

US 2/US 81 SKEWED INTERSECTION STUDY

EXISTING and FUTURE CONDITIONS

Grand Forks, ND
February 2019



ENGINEERING, REIMAGINED

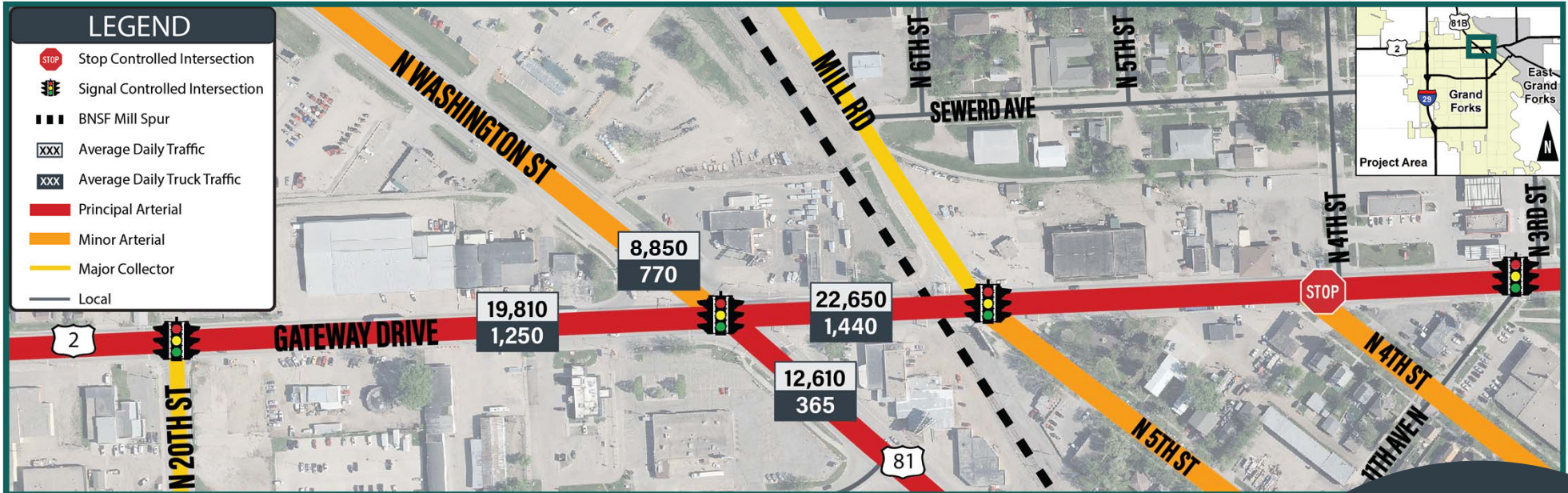


AGENDA

- Study Goals
- Steering Committee Issues and Concerns
- Existing Conditions
- Future Conditions
- Environmental Conditions
- Alternatives Brainstorming

Study Area

Pg. 1



➤ Known Issues and Conflicts;

- Intersection skew makes turning movements for trucks difficult.
- Mill spur railroad crossing creates traffic blockages and queuing issues.
- Opportunities for improved pedestrian, bicycle and transit conditions.

What are the key issues and concerns to you?



Existing Conditions

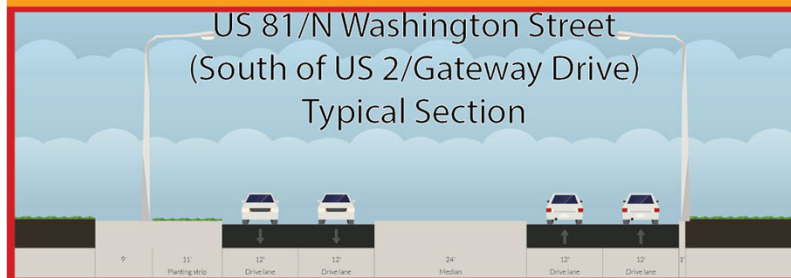
N WASHINGTON ST



2

N 20TH ST

Typical Sections



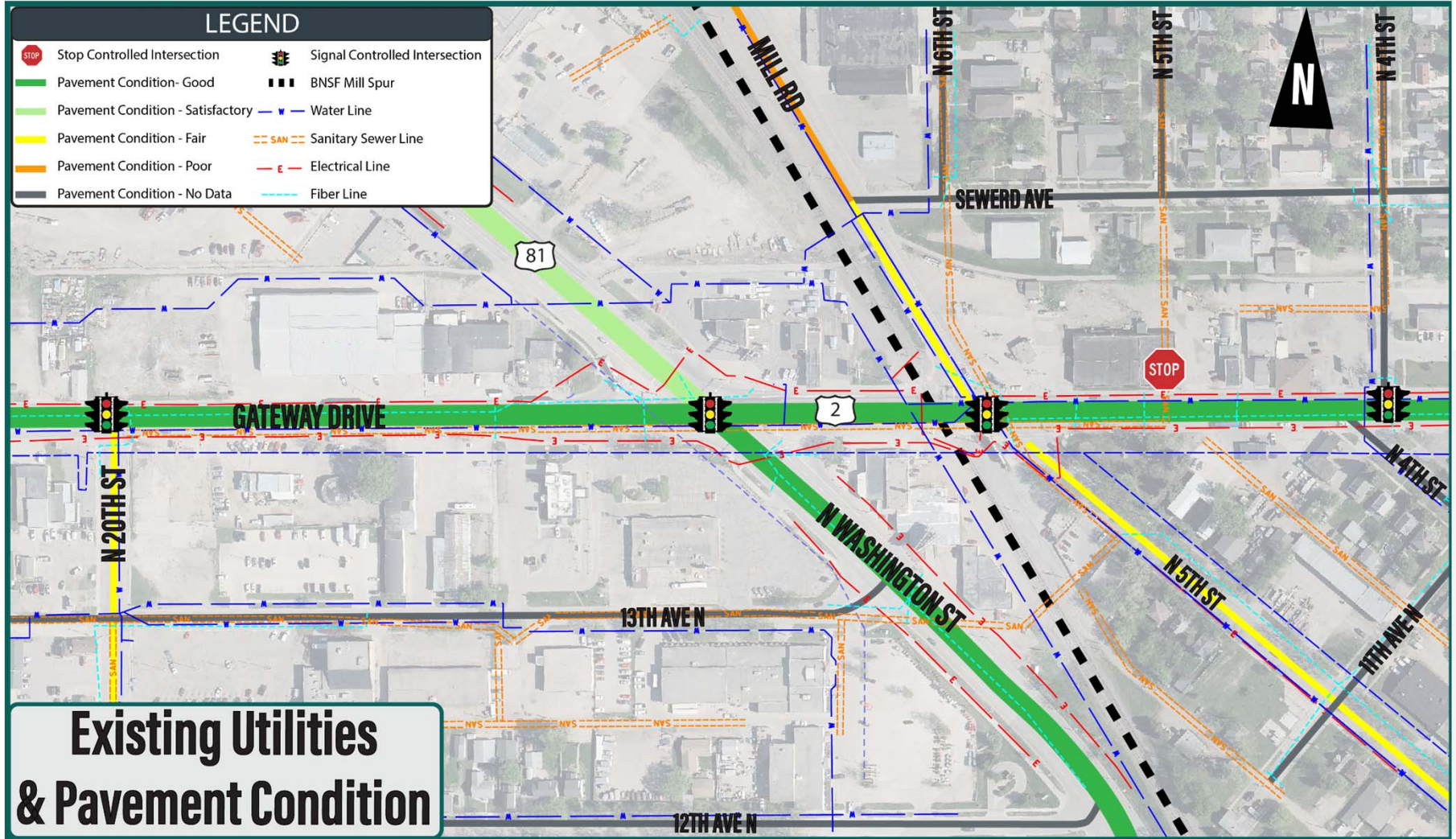
Principal Arterial Minor Arterial

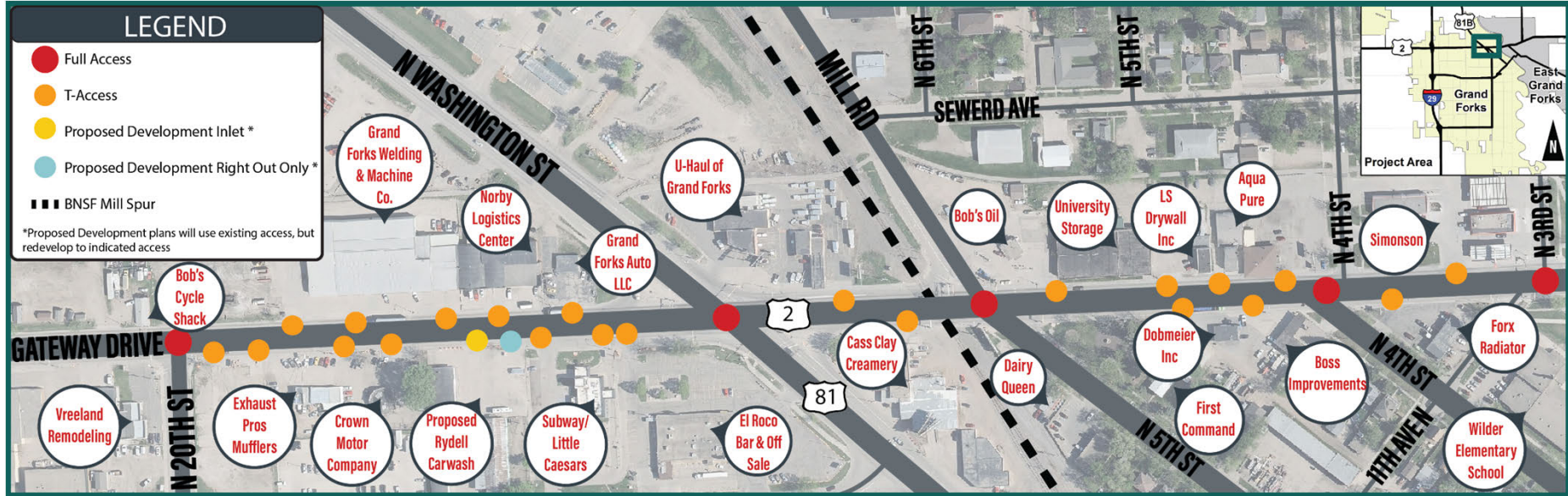
Right-Of-Way

Pg. 3



- US2/Gateway Drive : 70 feet
- US 81/Washington Street : 20 feet on east side, 60 feet of west side





- Unsignalized driveways
 - Increase crash rate by 2%
 - Reduces corridor travel speed by 0.25 MPH

- Desired Access Spacing
 - 660 feet
 - 8 access/mile
- Existing Access Spacing
 - 33 accesses
 - 66 access/mile (8x Standard)

Mill Spur Crossing

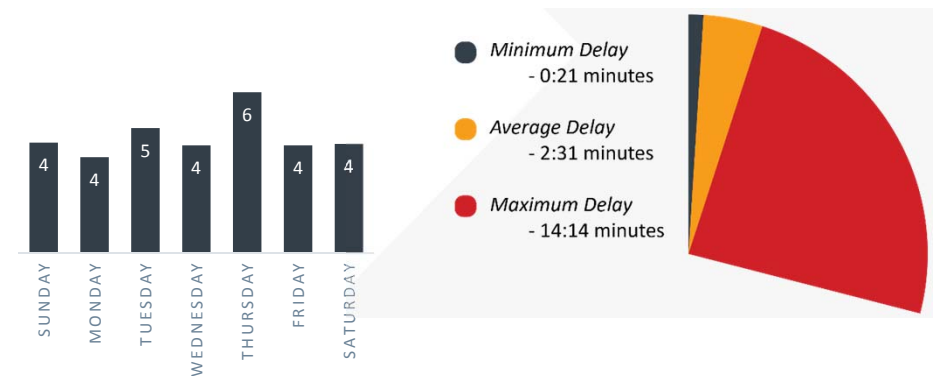
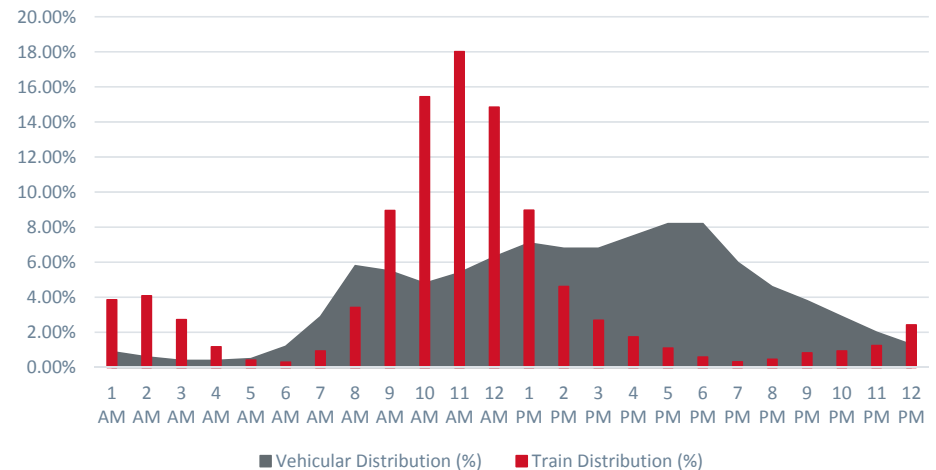
- Safety
 - 12 crashes between 1975-1994
 - No crashes since 1994
- Crossing Exposure
 - 90,600
 - 500,000 threshold for grade separation
- Crash Prediction
 - 0.028 crashes per year (FRA)
 - 5th highest rate in City
 - 7th highest rate in County



Train Activity

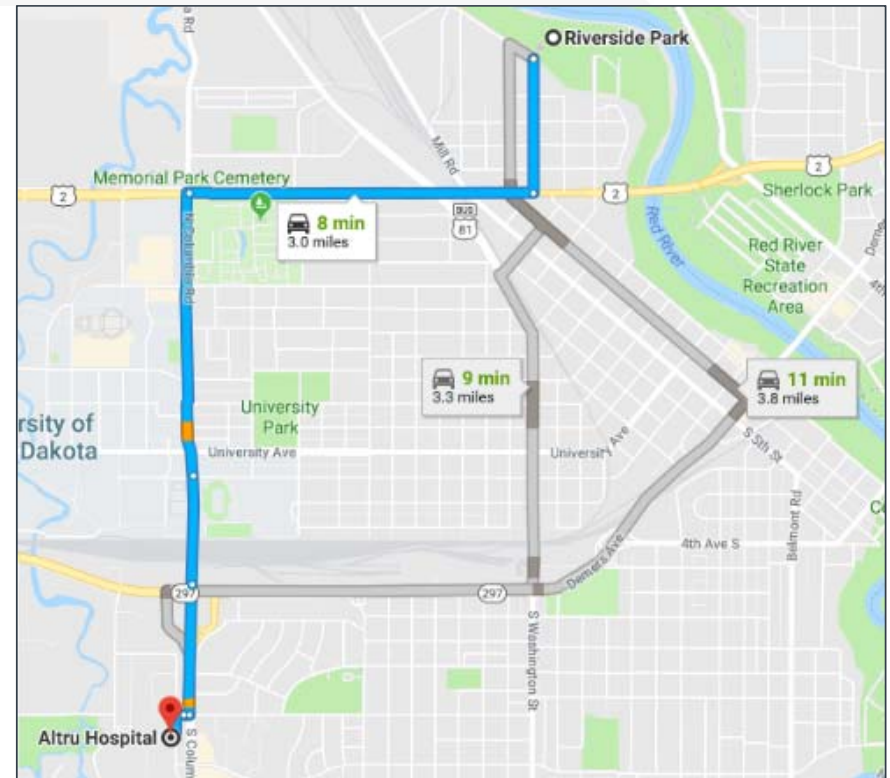
Pg. 6,7

- 4 to 5 trains per day
 - Consistent Between City and FRA Data
 - 10 MPH average, 20 MPH max
 - NDSM to add unit trains
- Rail Delay Estimates
 - 89 Hours/Day
 - 2,670 Hours/Month
 - 32,396 Hours/Year
 - Meet FHWA Grade Separation Guidance



