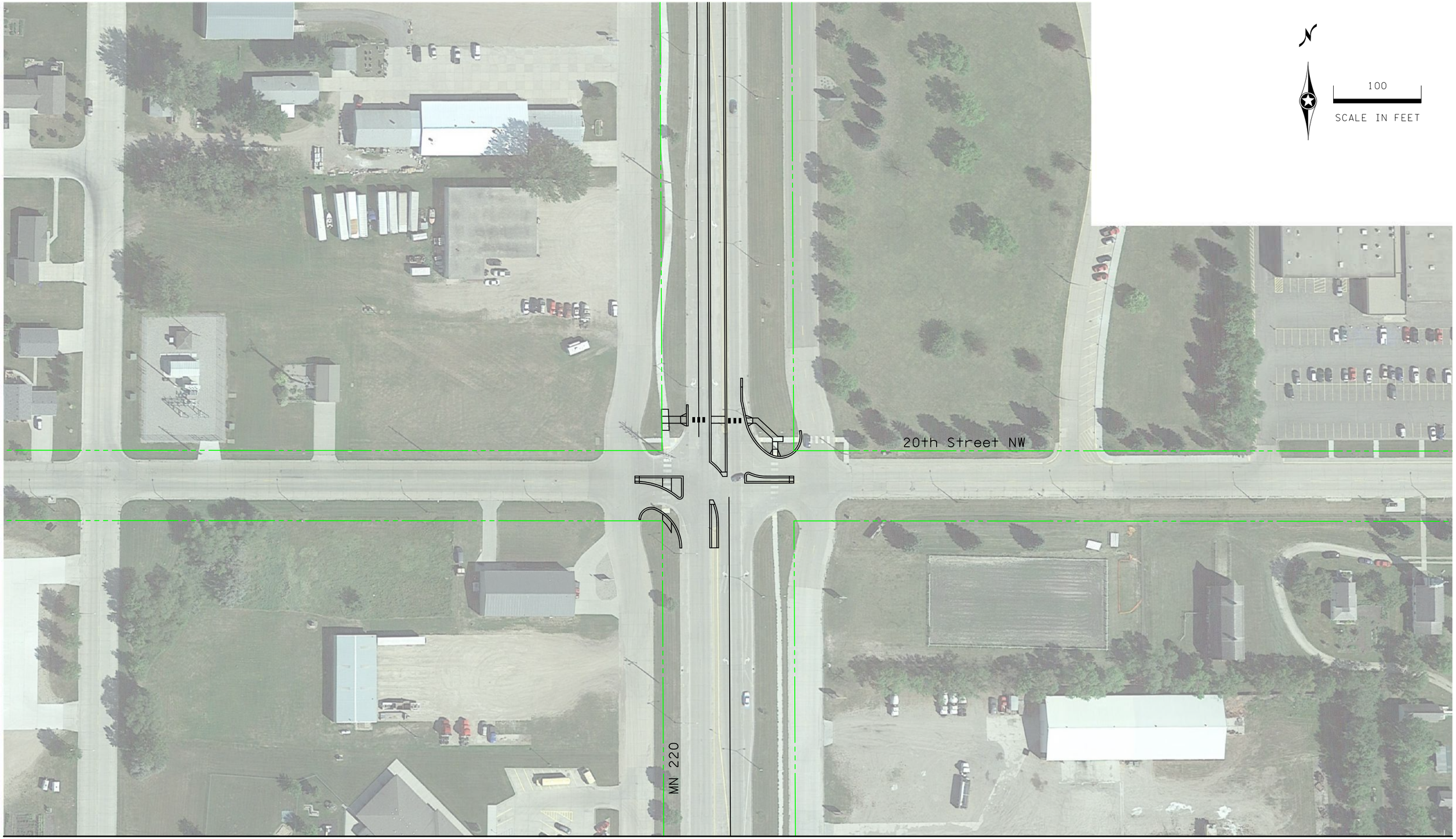
Description	Options and Considerations	Pros and Cons	Comparison Summary
3/4 access configuration, but also prevents the southbound left turning movement to provide for a wide pedestrian refuge median. **Improve crosswalk on north side of intersection with markings and signing.**	• Minimal impact/inconvenience to travel routes/destinations due to connectedness of the urban network and the presence of frontage roads. • Consider curb extensions to minimize pedestrian crosswalk distance on the north leg • Removing the southbound left turn allows for a wide median refuge island for pedestrians. Greatly reducing crossing exposure and potential conflicts. • Reduces need for the installation of a sidewalk on the east side of Mn 220 to reduce need for pedestrians to cross at this intersection to continue north/south. • Redistributed left/through movements help satisfy traffic signal warrants at 23rd Street NW and 17th Street NW • Best compatibility with 2-lane segment to the north of 20th Street, 2-lane or 4-lane (right turn lane drop) to the south	Pros 1. Will improve safety by decreasing conflict points and removing right angle type crash occurrences currently being experienced 2. All work can be done within the existing ROW 3. Greatly improves the pedestrian crossing 4. Minimal ongoing maintenance 5. Improves overall quality of access along Mn 220 6. Expected to operate at a LOS A through forecast 2045 conditions Cons 1. Expected ton increase utilization of the frontage roads and could unnecessarily increase traffic volumes and turning movements on other minor roads 2. Public/business perception of reduced access	**Cost:** Approximately $600,000 **Mobility**: LOS A **Safety**: Reduced Crash Rate (Reduces Right Angle Crashes) **R/W:** None **20-year Traffic Operation Benefit:** NA **20-year Safety Benefit:** NA **Benefit/Cost:** NA



MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/20th Street NW
Alternative A - 3 / 4 Access with SB & NB Left Turn



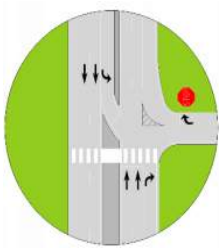
MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/20th Street NW
Alternative B - 3 / 4 Access with NB Left Turn

Mn 220 at 15th Street

Alternative A: Convert to 3/4 Access



Description	Options and Considerations	Pros and Cons	Comparison Summary
Reconstruct intersection to a 3/4 access configuration. Three-quarter intersections are an access management technique that limits cross street movements through an intersection. A median is installed in the middle of the intersection that permits all mainline through and turning movements but prevents cross-traffic through and left turn movements. **Option: Establish crosswalk on south side of the intersection.**	• Minimal impact/inconvenience to travel routes/destinations due to connectedness of the urban network and the presence of frontage roads. • Consider curb extension on the west side (fill in shoulder) to minimize pedestrian crosswalk distance on the south leg • Reconstruct the median to provide for a wide median refuge island for pedestrians. Greatly reducing crossing exposure and potential conflicts. • Redistributed left movements help satisfy traffic signal warrants at 17th Street NW	Pros 1. Will improve safety by decreasing conflict points and removing right angle type crash occurrences currently being experienced 2. All work can be done within the existing ROW 3. Greatly improves the pedestrian crossing whether marked or unmarked 4. Minimal ongoing maintenance 5. Improves overall quality of access along Mn 220 Cons 1. Will increase the utilization of the frontage road and could unnecessarily increase traffic volumes and turning movements on other minor roads 2. Public/business perception of reduced access	**Cost:** Approximately $490,000 **Mobility**: LOS A (2045) **Safety**: Reduced Right Angle Crashes **R/W:** None **20-year Traffic Operation Benefit:** NA **20-year Safety Benefit:** NA **Benefit/Cost:** NA

Alternative B: Establish Crosswalk with Pedestrian Refuge

Description	Options and Considerations	Pros and Cons	Comparison Summary
Maintain full access intersection and add crosswalk with wide pedestrian median on south leg.	• Provide high visibility crosswalk markings and pedestrian crosswalk signing • Maintain full access if median closure of frontage road is necessary for the roundabout alternative at 17th Street to provide best network circulation • Consider curb extension on the west side (fill in shoulder) to minimize pedestrian crosswalk distance on the south leg • Reconstruct the median to provide for a wide median refuge island for pedestrians. Greatly reducing crossing exposure and potential conflicts.	Pros 1. All work can be done within the existing ROW 2. Establihes pedestrian crosswalk and improves the pedestrian crossing distance and reduces exposure 3. Minimal ongoing maintenance Cons 1. Does not meet 1/4 mile full access spacing guidelines	**Cost:** Approximately $350,000 **Mobility:** LOS C (2045) **Safety:** No Change **R/W:** None **20-year Traffic Operation Benefit:** NA **20-year Safety Benefit:** NA **Benefit/Cost:** NA

MN 220 Corridor Study

ALLIANT ENGINEERING

MN 220/15th Street NE

Alternative A - 3 / 4 Access Configuration with Pedestrian Crossing

Mn 220 at 10th Street

Convert to 3/4 Access

Description	Options and Considerations	Pros and Cons	Comparison Summary
Reconstruct to a 3/4 access configuration. Three-quarter intersections are an access management technique that limits cross street movements through an intersection. A median is installed in the middle of the intersection that permits all mainline through and turning movements but prevents cross-traffic through and left turn movements.	• Business access will potentially be significantly impacted. • Would likely necessitate the extension of 10th St NW to 5th Ave NW to provide reasonable service to all movements.	Pros 1. Will improve safety by decreasing conflict points 2. All work can be done within the existing ROW 3. Minimal ongoing maintenance 4. Will improve the overall intersection operation (reduce delays) Cons 1. Could unnecessarily increase traffic volumes and turning movements on other minor roads 2. Potential for increased U-turn related crashes 3. Public/business perception of reduced access	**Cost:** NA **Mobility:** LOS A **Safety:** Reduced Right Angle Crashes **R/W:** None **20-year Traffic Operation Benefit:** NA **20-year Safety Benefit:** NA **Benefit/Cost:** NA

MN 220 Corridor Study

ALLIANT ENGINEERING

9th Street NE/10th Street NE
Alternative 1 - Restriping