I-35 Connects
Moving Duluth People and Goods

ARDC MIC
I-35 CORRIDOR PLAN
Existing Conditions Report

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK
Real People. Real Solutions.

AGENDA

- EXISTING CONDITIONS
  - Context
  - Inventory
  - Function
  - Utility
  - Connectivity
- FOCUS AREAS
- FUTURE SCENARIOS
- STAKEHOLDERS

STUDY APPROACH

DISCOVER + LISTEN

Summer/Fall 2022

Existing Conditions

Future Conditions

DESIGN + EVALUATE

Winter-Summer 2023

Visioning

Alternatives Analysis

REVIEW + APPROVE

Fall 2023

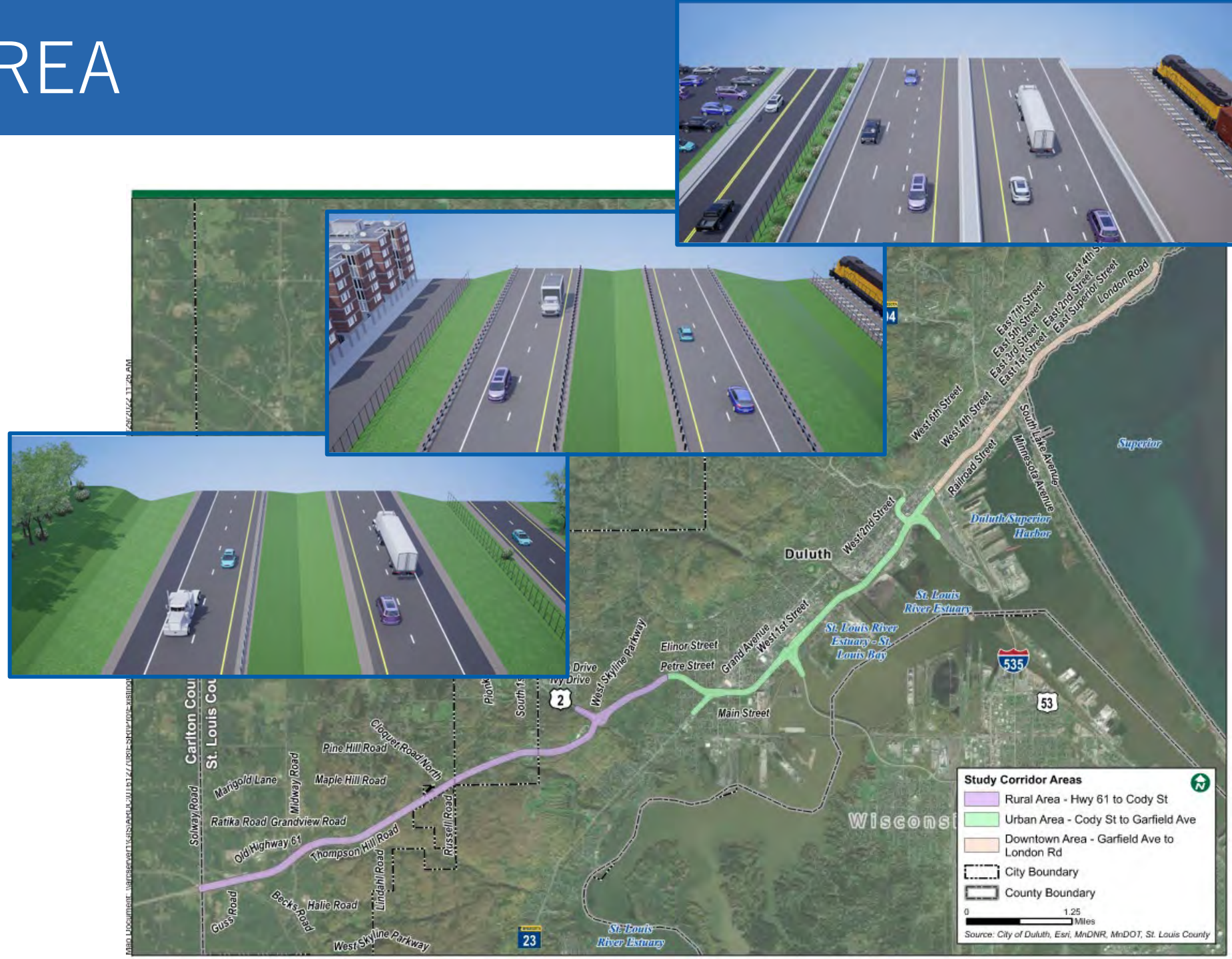
Implementation

Final Report

I-35 Connects

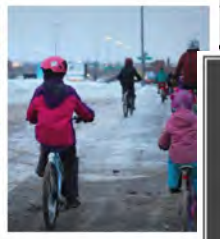
STUDY AREA

- 14-mile segment
- Nearly 29,000 people live within 1/2 mile of the I-35 corridor
- 16 interchanges, 30 intersections within study area



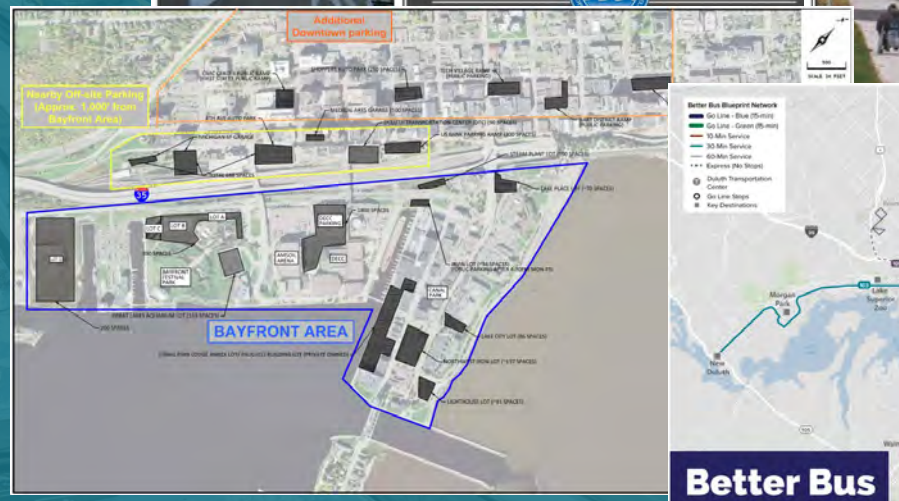
PREVIOUS STUDIES

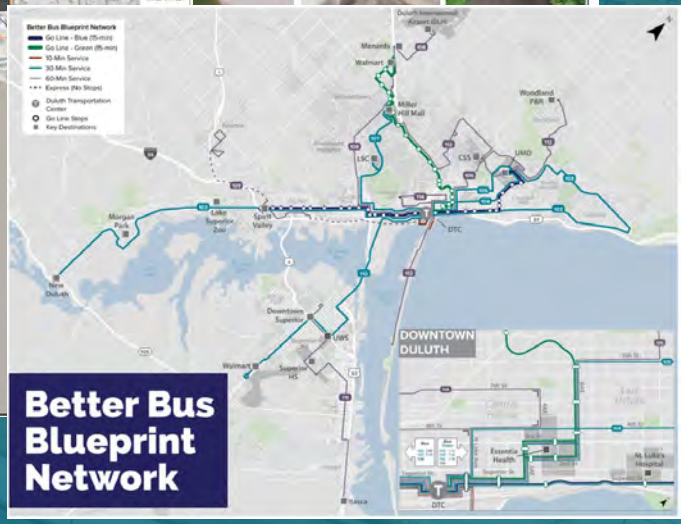
- Downtown Duluth Modal Connections Study
- Connections 2040
- Sustainable Choices 2045
- I-35 Bayfront Traffic Modeling & Event Traffic Control Plan
- 5th Avenue Bridge Planning Study
- Proctor Transportation Plan
- DTA Better Bus Blueprint
- Duluth-Superior Metropolitan Pedestrian Plan
- Duluth-Superior Metropolitan Bikeways Plan
- MnDOT District 1 Freight Plan
- Duluth Waterfront Collective