Emergency Responders

- Average train blockage is 2:31
 - Brain damage in four to six minutes when heart stops
 - Altru Hospital provides emergency service to East Grand Forks and surrounding area



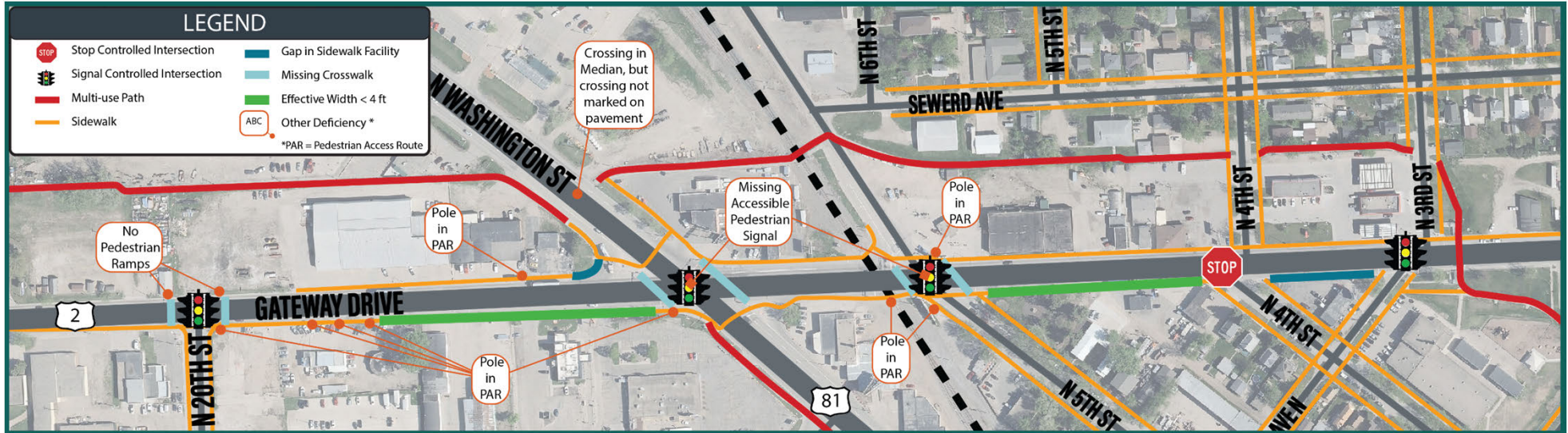
Emergency Responders

- Average train blockage is 2:31
 - Fires can double every 60 seconds
 - Goal to reach every address within four minutes



Pedestrian Amenities

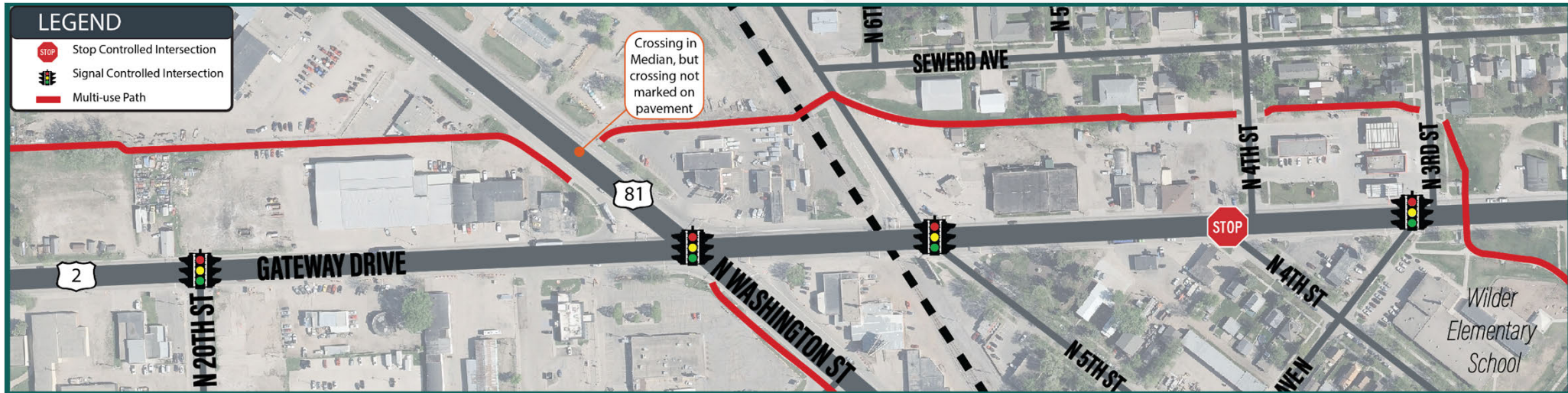
Pg. 9,10



- Only controlled crossing at 3rd Street underpass
- ADA conflicts at crosswalks, utilities and driveways
- Minimal to no buffer



Bicycle Amenities



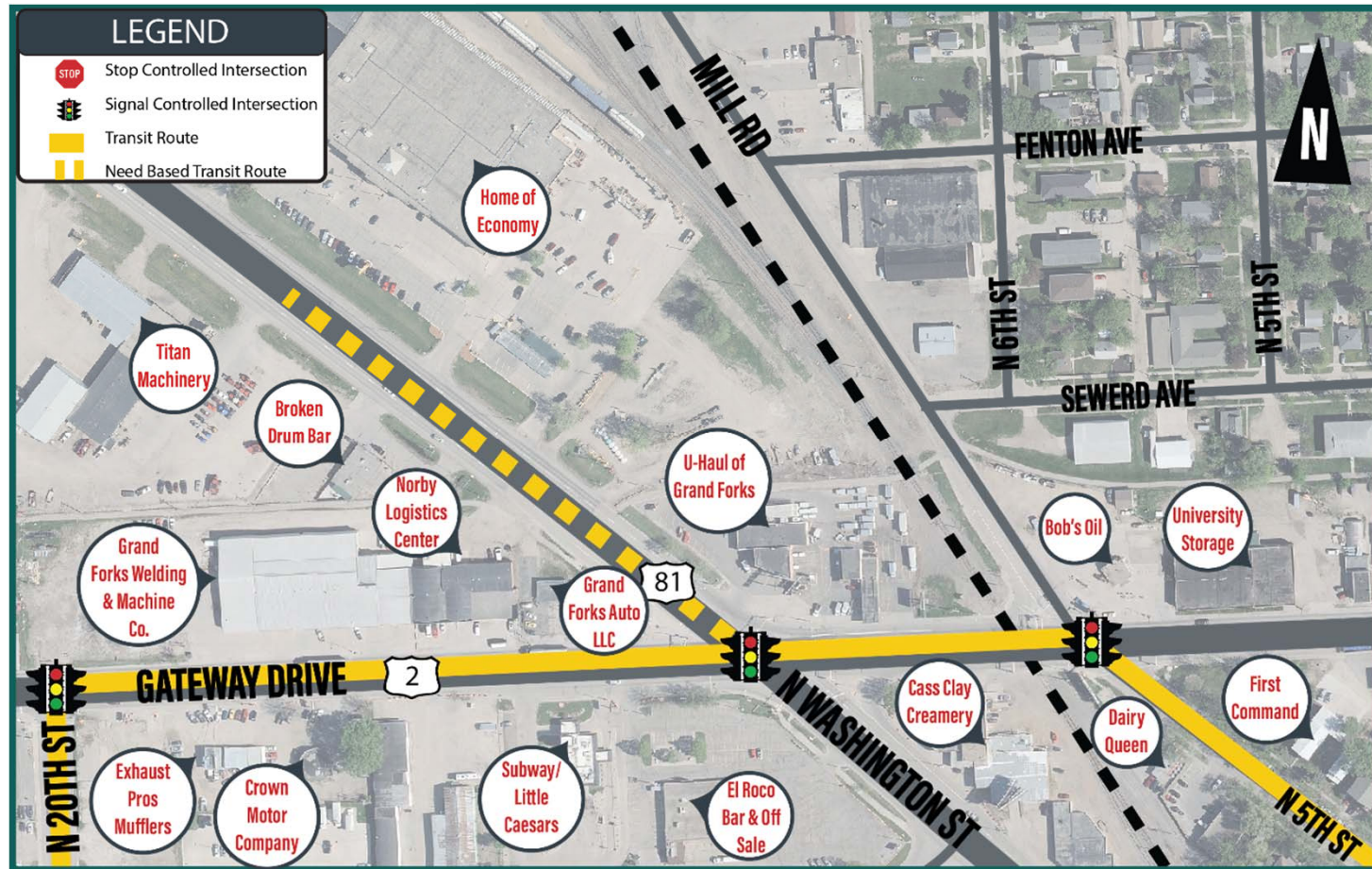
➤ Connections

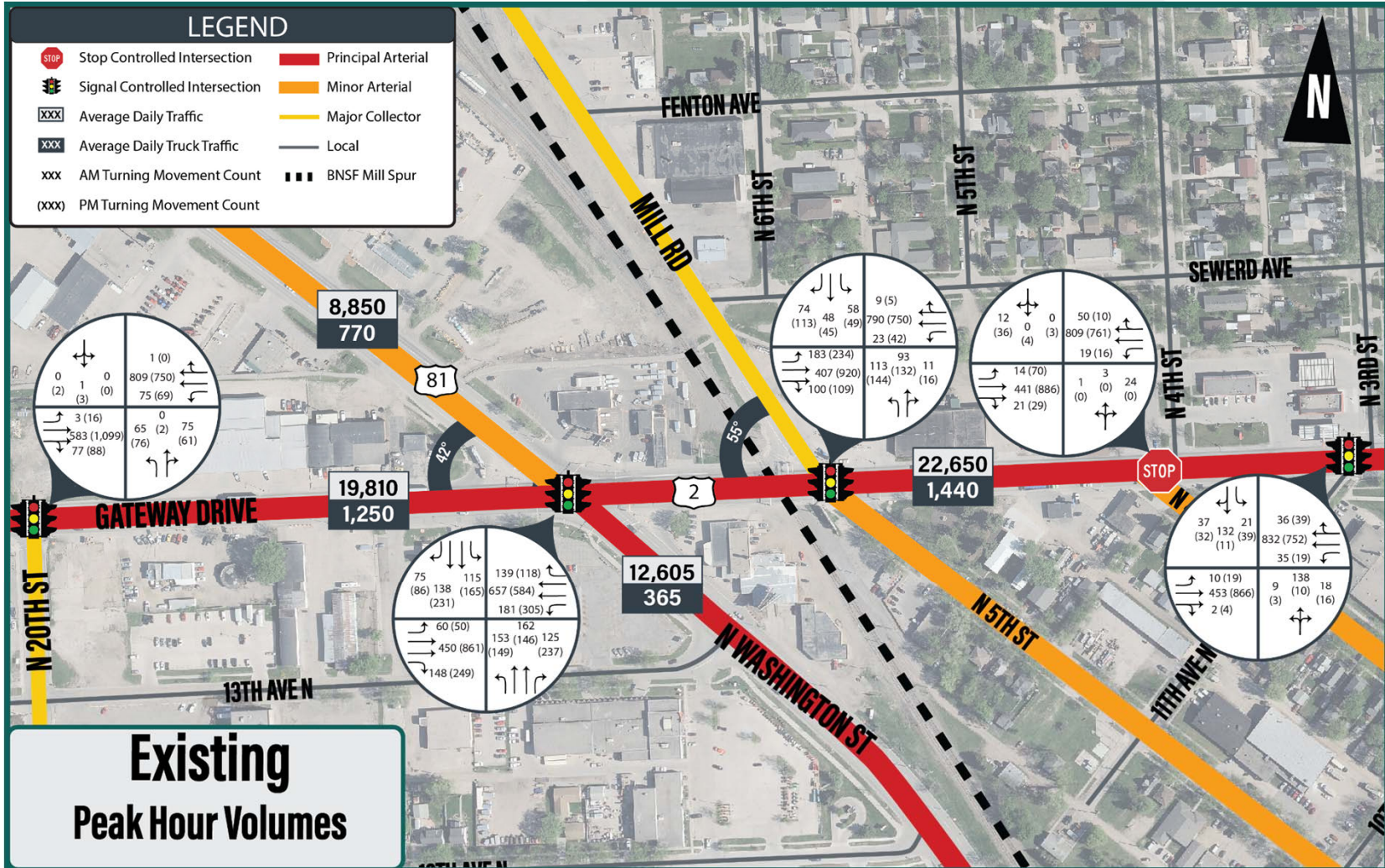
- 3rd Street and Red River Greenway to the east
- Columbia Road to the west
- No traffic control to cross US 2/Washington Street
- Underpass at 3rd Street



Transit Amenities

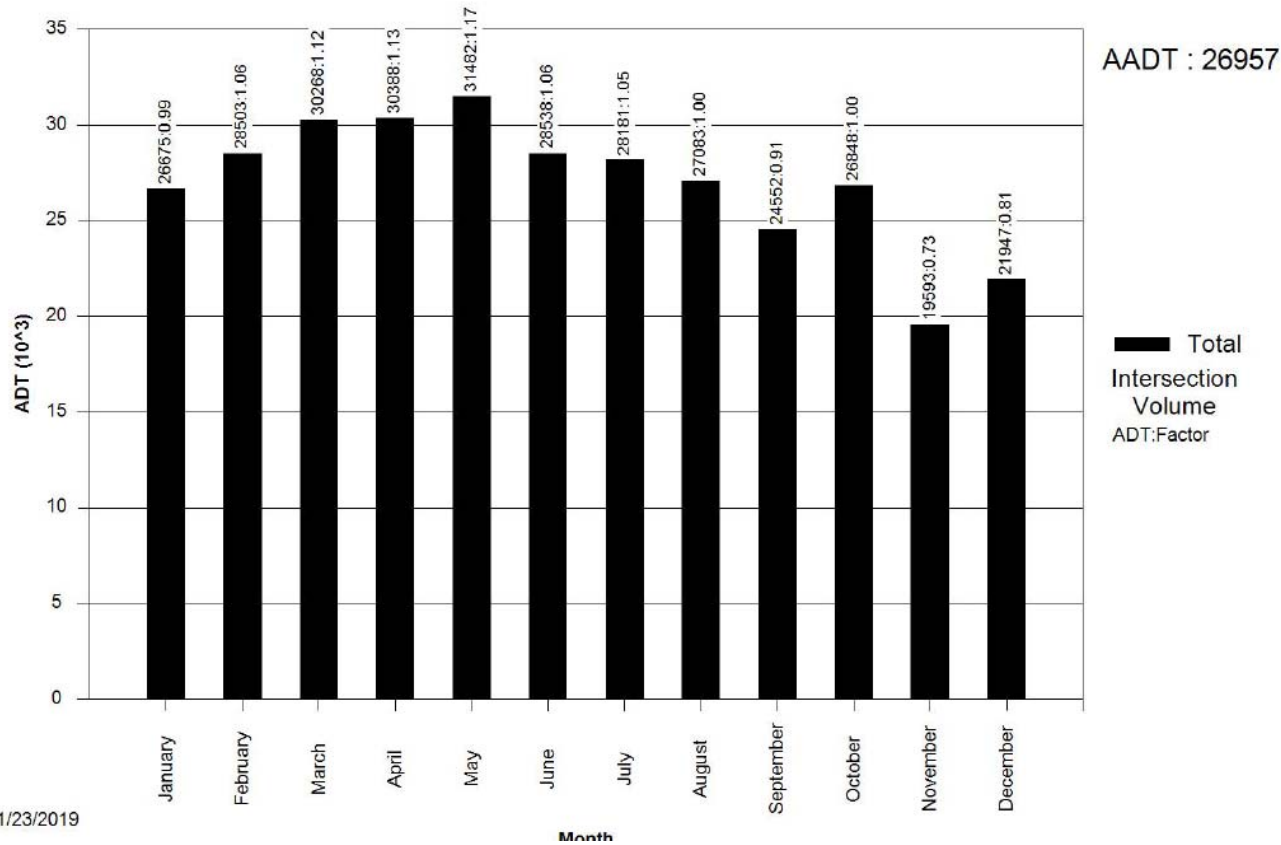
- CAT Route 2
 - Hourly service
- Stops
 - 5th Street/10th Ave
 - Hugo's on 20th St
 - Home of Economy when scheduled in advance
- Requires vehicular, pedestrian, and bicycle system efficiency



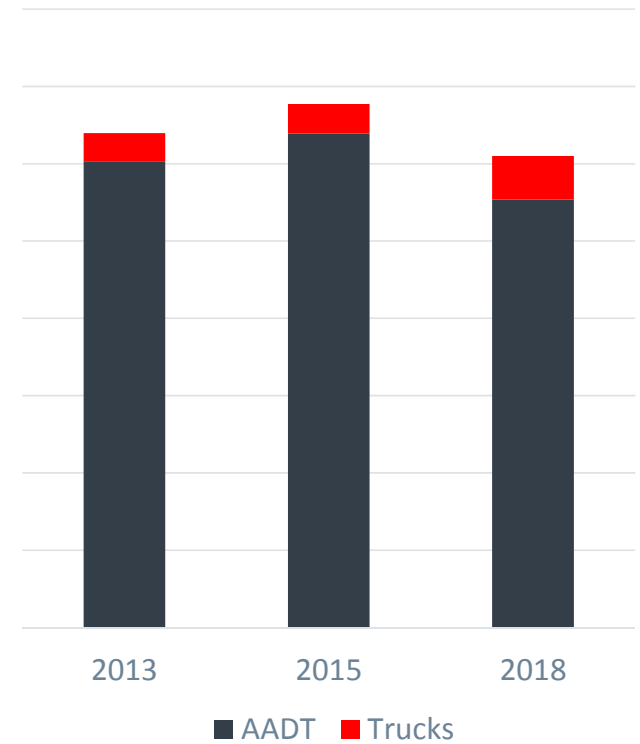


Traffic Variation

Monthly Variation

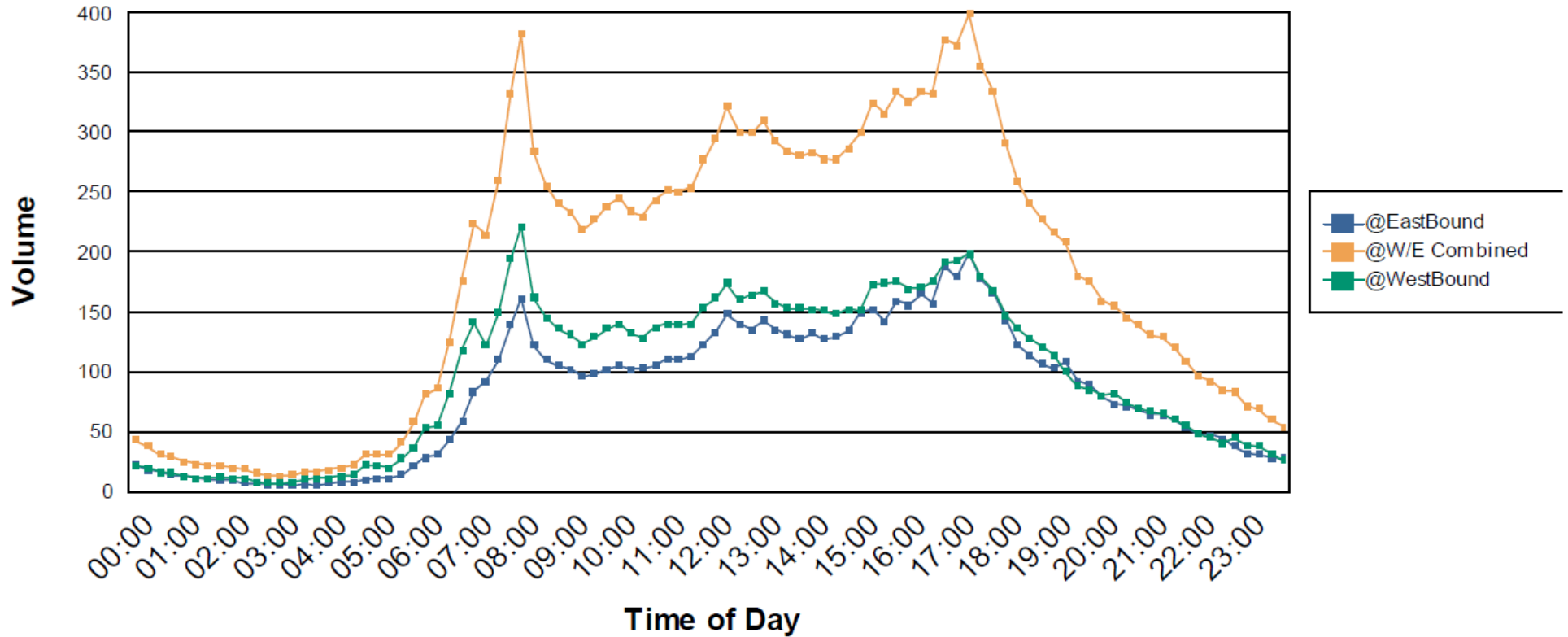


Yearly Variation



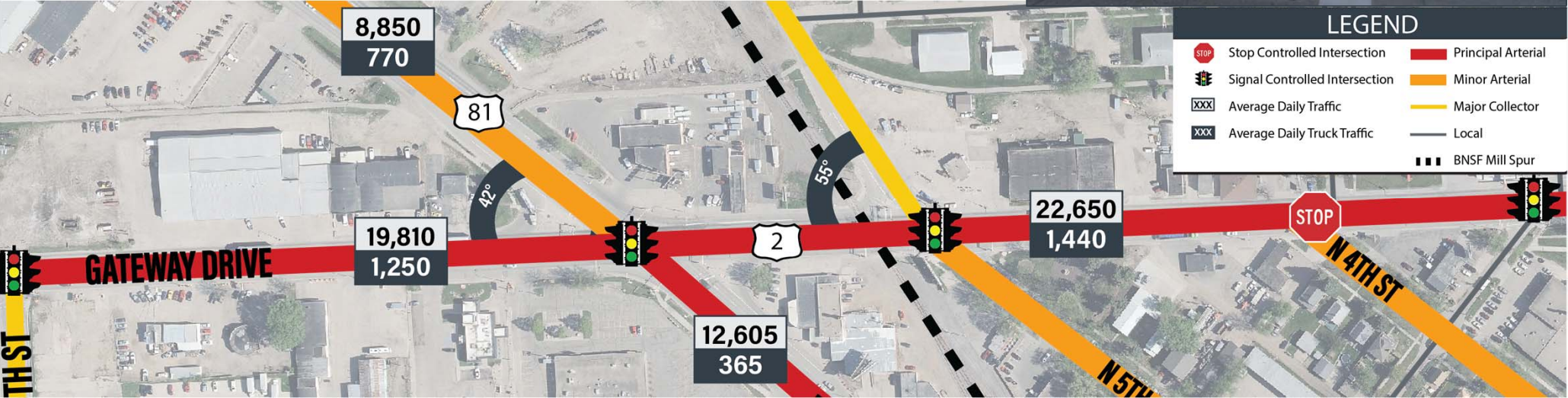
Daily Volume Profile

Volume Profile Along Gateway Drive (Weekdays)
During 1/1/2017 - 12/30/2017
Effective Number of Days: 260



Truck Traffic

- > Level One Freight System with international connections
- > Skewed intersections
- > 1,200-1,500 trucks per day
 - > Trucks per day > 1,500 during sugar beet harvest season
 - > NDSM processes/ships 5M pounds of products daily



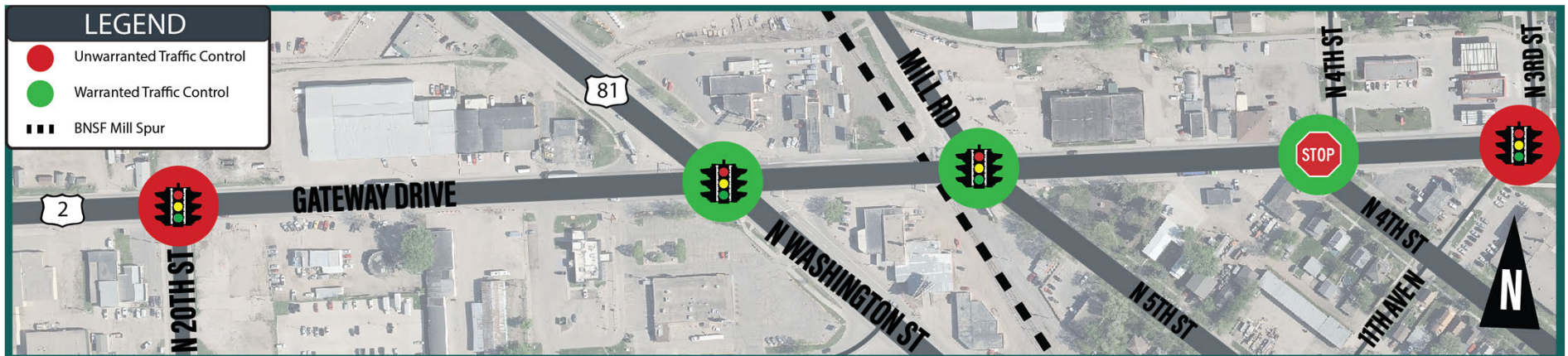
Existing Traffic Control Analysis

- > Traffic Control Warrants based on MUTCD
- > Removal of unwarranted signals reduces
 - > All crashes by 24%
 - > Injury crashes by 54%
 - > Right angle crashes by 24%
 - > Rear end crashes by 29%



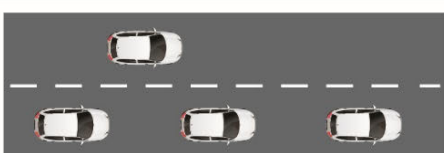



Intersection	Existing Traffic Control	Warrants Met (Hours Met/Required)			
		1A	1B	2	3
20th Street	Signal	0/8	0/8	0/4	0/1
US 81/ Washington Street	Signal	8/8	8/8	4/4	1/1
Mill Road/5th Street	Signal	0/8	8/8	4/4	1/1
4th Street	Thru/Stop	0/8	0/8	0/4	0/1
3rd Street/11th Ave	Signal	0/8	1/8	1/4	0/1

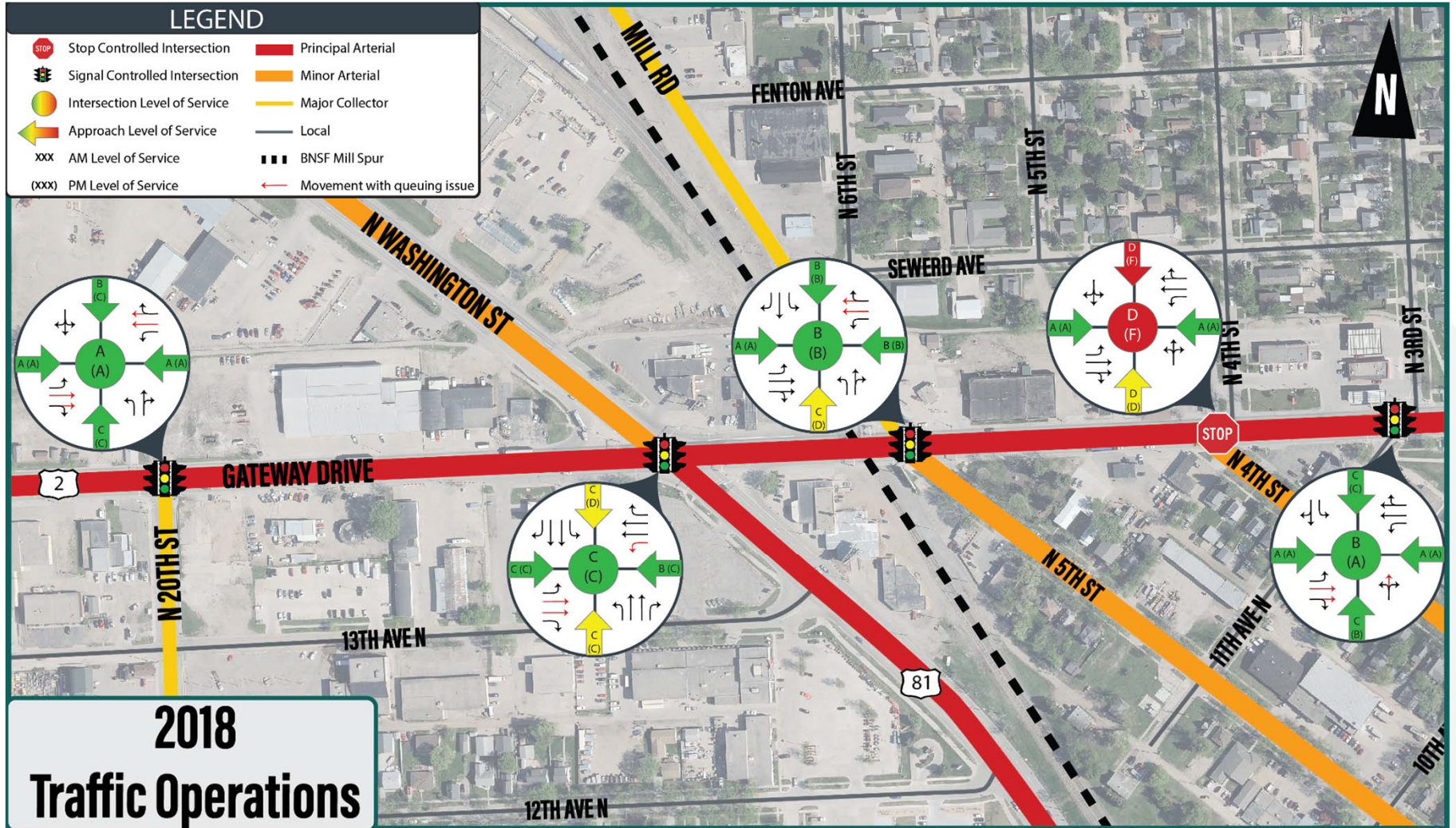
Warrant 1a: Minimum Vehicular Volume
 Warrant 1b: Interruption of Continuous Traffic
 Warrant 2: Four-Hour Vehicular Volume