Duluth-Superior Metropolitan Bikeways Plan

Duluth-Superior Metropolitan
Pedestrian Plan
August 2021





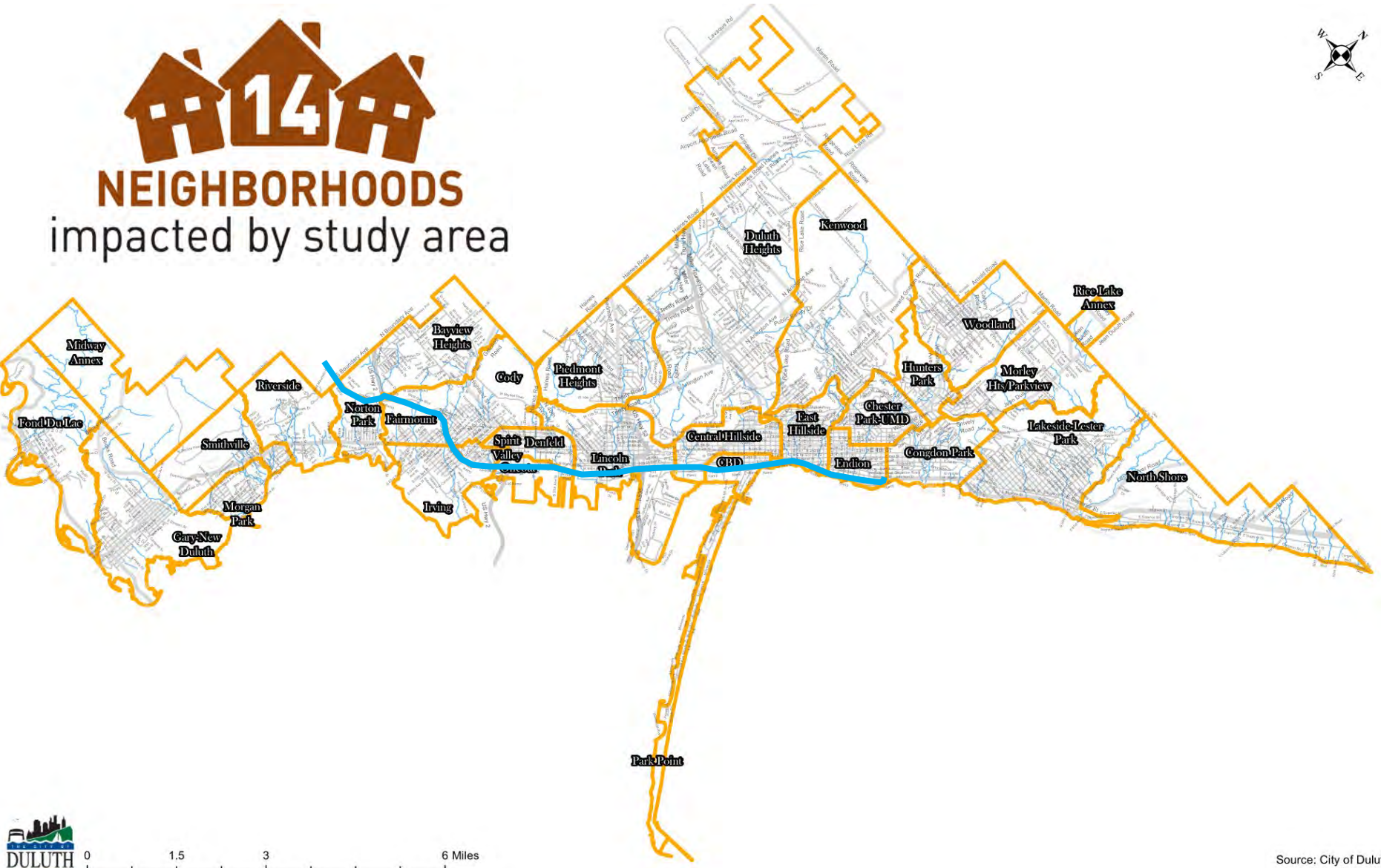
I-35 Connects

CONTEXT

I-35 Connects

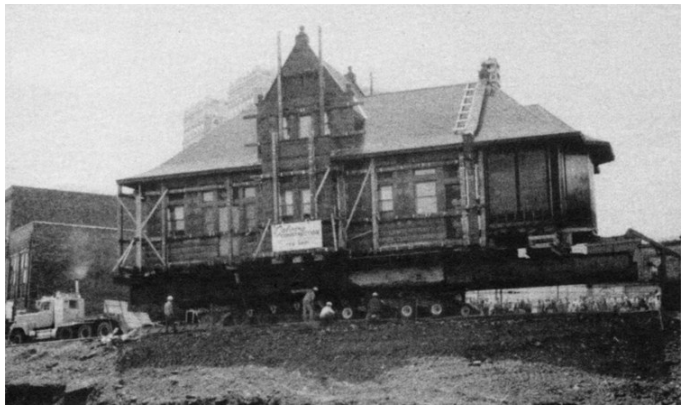
I-35 AS A DISRUPTOR

14 NEIGHBORHOODS
impacted by study area



Construction History:

- Mesaba Ave: 1971
- London Road: 1992

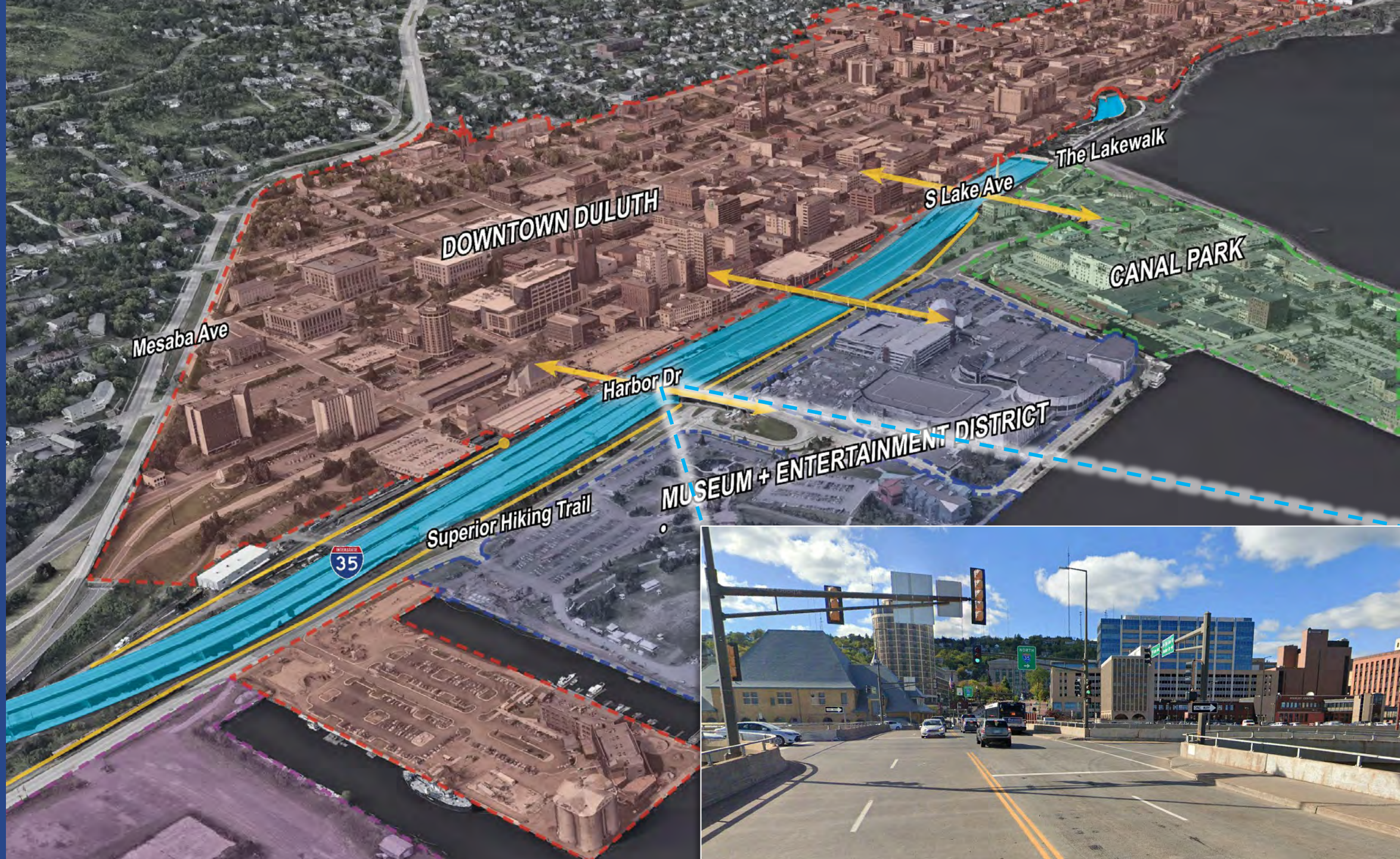


Source: City of Dulu
Date: June 23rd. 20

I-35 AS A DIVIDER

I-35 Connects

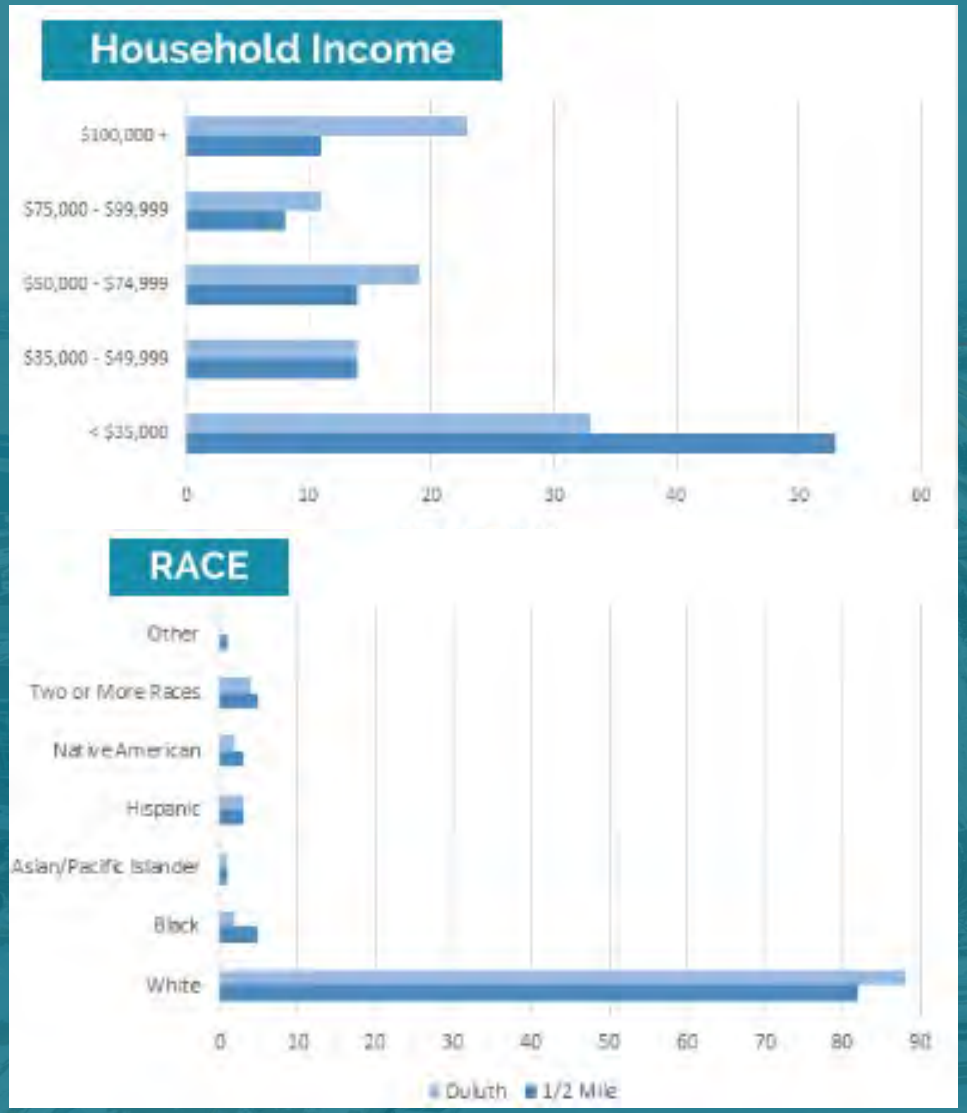
I-35 AS A SEGREGATOR



I-35 Connects

I-35 Connects

I-35 AS A DEFINER



BIPOC RESIDENTS

16% 1/2 Mile

10% Duluth

RENTER OCCUPIED HOUSING

35% 1/2 Mile

23% Duluth

NON-DRIVING COMMUTE

22% 1/2 Mile

15% Duluth

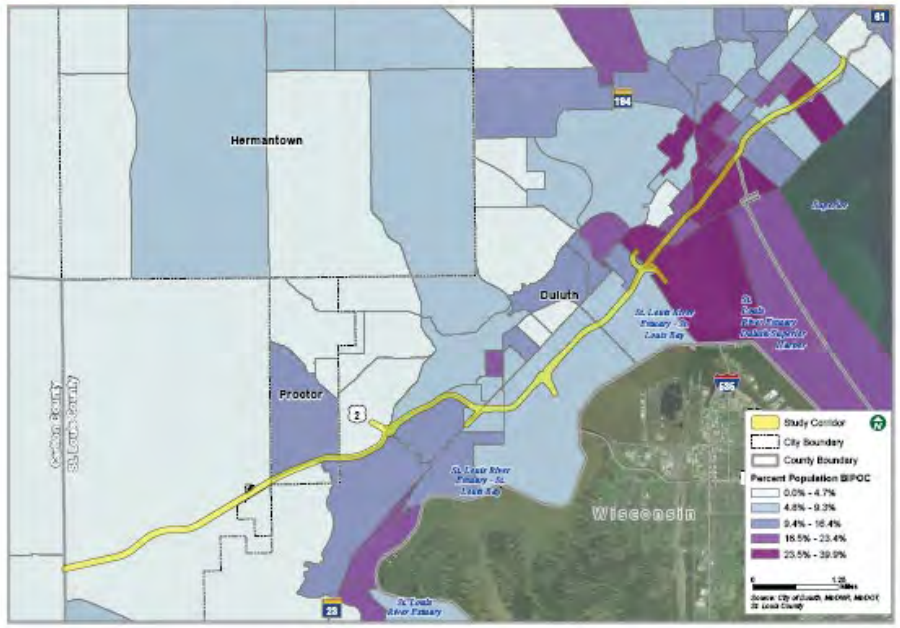
NO CAR

25% 1/2 Mile

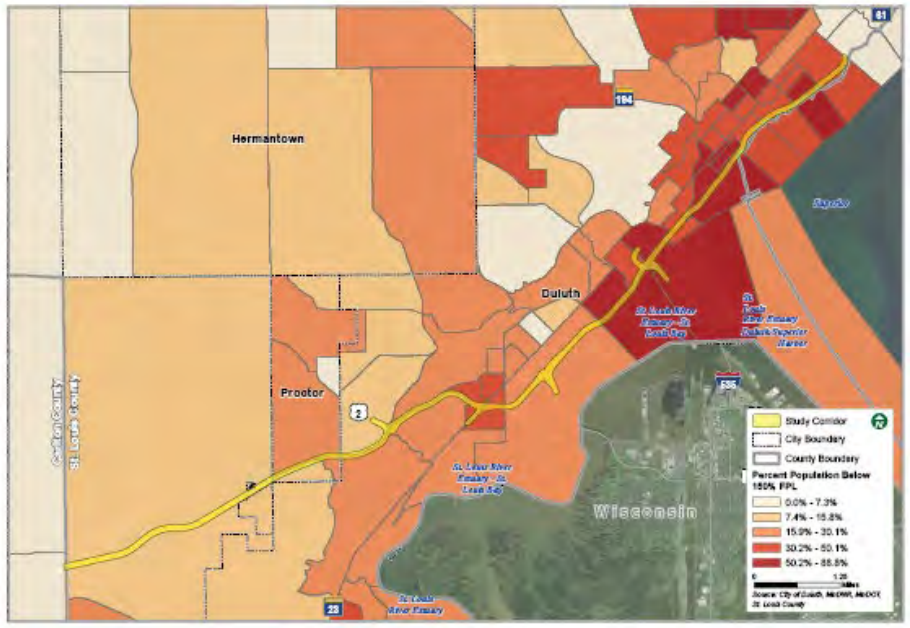
11% Duluth

I-35 AS A DEFINER

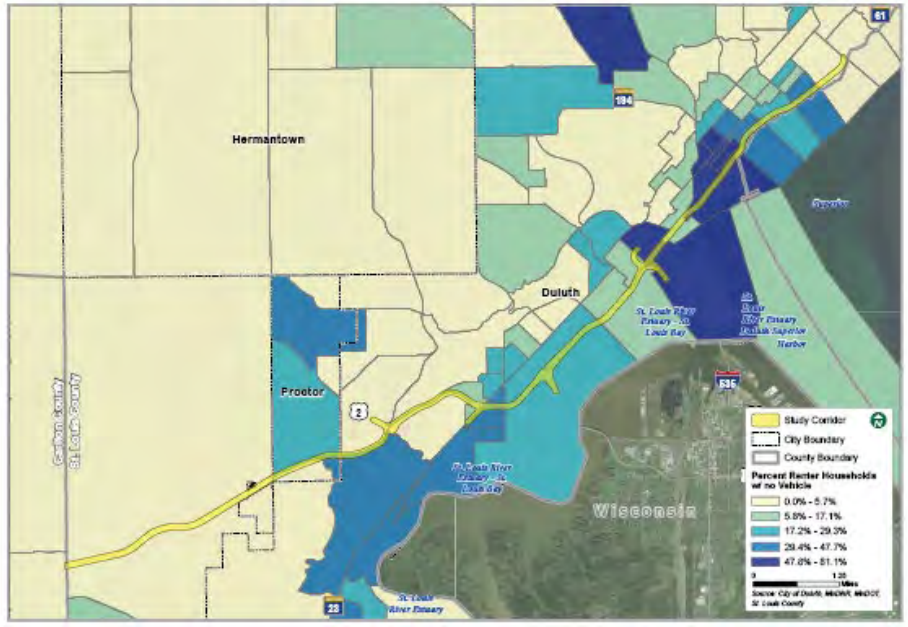
Percent of the Population BIPOC - Aug 2022