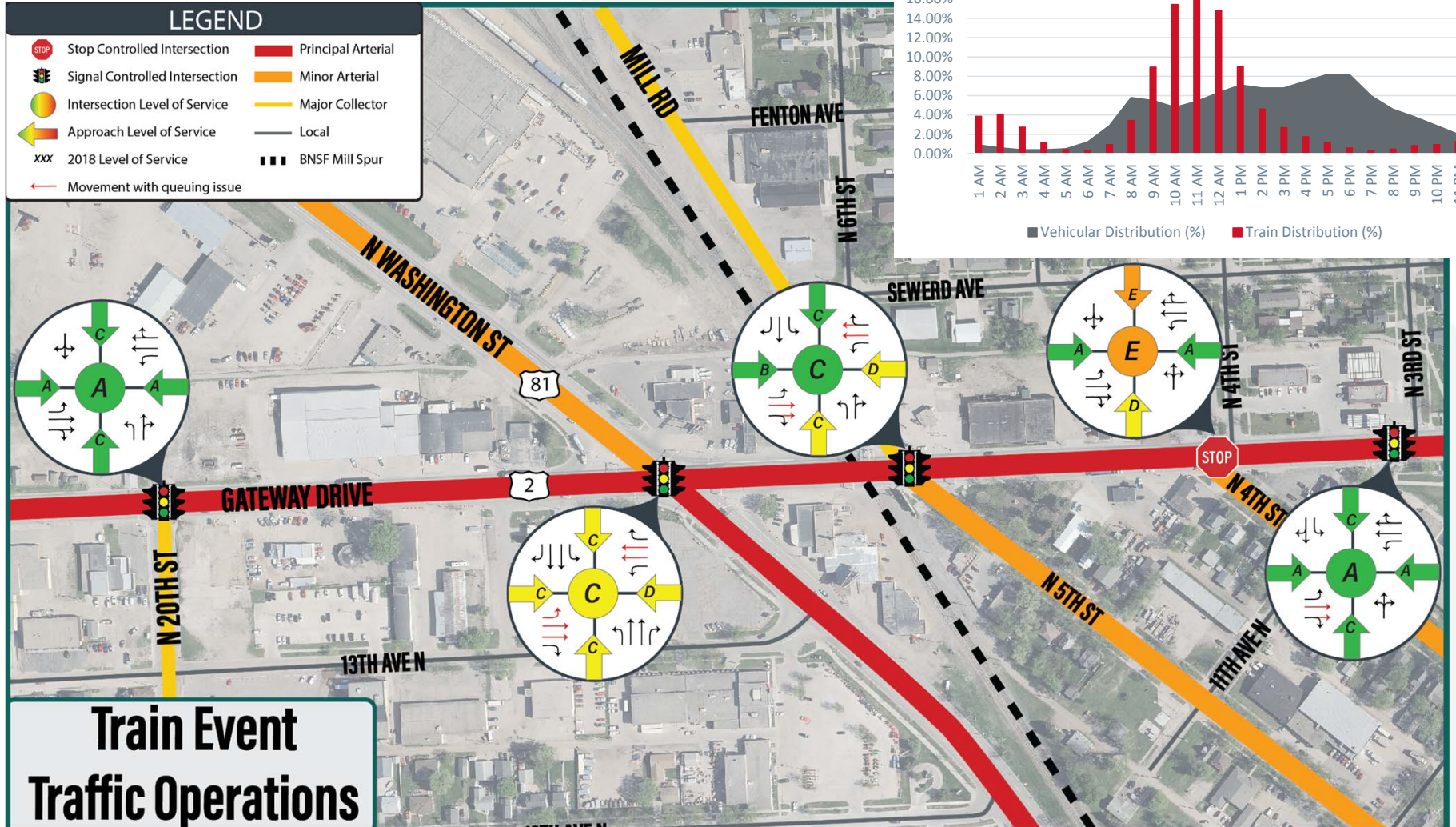
Warrant 3: Peak Hour Vehicular Volume
 Warrant 9: Intersection Near a Grade Crossing



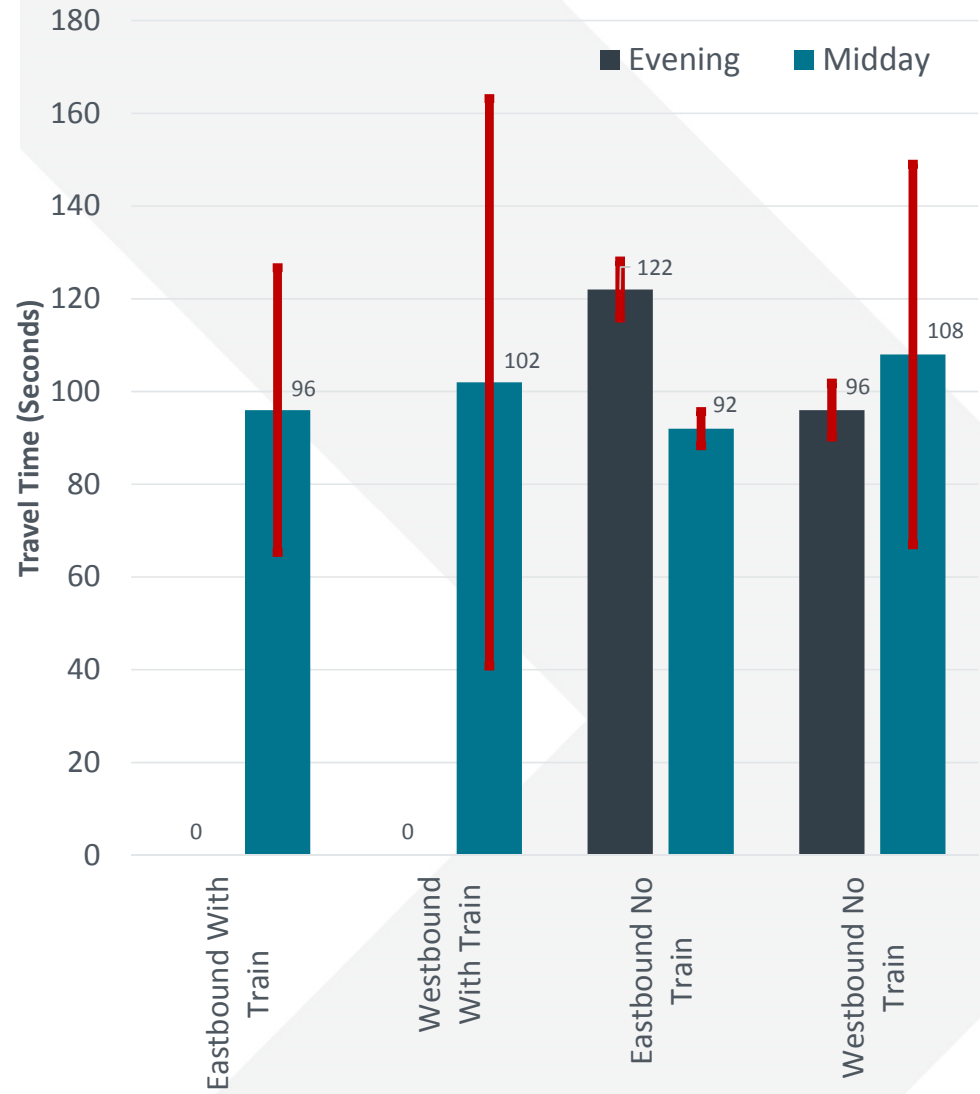
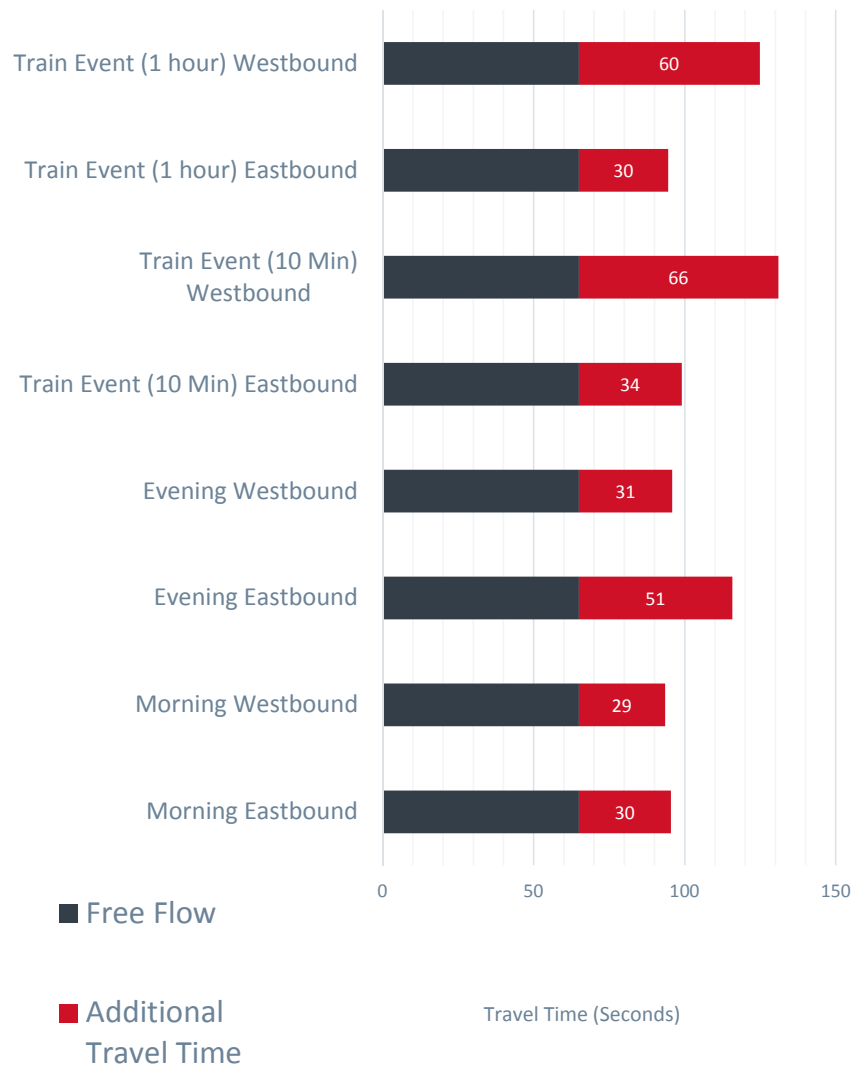
Traffic Operations

CAPACITY	TRAFFIC FLOW	DESCRIPTION
Under		LOS A - FREE FLOW Low volumes and no delays.
		LOS B - STABLE FLOW Low volumes and speeds dictated by travel conditions.
		LOS C - STABLE FLOW Speeds and maneuverability closely controlled due to higher volumes.
Approaching		LOS D - RESTRICTED FLOW Higher density traffic restricts maneuverability and volumes approaching capacity.
At		LOS E - UNSTABLE FLOW Low speeds, considerable delays, and volumes at or slightly over capacity.
Over		LOS F - FORCED FLOW Very low speeds, volumes exceed capacity, and long delays with stop-and-go traffic.

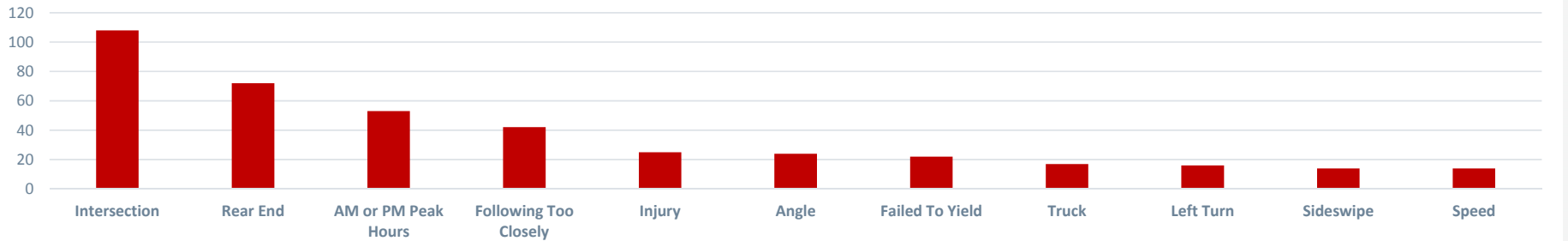
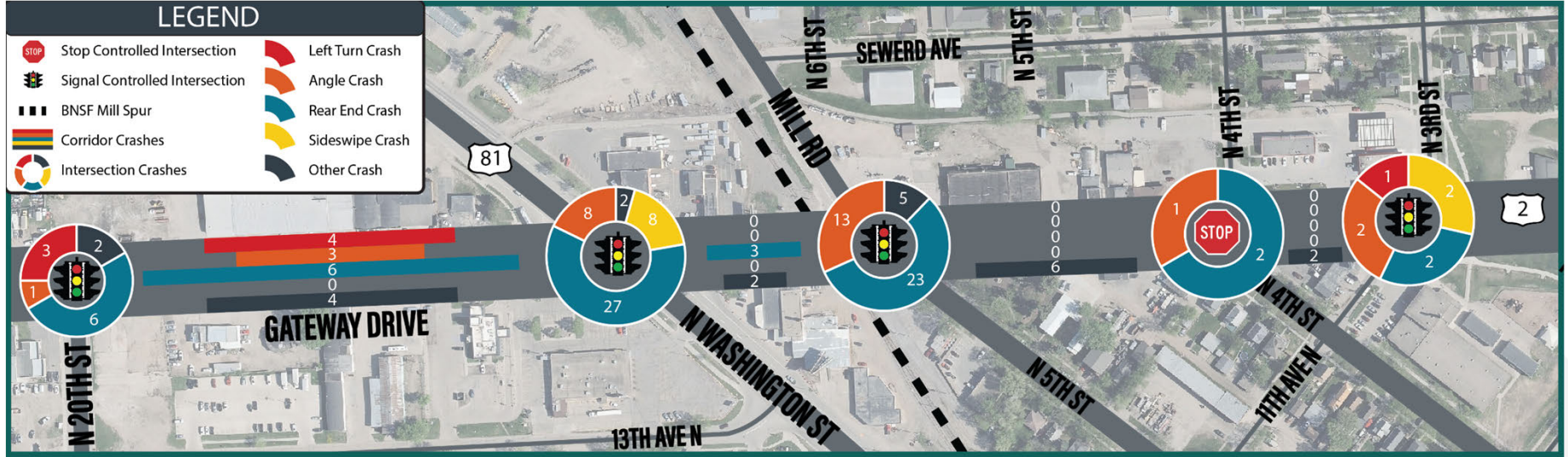