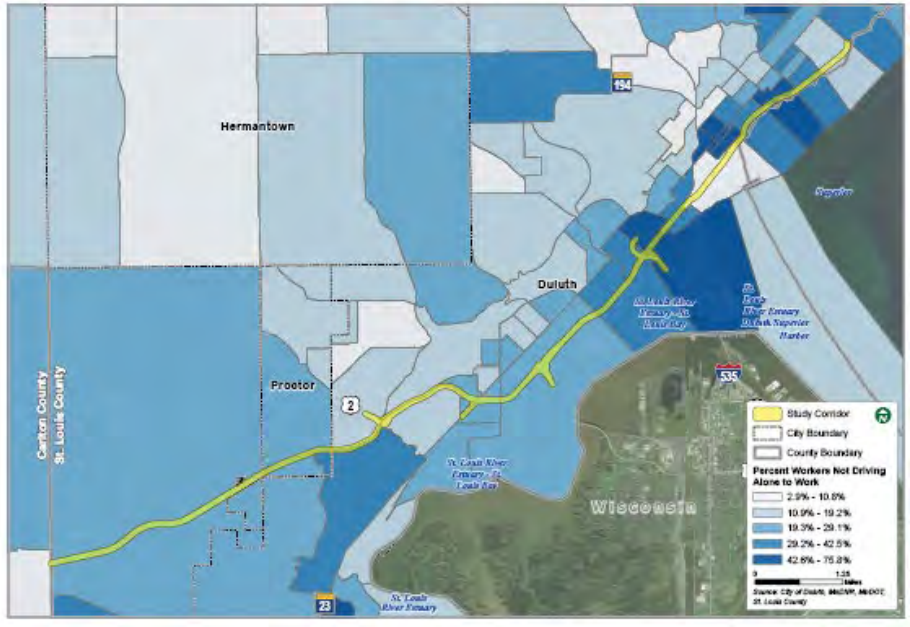
Percent of Population Below 150% FPL - Aug 2022



Percent of Renter Households with No Vehicle - Aug 2022



Percent of Workers Not Driving Alone to Work - Aug 2022



I-35 Connects

I-35 Connects

I-35 AS A CONNECTOR

1. Proctor

2. West Duluth

3. Lincoln Park

4. Downtown & Canal Park

5. Medical District

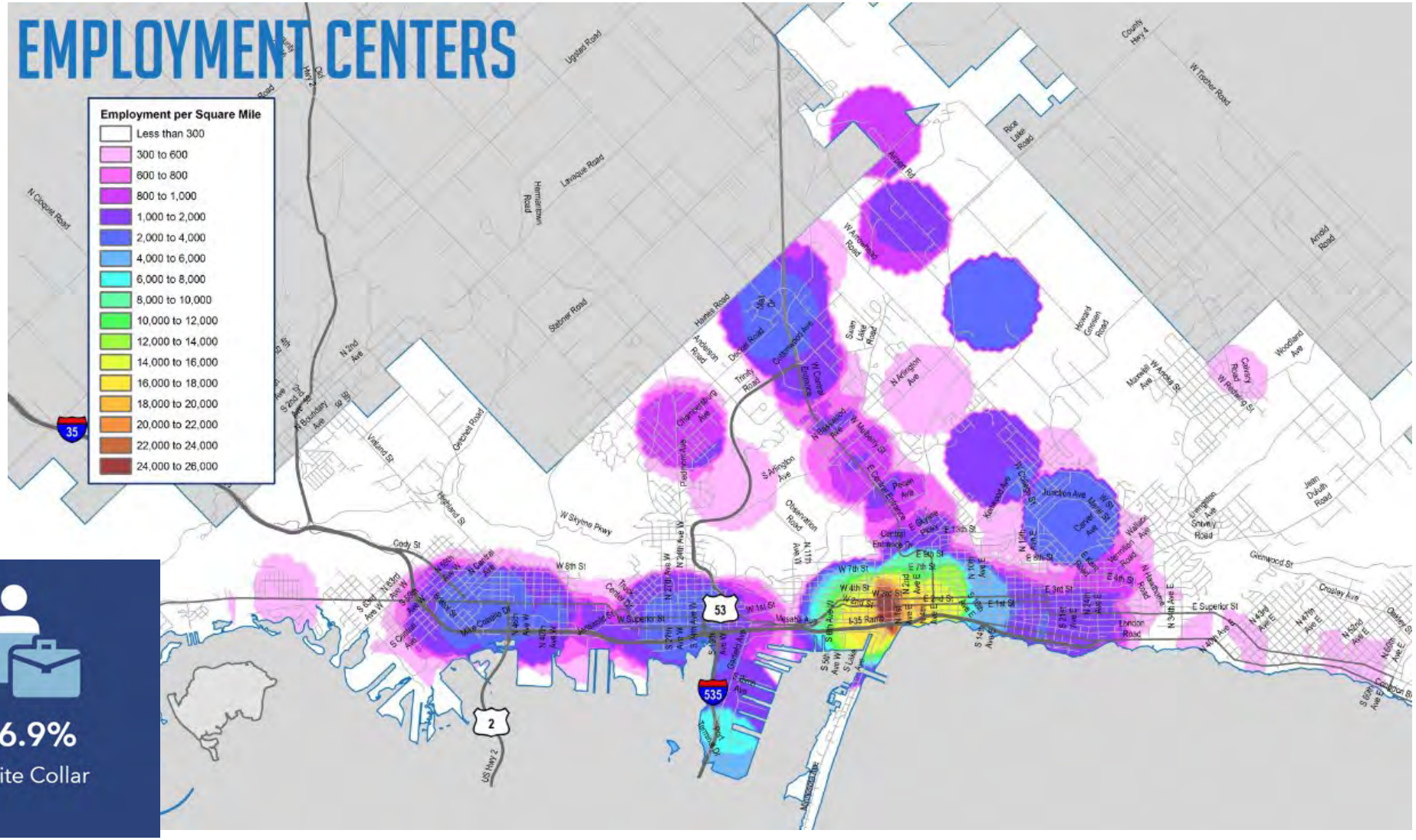
I-35 Connects

I-35 Connects

I-35 AS A RESOURCE

Major employment centers along the I-35 corridor include:

- Downtown and Canal Park
- Lincoln Park
- West Duluth



25.1% Services

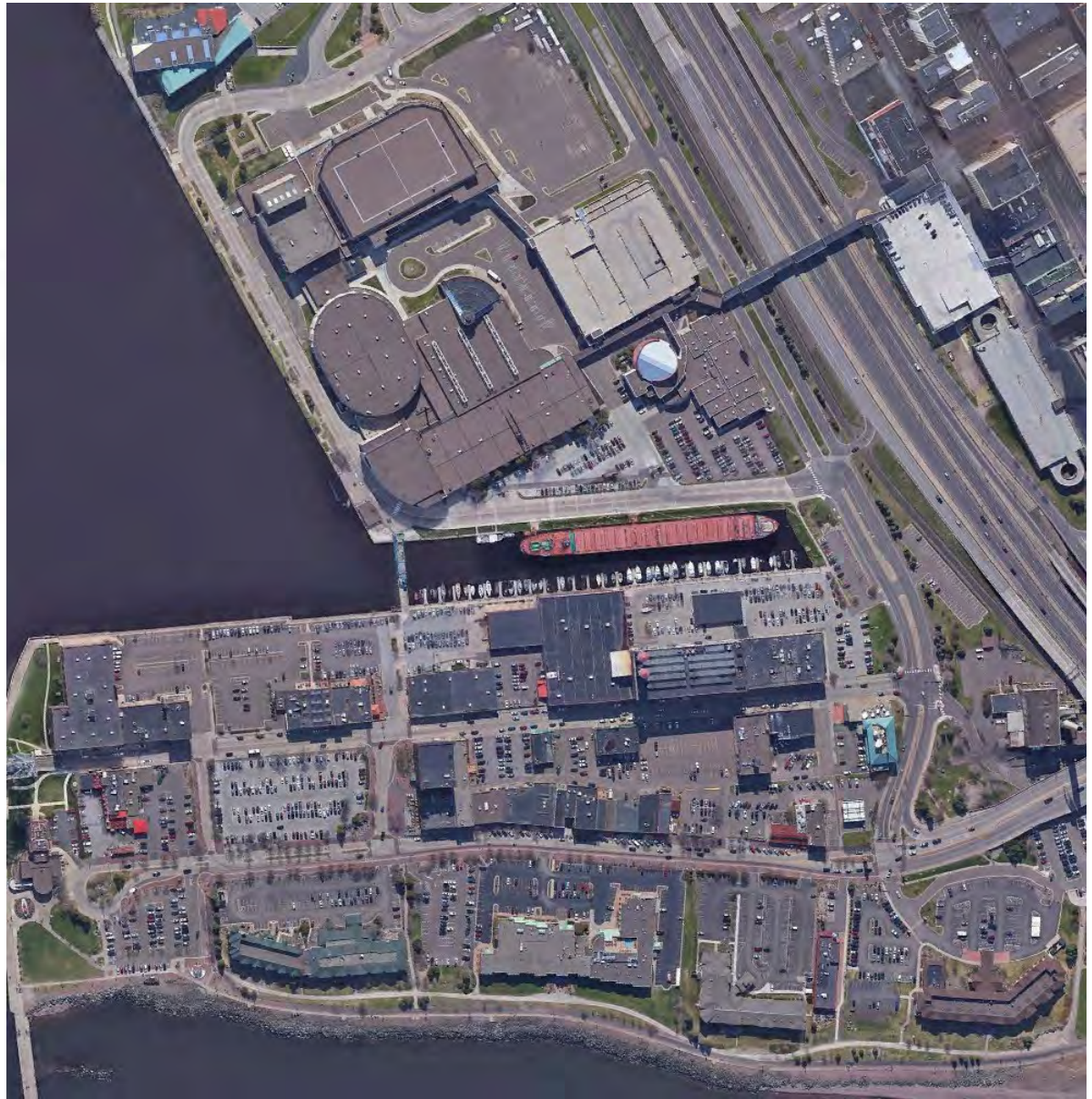
18.0% Blue Collar

56.9% White Collar

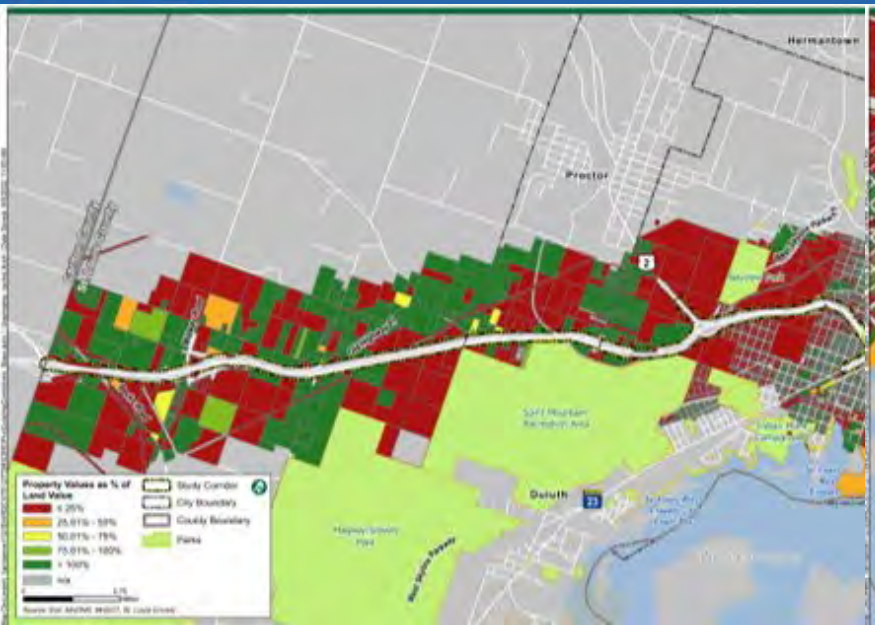
I-35 AS A RESOURCE

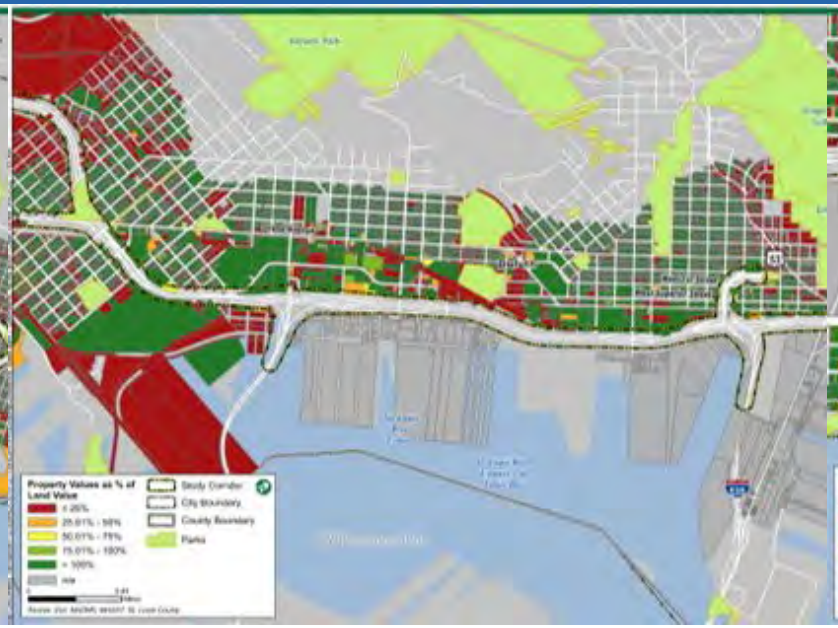
60% of **tourism revenue** in northeast MN is generated in **St. Louis County**

6,700,000+
ANNUAL VISITORS
from tourism



I-35 AS AN OPPORTUNITY





RURAL SUBARA | LIKELY BARRIERS

- Lack of density for efficient transportation and utilities
- Challenging topography that makes development either expensive or infeasible
- Land use policies or protections

URBAN SUBARA | LIKELY BARRIERS

- Challenging geography, geology, and weather
- Limited stock of flat, greenfield sites
- Land use policies or protections

DOWNTOWN SUBARA | LIKELY BARRIERS

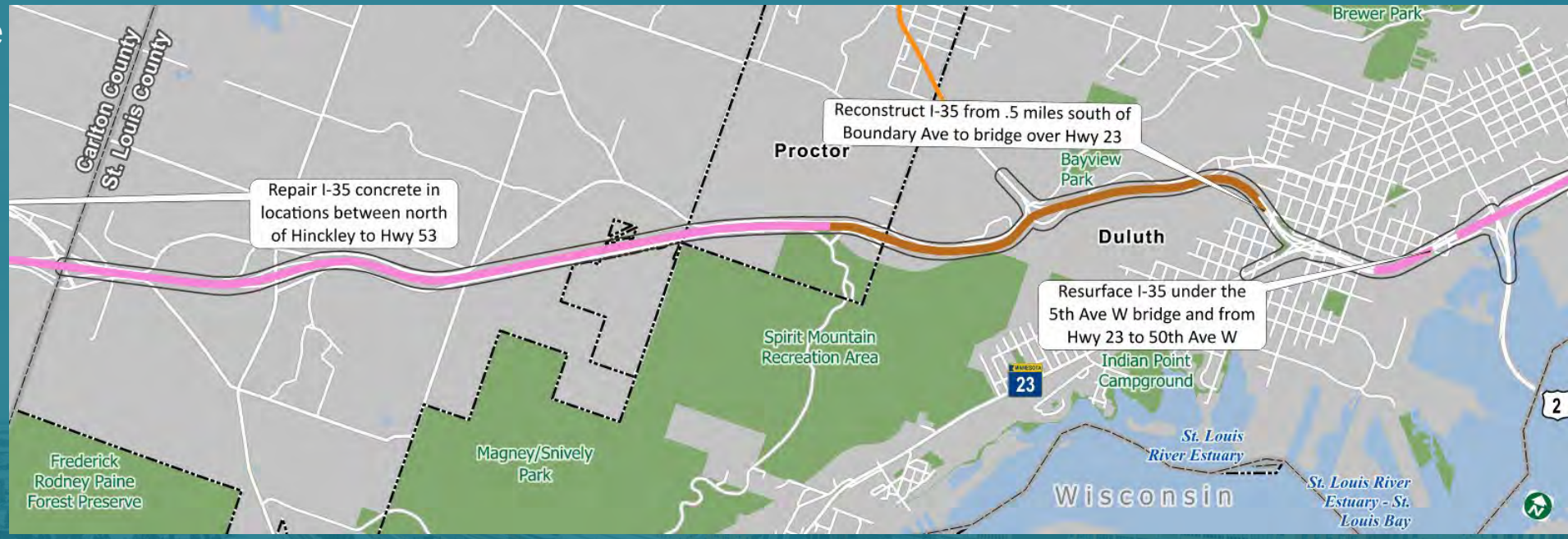
- Challenging geography, geology, and weather
- Challenging topography that makes development either expensive or infeasible
- Limited stock of flat, greenfield sites
- Land use policies or protections

INVENTORY

I-35 Connects

PROGRAMMED IMPROVEMENTS

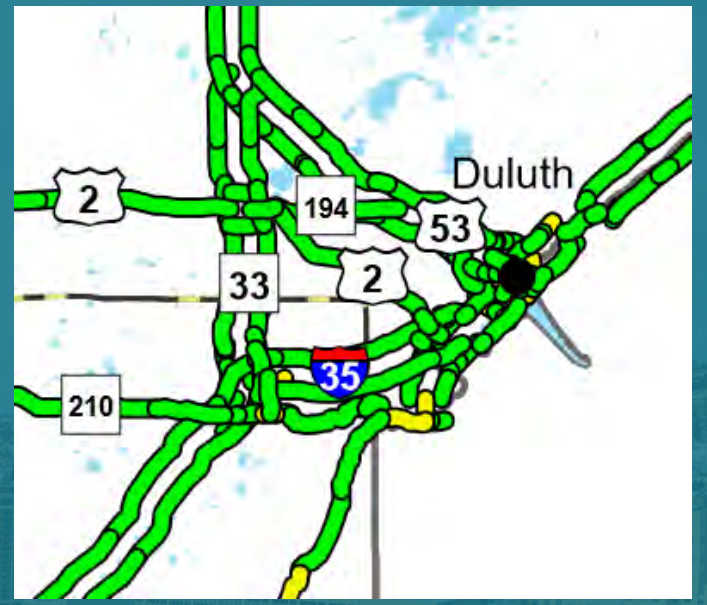
- TPI Interchange
- Thompson Hill
- 5th Ave bridge
- Blatnik Bridge



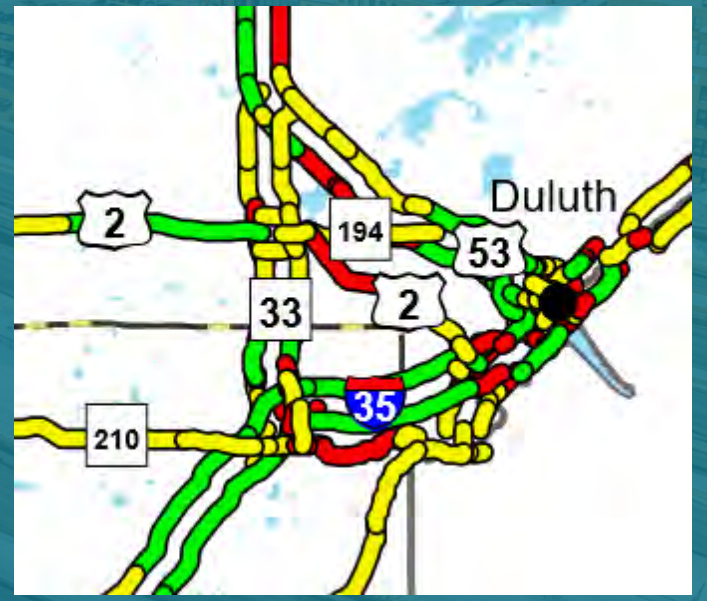
PAVEMENT CONDITIONS

- Most segments in good shape
- Thompson Hill, Canal Park pavement at end of service life
- North end approaching end of service life

Pavement Quality Index



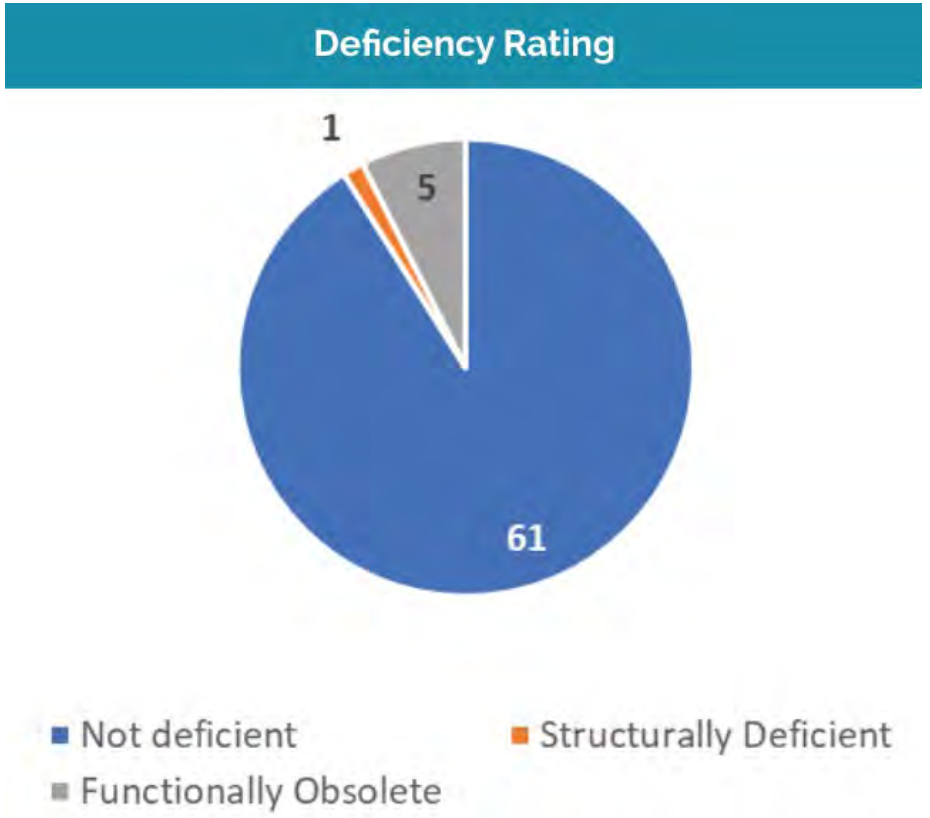
Remaining Service Life



I-35 Connects

STRUCTURES

- 67 bridges along corridor
- Steel Continuous-Beam Span most common bridge type (23 of this type)
- Deficient & Obsolete Structures
  - 40th Avenue W overpass
  - S 37th ½ Avenue West overpass
  - Exit 256A from NBI-35 to Mesaba Ave
  - E Superior Street (at Brewery Historic District Tunnel)
  - E Superior Street (at Jay Cooke Plaza Tunnel)
  - 5th Avenue W overpass



RETAINING WALLS AND TUNNELS

- 12 walls present in MnDOT ROW
  - 11 are in the northernmost 2.5 miles

- Thompson Hill wall
  - By far the oldest wall, made of stone
  - 1,000 feet long

- 4 tunnels present – combined 3,300 feet long
  - Leif Erickson tunnel – 1,480 feet long
  - Bordered by railroad, historic buildings, lakefront