Travel Time and Reliability



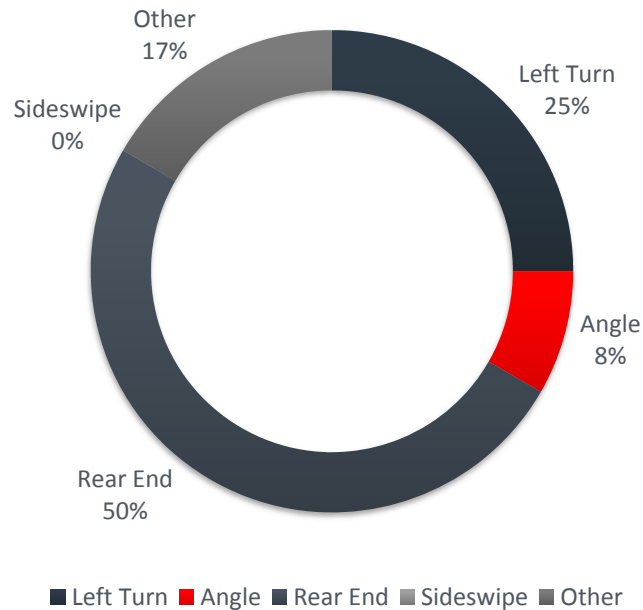
Crash History



➤ 28 Crashes/Year
➤ 78% Intersection Crashes

➤ 52% Rear-End Crashes
➤ 38% Peak Hour Crashes

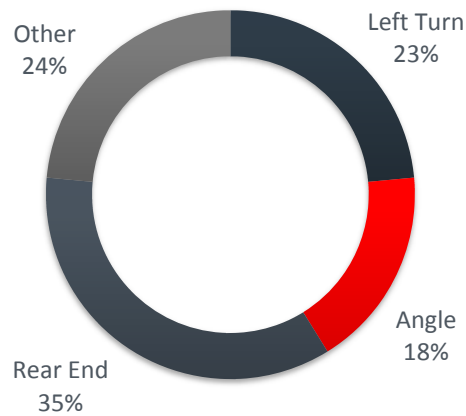
20th Street Intersection



- 12 crashes in last five years
- 33% rear end crashes on east approach
- 25% westbound left-turn crashes (Protected/Permitted)

- Unwarranted signal control increases
 - All crashes by 24%
 - Injury crashes by 53%
 - Right angle crashes by 24%
 - Rear end crashes by 29%

20th Street to Washington Street

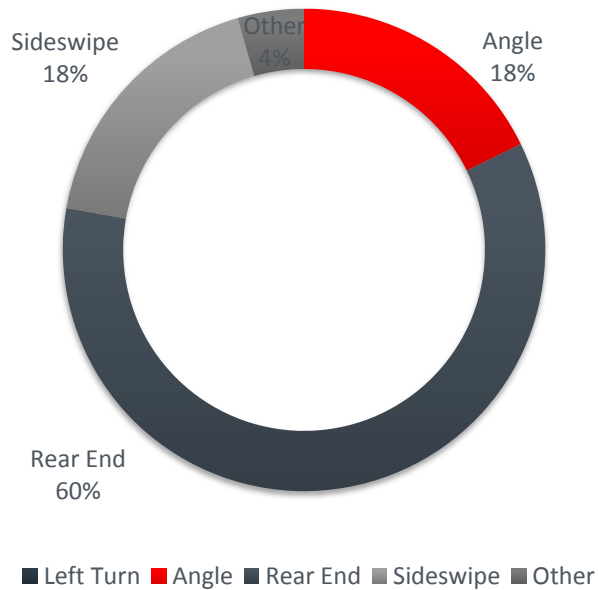


■ Left Turn ■ Angle ■ Rear End
■ Sideswipe ■ Other

- 17 crashes in last five years
- Above critical crash rate
- 41% during AM/PM peak hours
- Long queues and dense access spacings
- Queues block sight lines



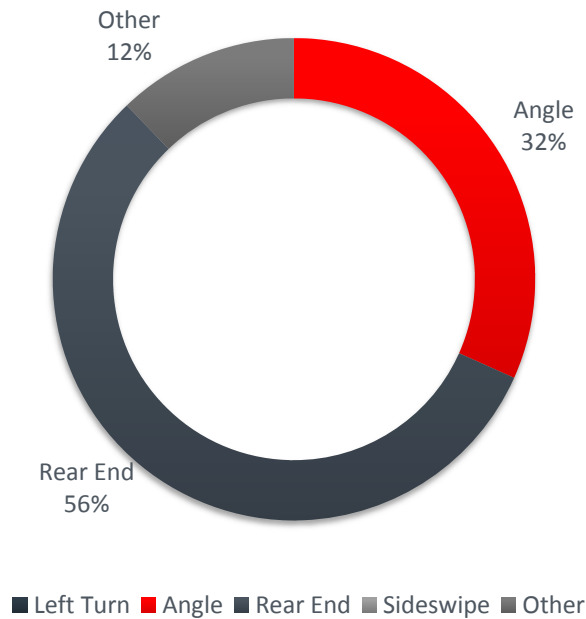
US 81/Washington Street Intersection



- 45 crashes in last five years
- 60% rear end crashes
 - 30% during AM or PM peak hour
 - 30% between 11 AM to 1 PM

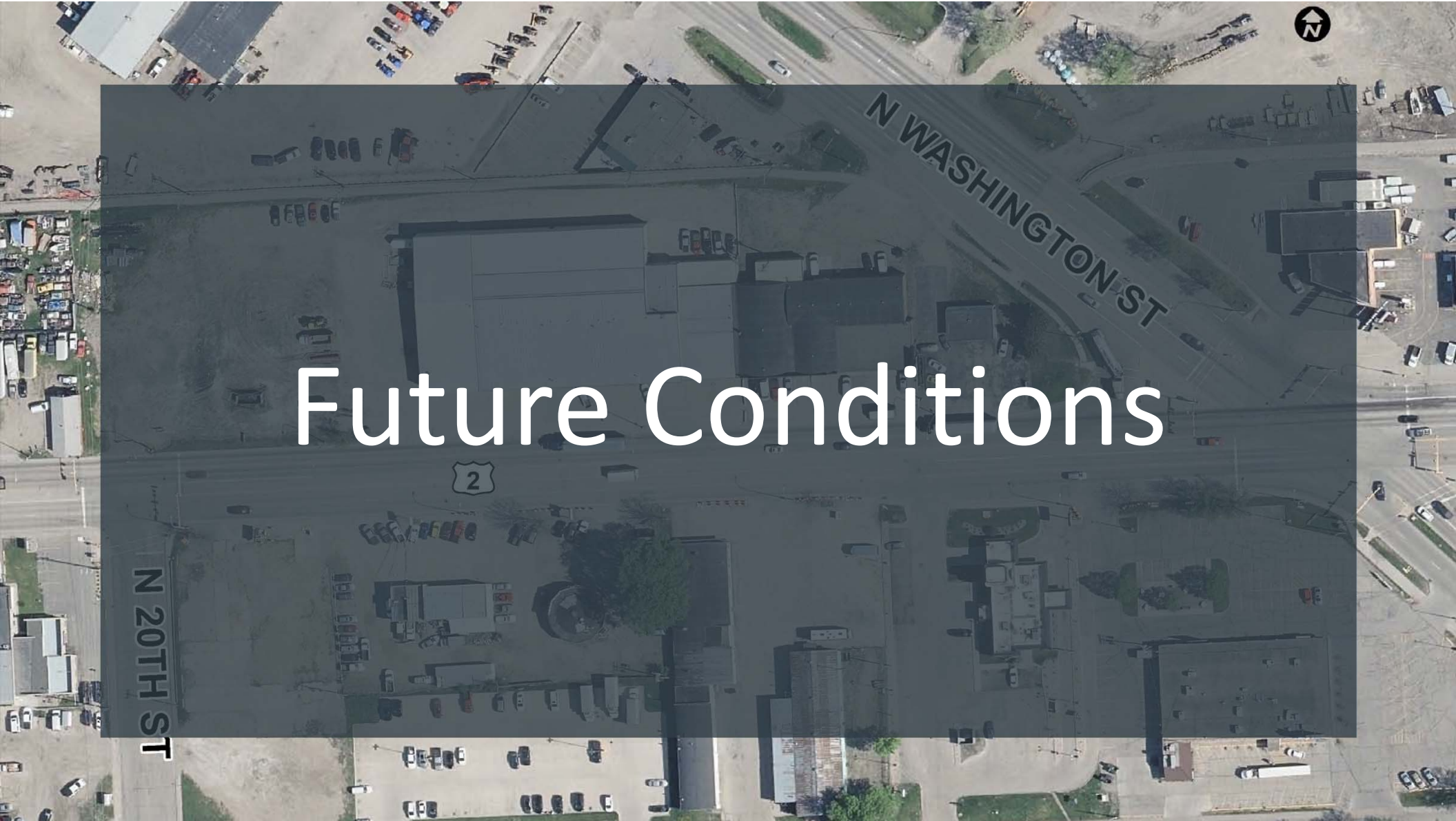
- 8 crashes involving trucks
- 0 Crashes involving Pedestrians or Bikes
- Long queues and dense access spacings
- 30% rear end crashes during peak hours

Mill Road/5th Street Intersection



- > 41 crashes in last five years
- > Above critical crash rate

- > 50% rear end crashes
 - > 65% During AM or PM peak hours
 - > 52% occurred on east approach