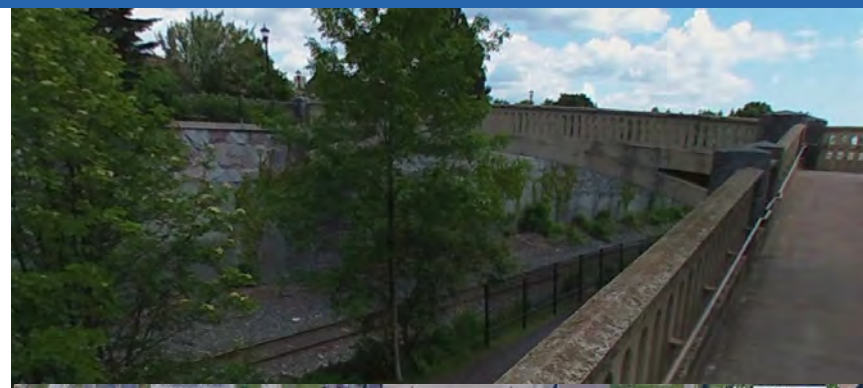
Thompson Hill Stone Wall

INVENTORY

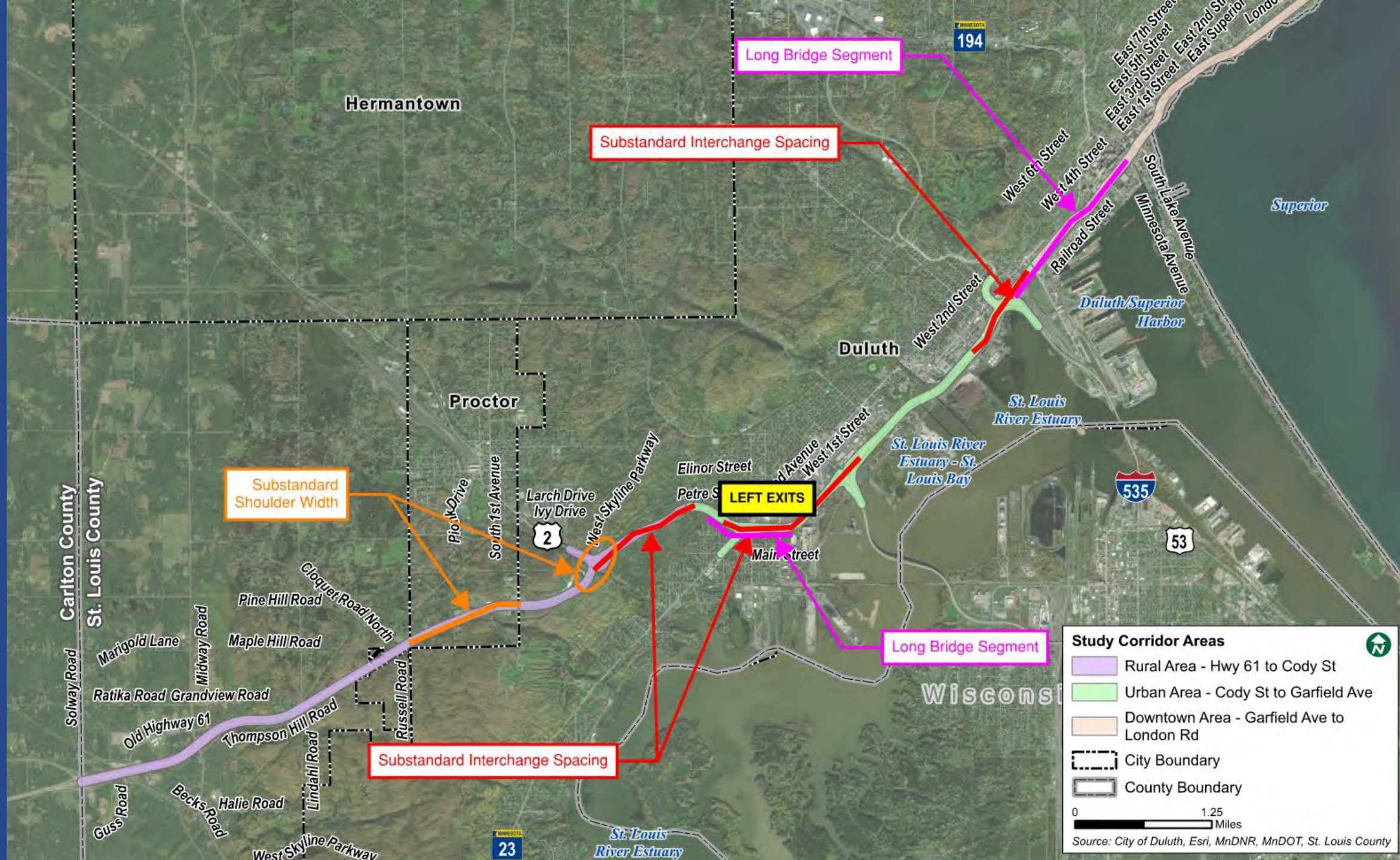
$750,000,000+
TO CONSTRUCT

INTERSTATE 35

from Thompson Hill to 26th Ave E
(in 2022 dollars)



DESIGN REVIEW

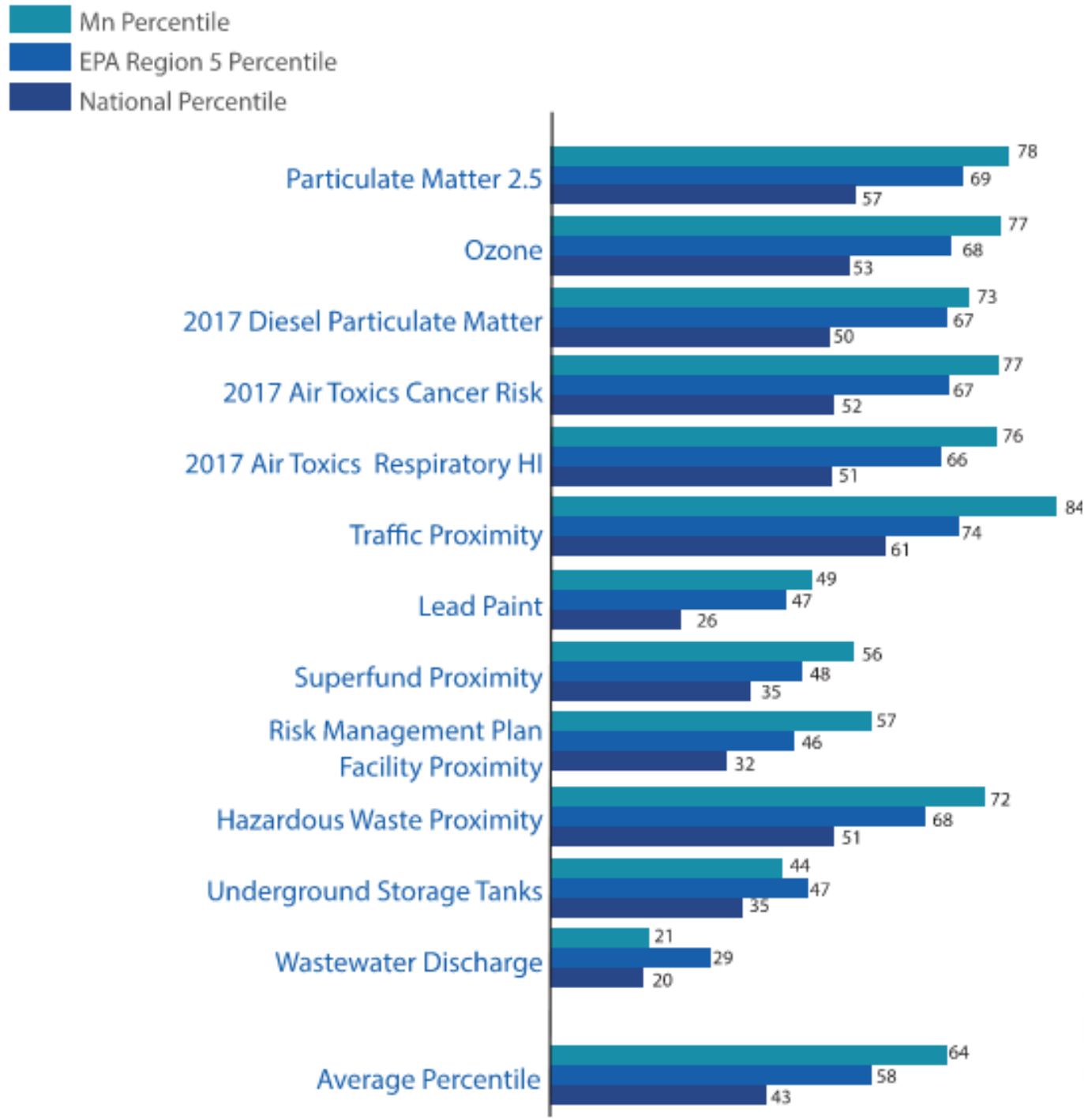


I-35 Connects

ENVIRONMENTAL JUSTICE

- Across all EJ Factors, the 1-mile area around the I-35 Corridor ranks in the 64th Percentile for the State

- Concentrations of EJ factors near and around historic shipping, industrial, and manufacturing centers:
  - Lincoln Park
  - Central Hillside
  - Downtown

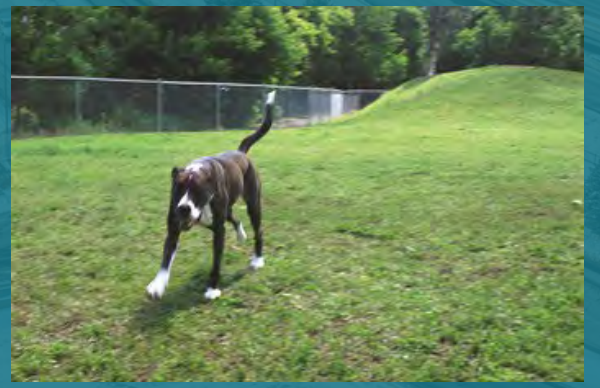


REGULATED MATERIALS & HAZARDOUS/CONTAMINATED WASTE SITES

- Present throughout project area
- Concentrations north of Grand Ave, core Downtown areas
- Historical manufacturing and industrial land uses
- Phase I ESA recommended with any design work