Future Conditions

N WASHINGTON ST

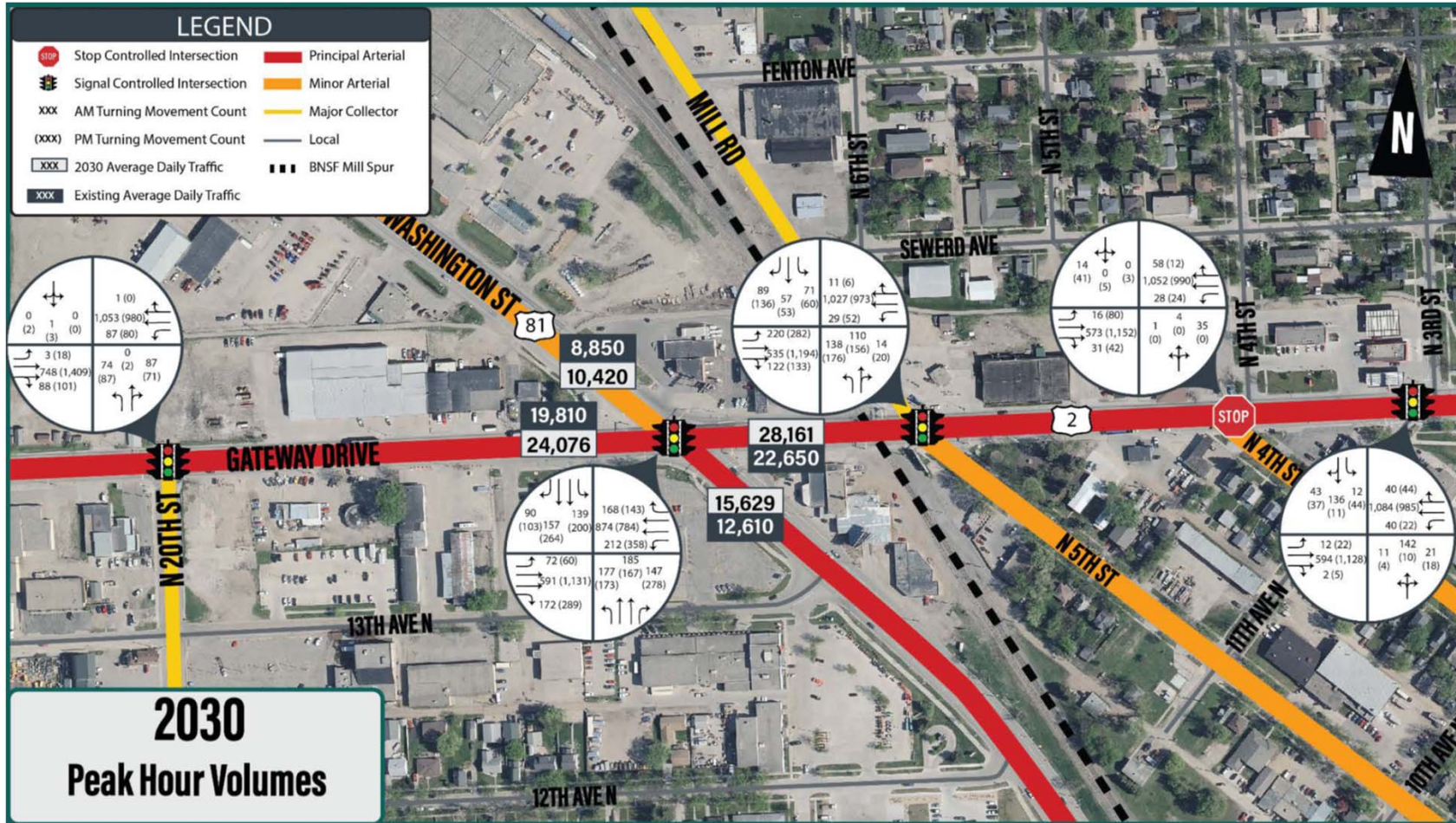
N 20TH ST

2



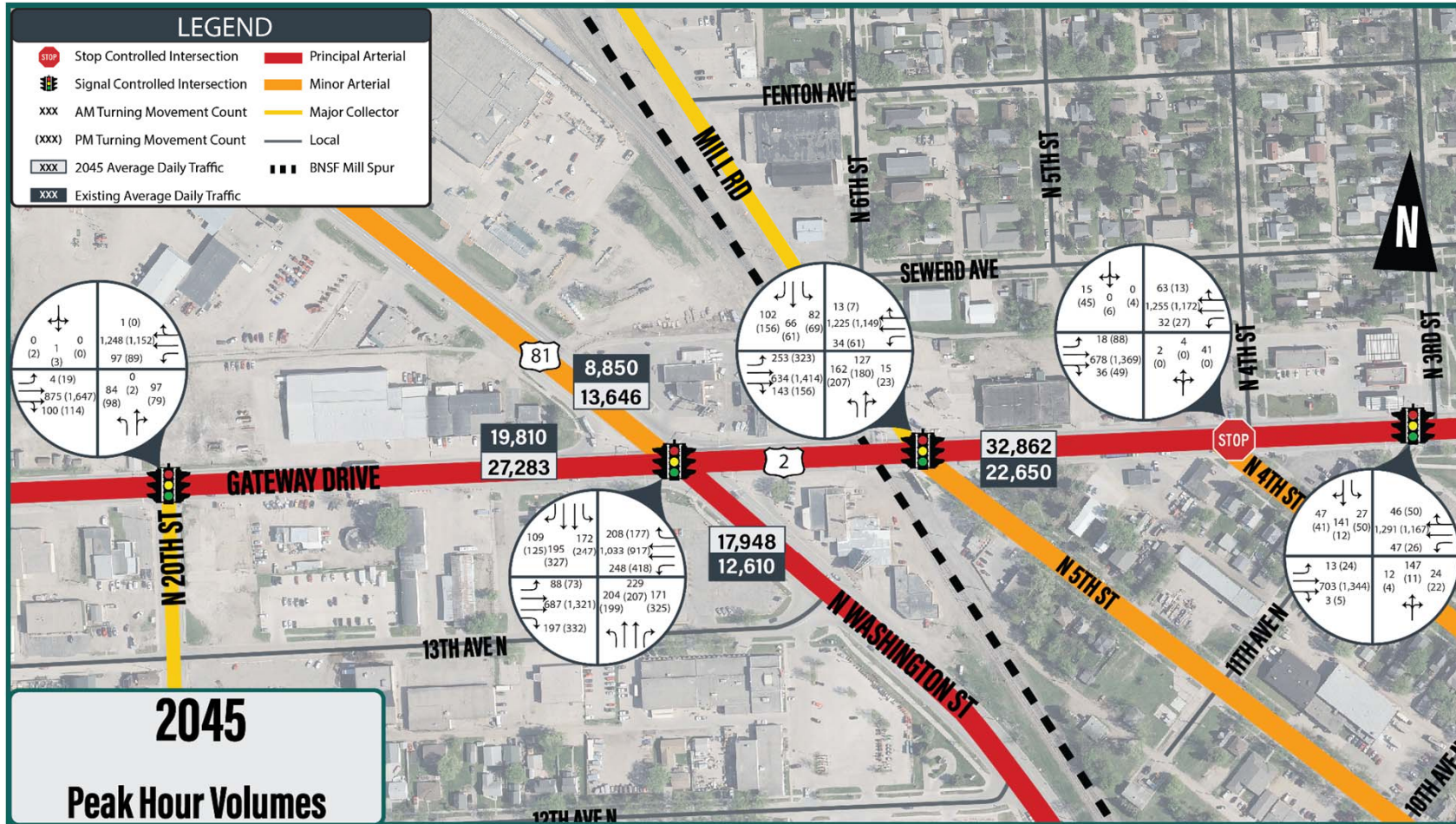
2030 Traffic Forecasts

- MPO Travel Demand Model
- No train increases projected



2045 Traffic Forecasts

- MPO Travel Demand Model
- No train increases projected



YEAR 2030

Intersection	Existing Traffic Control	Warrants Met (Hours Met/Required)			
		1A	1B	2	3
20th Street	Signal	0/8	1/8	0/4	0/1
US 81/ Washington Street	Signal	8/8	8/8	4/4	1/1
Mill Road/5th Street	Signal	8/8	8/8	4/4	1/1
4th Street	Thru/Stop	0/8	0/8	0/4	0/1
3rd Street/11th Ave	Signal	0/8	1/8	1/4	1/1

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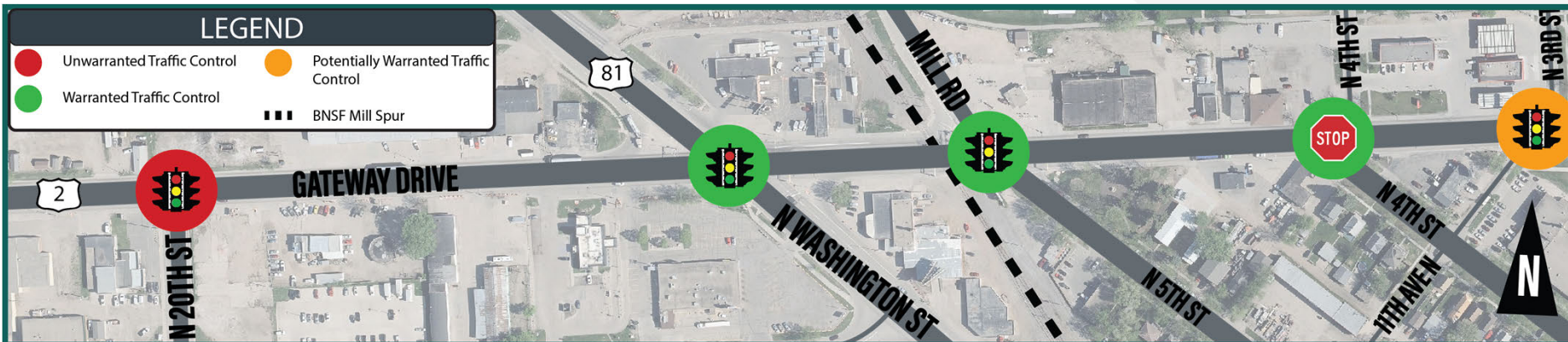
Warrant 3: Peak Hour Vehicular Volume
 Warrant 9: Intersection Near a Grade Crossing

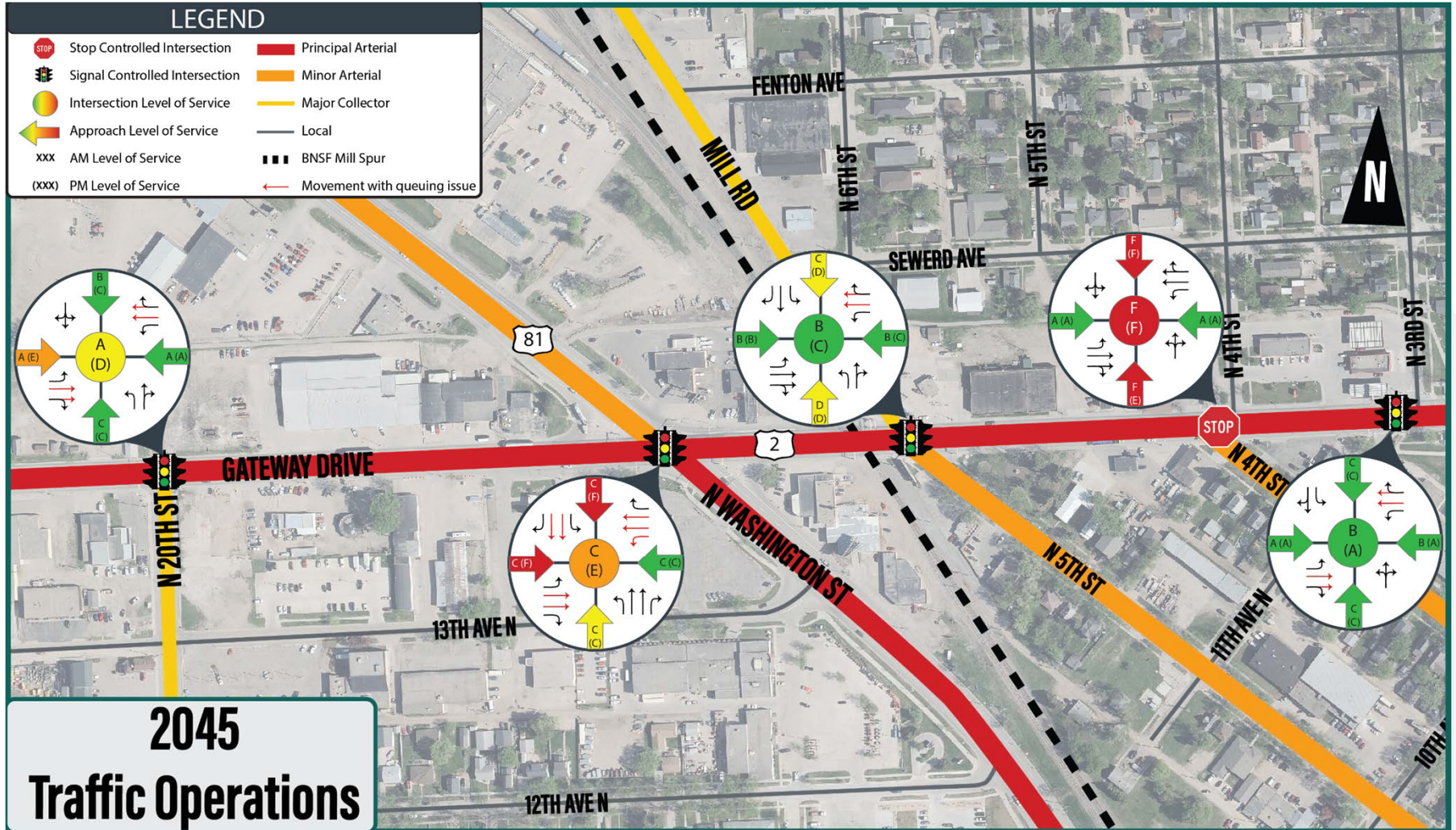
YEAR 2045

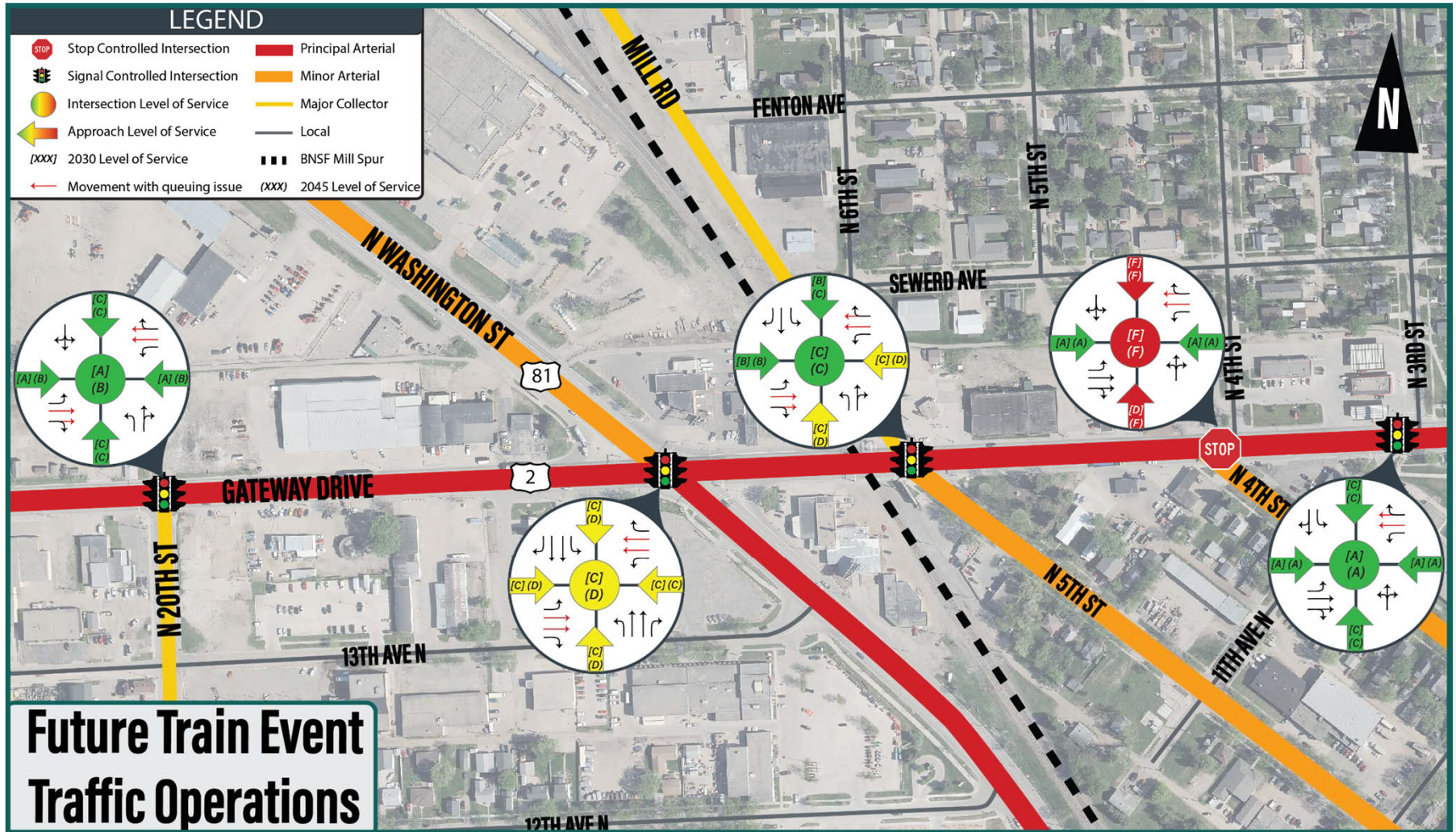
Intersection	Existing Traffic Control	Warrants Met (Hours Met/Required)			
		1A	1B	2	3
20th Street	Signal	0/8	6/8	0/4	0/1
US 81/ Washington Street	Signal	8/8	8/8	4/4	1/1
Mill Road/5th Street	Signal	8/8	8/8	4/4	1/1
4th Street	Thru/Stop	0/8	0/8	0/4	0/1
3rd Street/11th Ave	Signal	0/8	1/8	1/4	1/1

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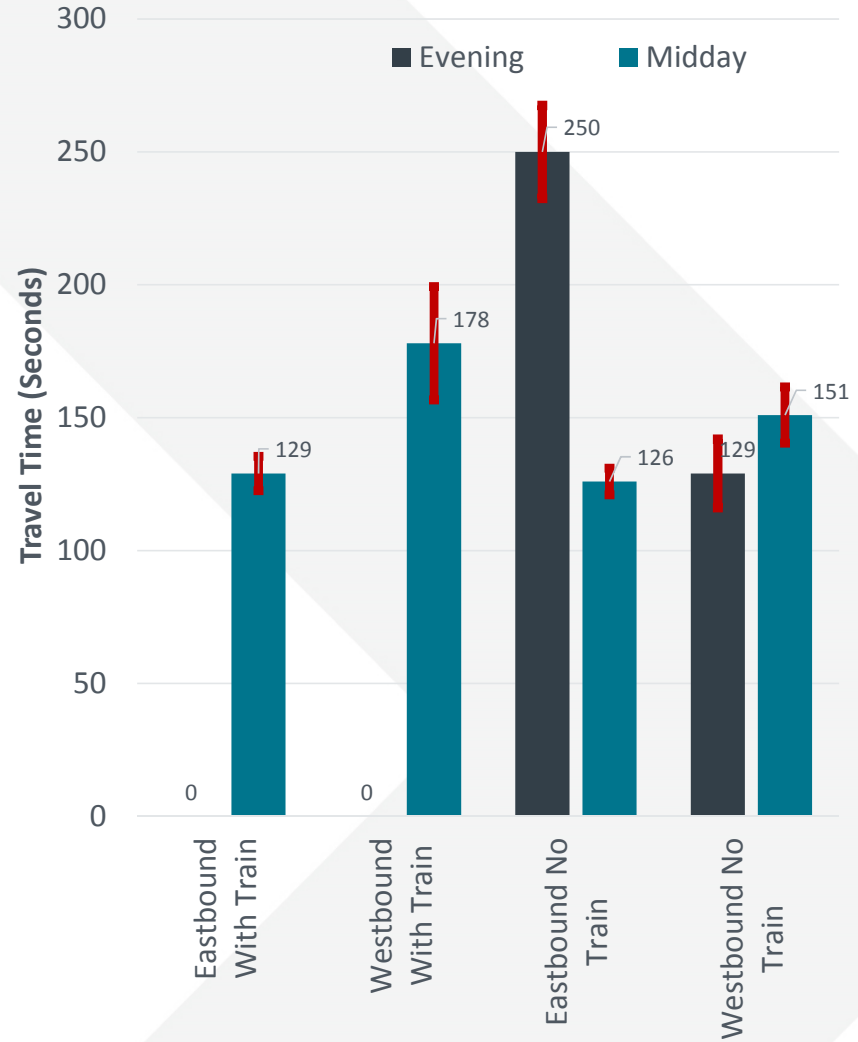
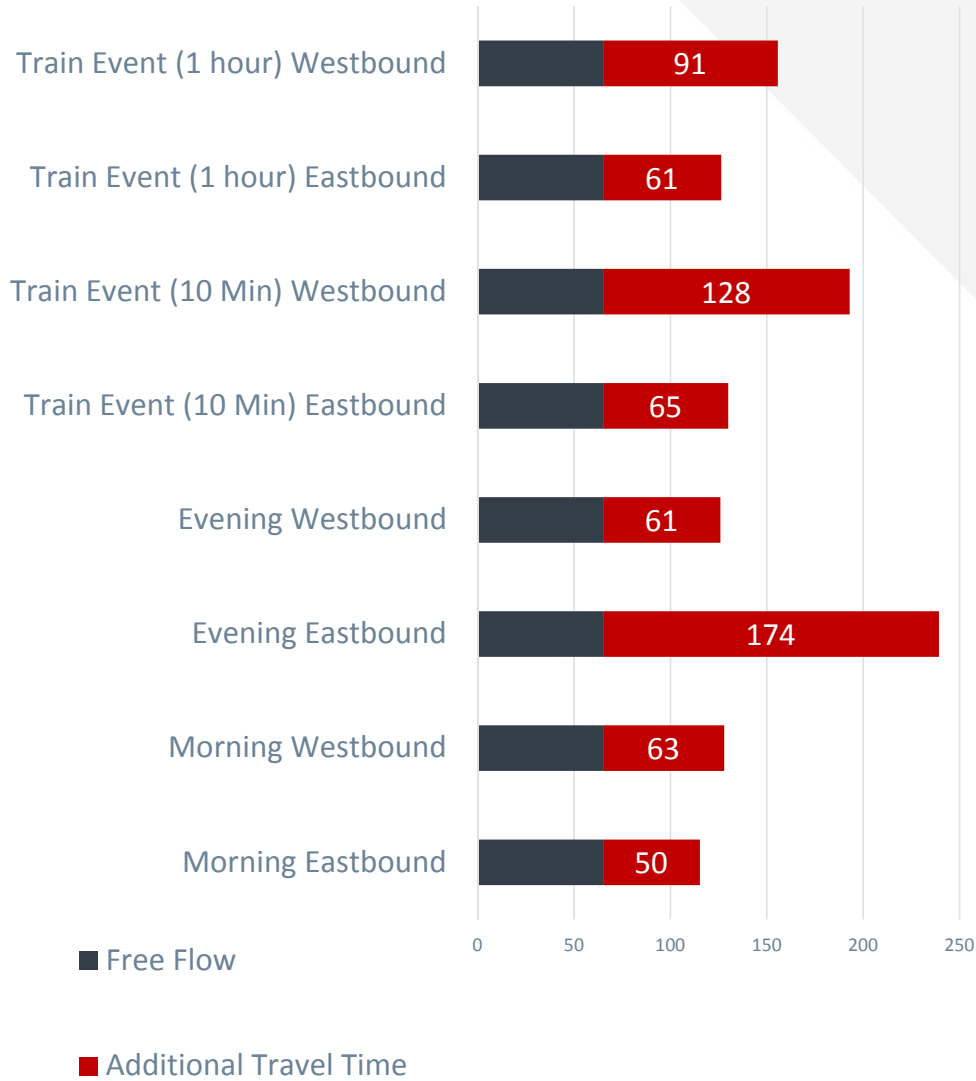
Warrant 3: Peak Hour Vehicular Volume
 Warrant 9: Intersection Near a Grade Crossing







One 2:31 train event causes 7 hours of delay under current traffic conditions



2045 Train Event Operations



- > One train event:
 - > 4 hours of vehicle delay today
 - > 7 hours by 2045
- > Future unit trains

2045 Queuing Issues

PM Peak

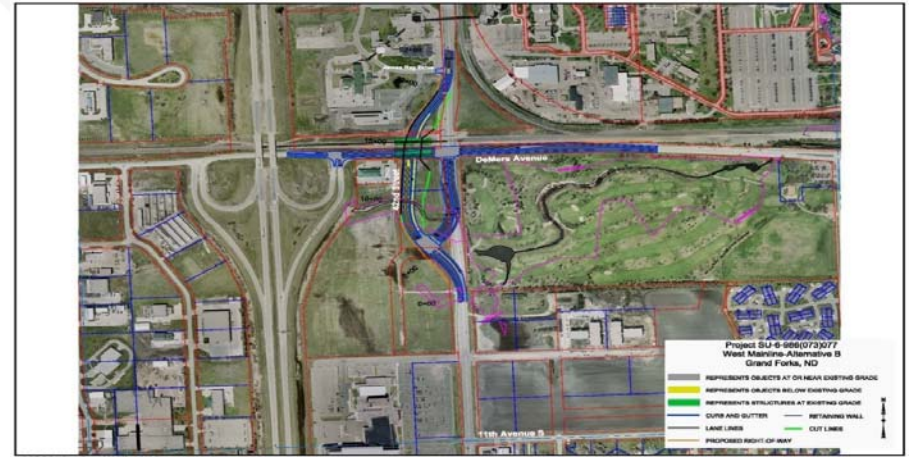


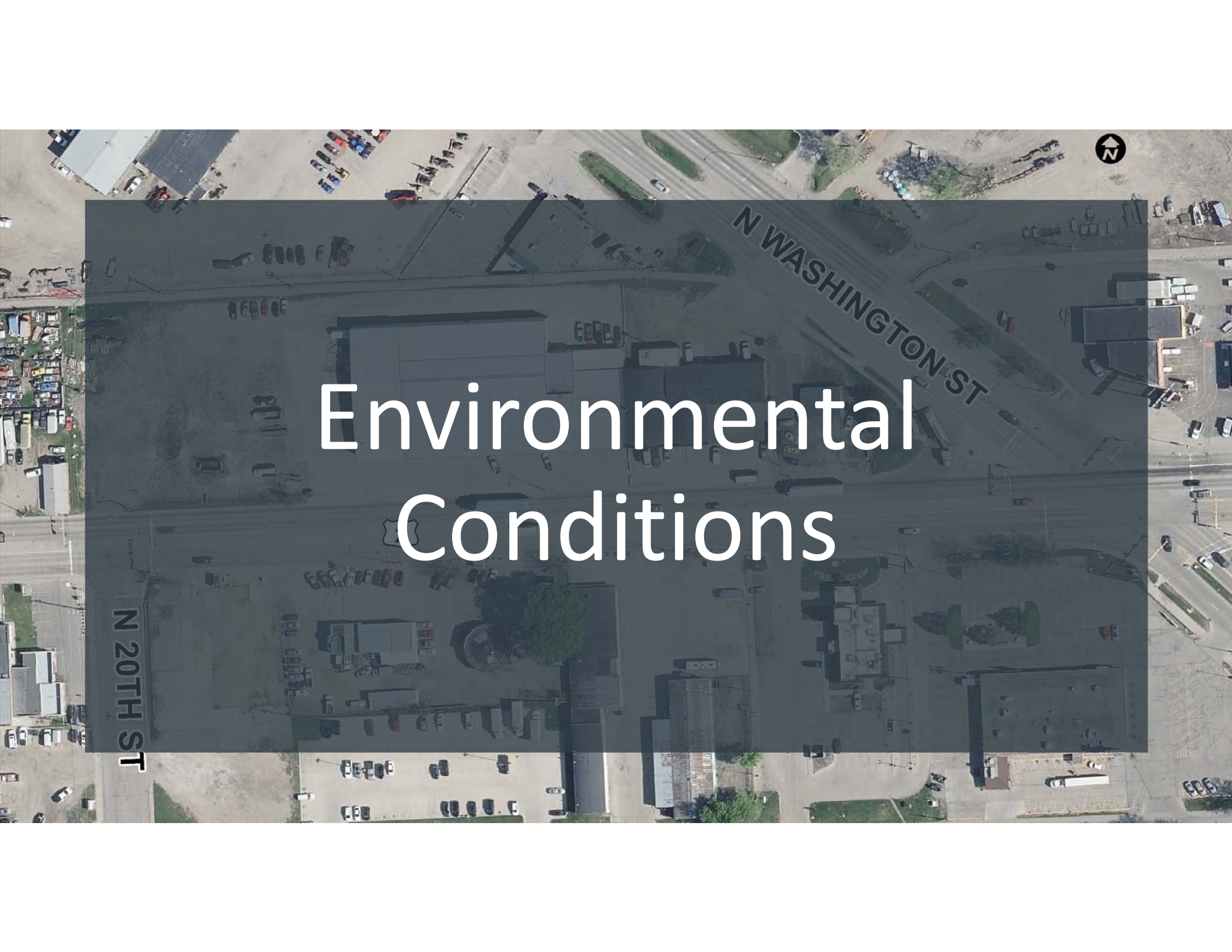
Train Event



Funding Availability

- >\$150,000,000 in Unfunded Grand Forks Projects
- 42nd Street and DeMers Avenue (~\$25-30M)
- Gateway Drive/US 2 and Glasston (~\$28M)





Environmental Conditions

N WASHINGTON ST

N 20TH ST

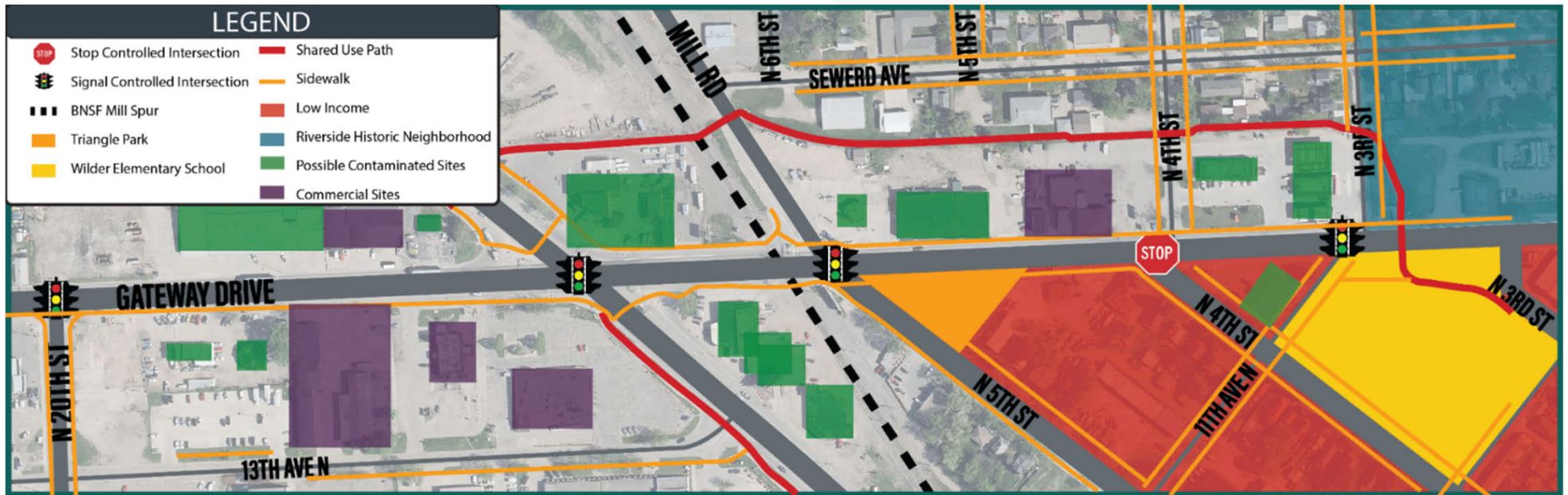


Purpose and Need Statement

- Capacity
 - Corridor travel time
 - Intersection delays and queueing
 - Travel time reliability
- Social Demands and Economic Development
 - NDSM unit trains
 - Critical truck movement
- Roadway Deficiencies
 - At-grade rail crossing
 - 8X recommended access spacings
- Modal Interrelationships
 - Gaps in pedestrian and bicycle facilities
- Safety
 - Intersection and link crash rates
 - EMS response time
 - Rail crossing exposure



Affected Environment

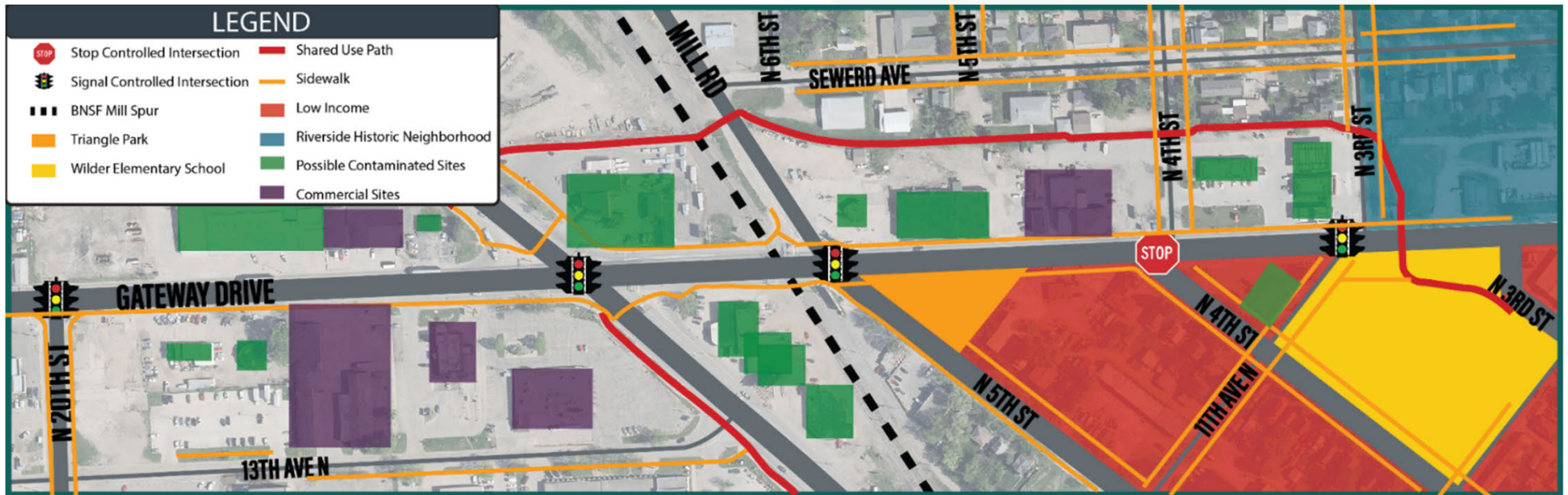


> Unlikely Impacts

- > Floodplains
- > Surface Water
- > Section 6F

> Land Use

Affected Environment



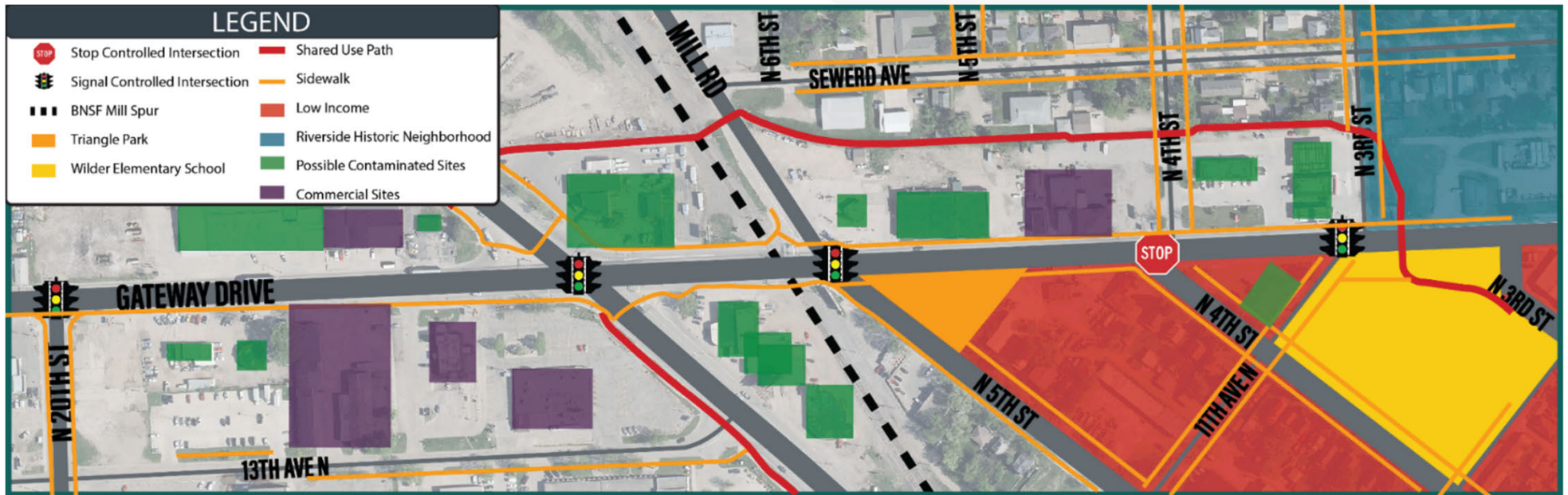
➤ Potential Impacts

- Hazardous Waste Sites
- Social and Economic Impacts
- Noise

- Pedestrians and Bicyclists
- Environmental Justice
- Historic and Archaeological Preservation

- Section 4f

Affected Environment



➤ Potential Positive Impacts

- Social and Economic Impacts
- Pedestrians and Bicyclists
- Environmental Justice



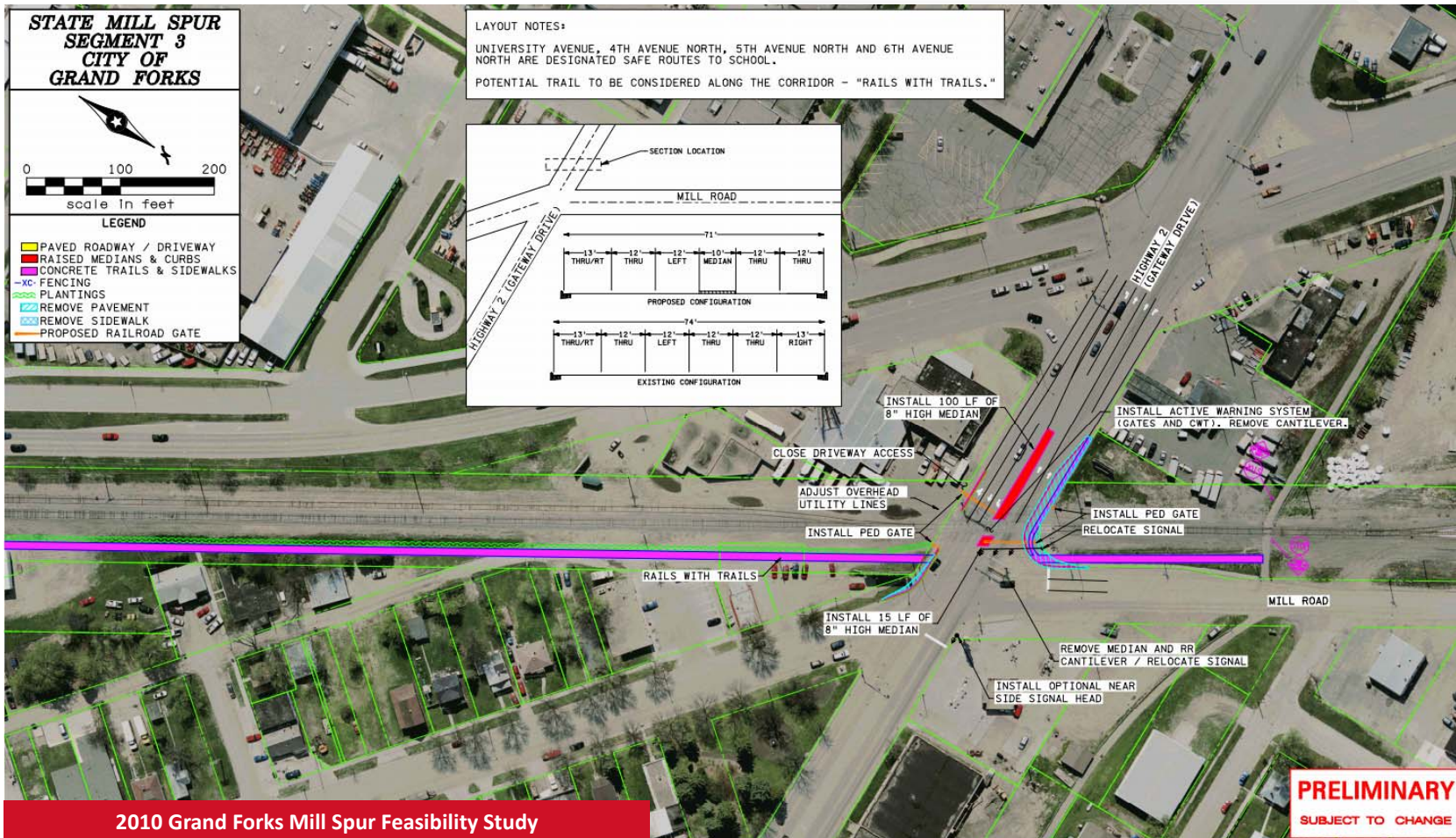
Alternative Brainstorming



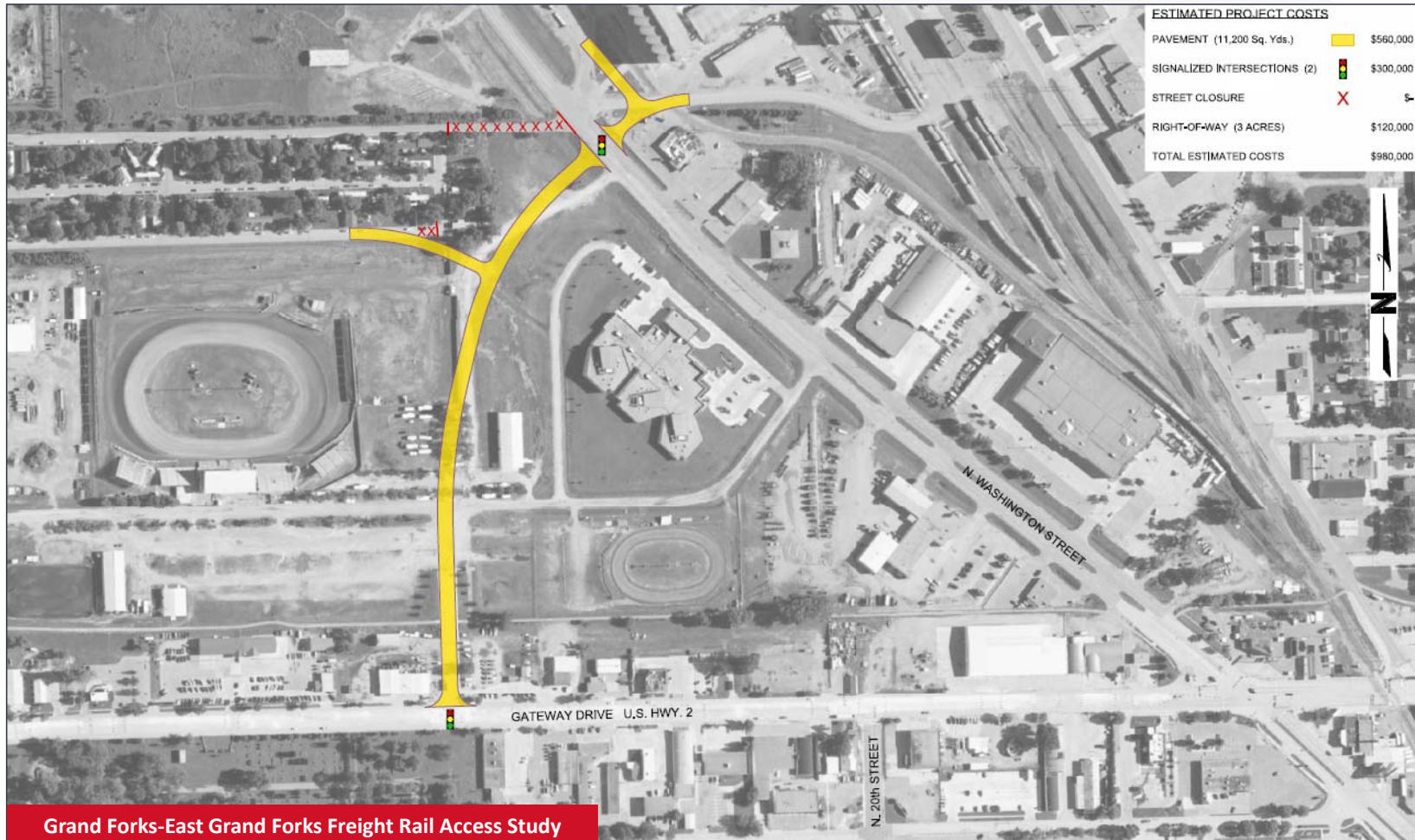
N 20TH ST

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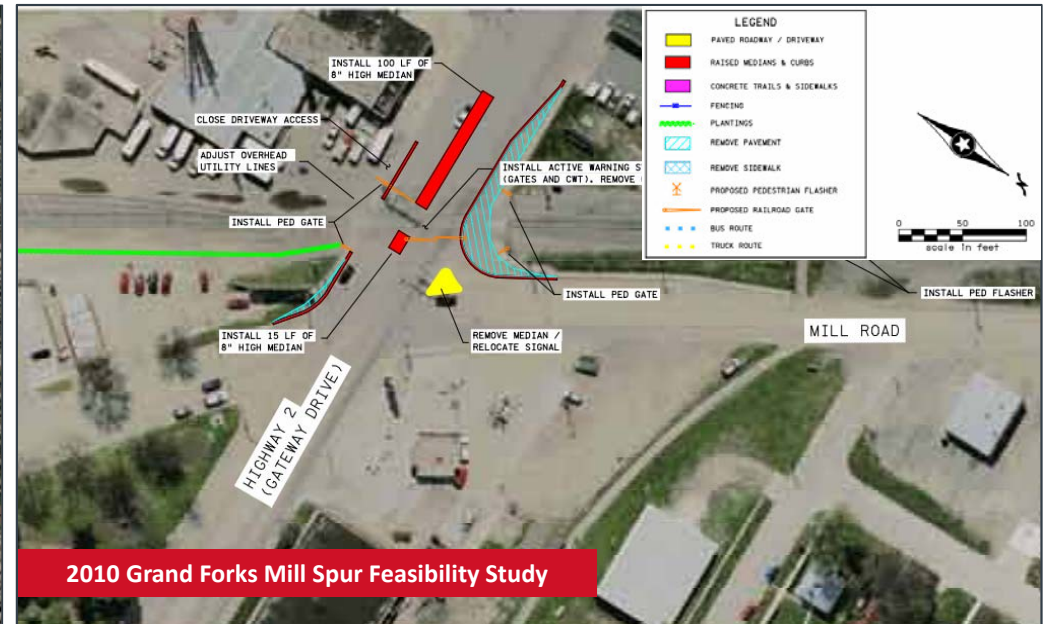
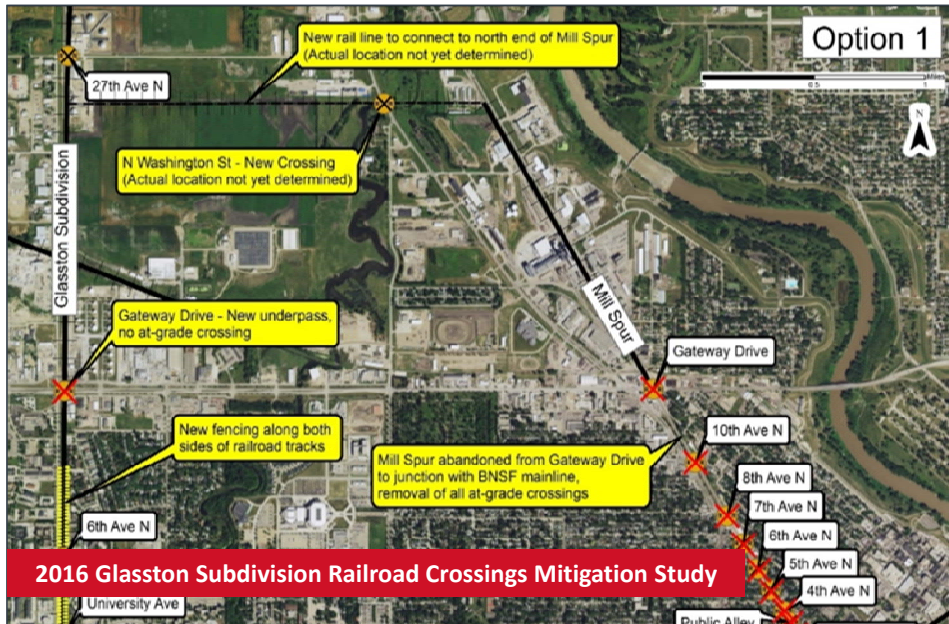
At-Grade Improvements



Rerouting Skewed Movements



Reroute the Mill Spur



Grade Separated Crossing