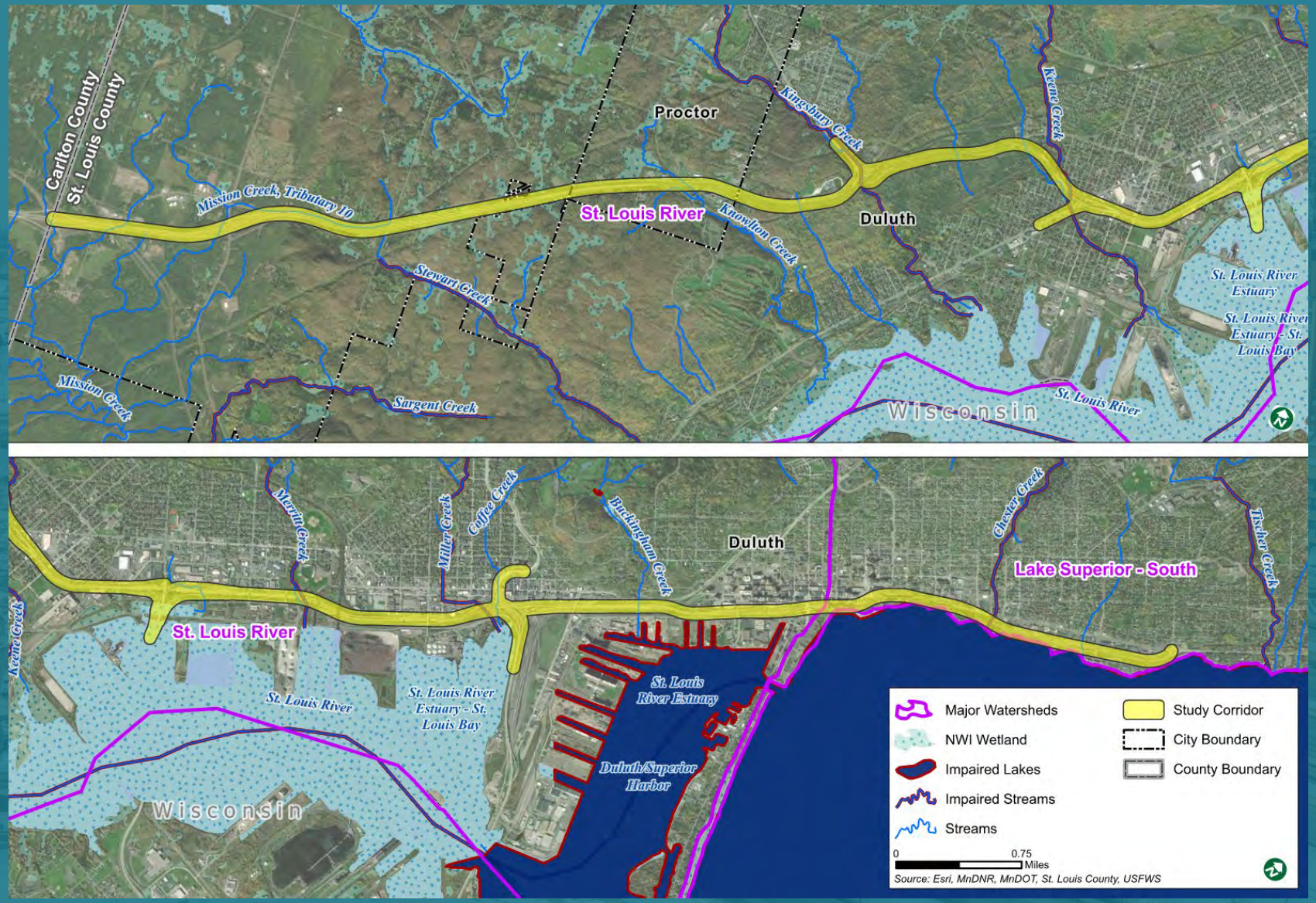
SECTION 4(F)/6(F)

- 4(F) Properties
  - Bayfront Park
  - Cross City Trail
  - Duluth Rose Garden
  - Gichi-ode Akiing Park
  - Keene Creek Park
  - Jay Cooke Plaza
  - Lakewalk Park/Trail
  - Leif Erikson Park
  - Sister Cities Park
  - Spirit Mountain



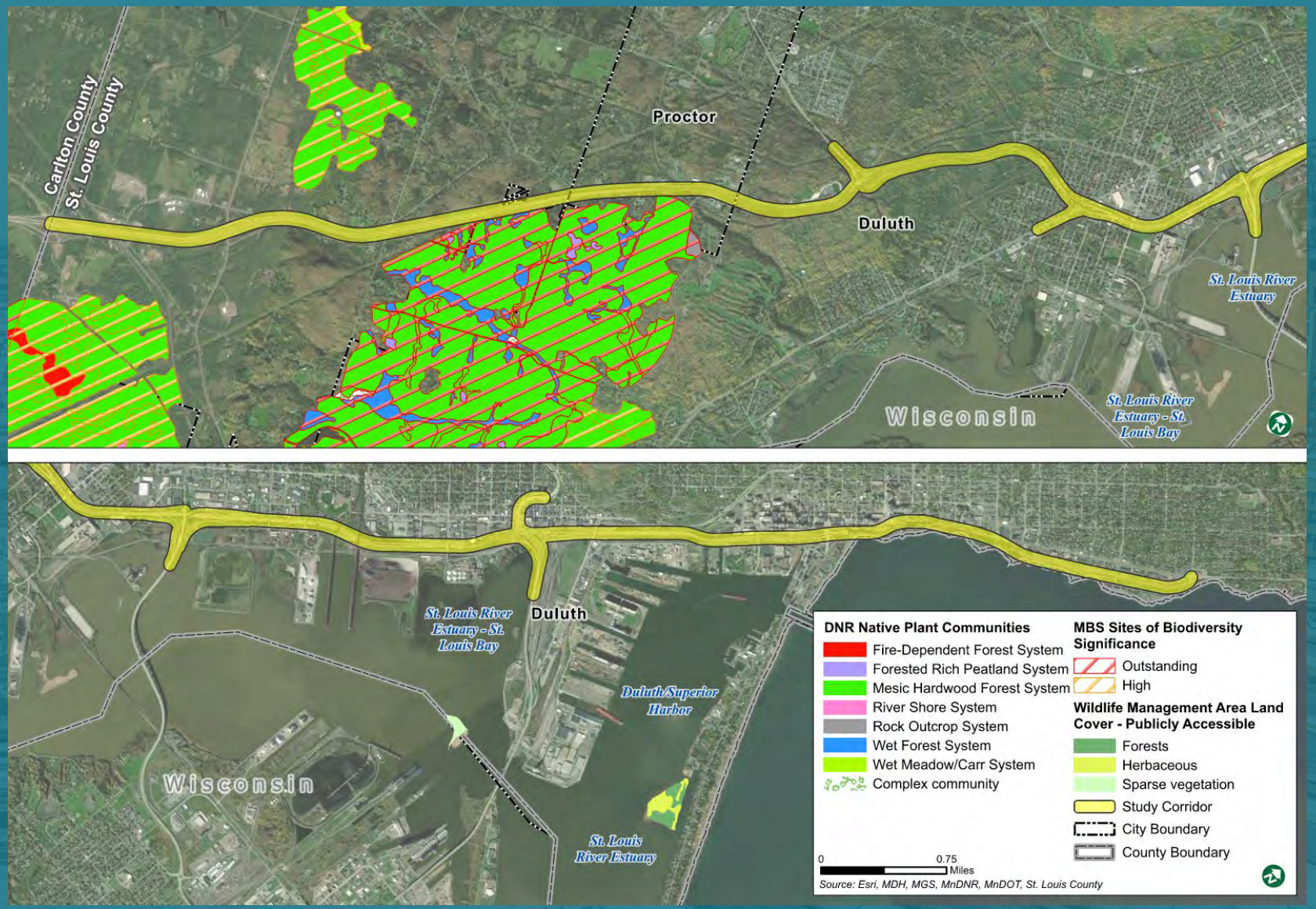
SURFACE WATER RESOURCES

- 6 impaired streams within project area
- Drain towards Lake Superior and St Louis River
- Wetland ditch and artificial wetlands present in rural section



WILDLIFE HABITAT, THREATENED & ENDANGERED SPECIES

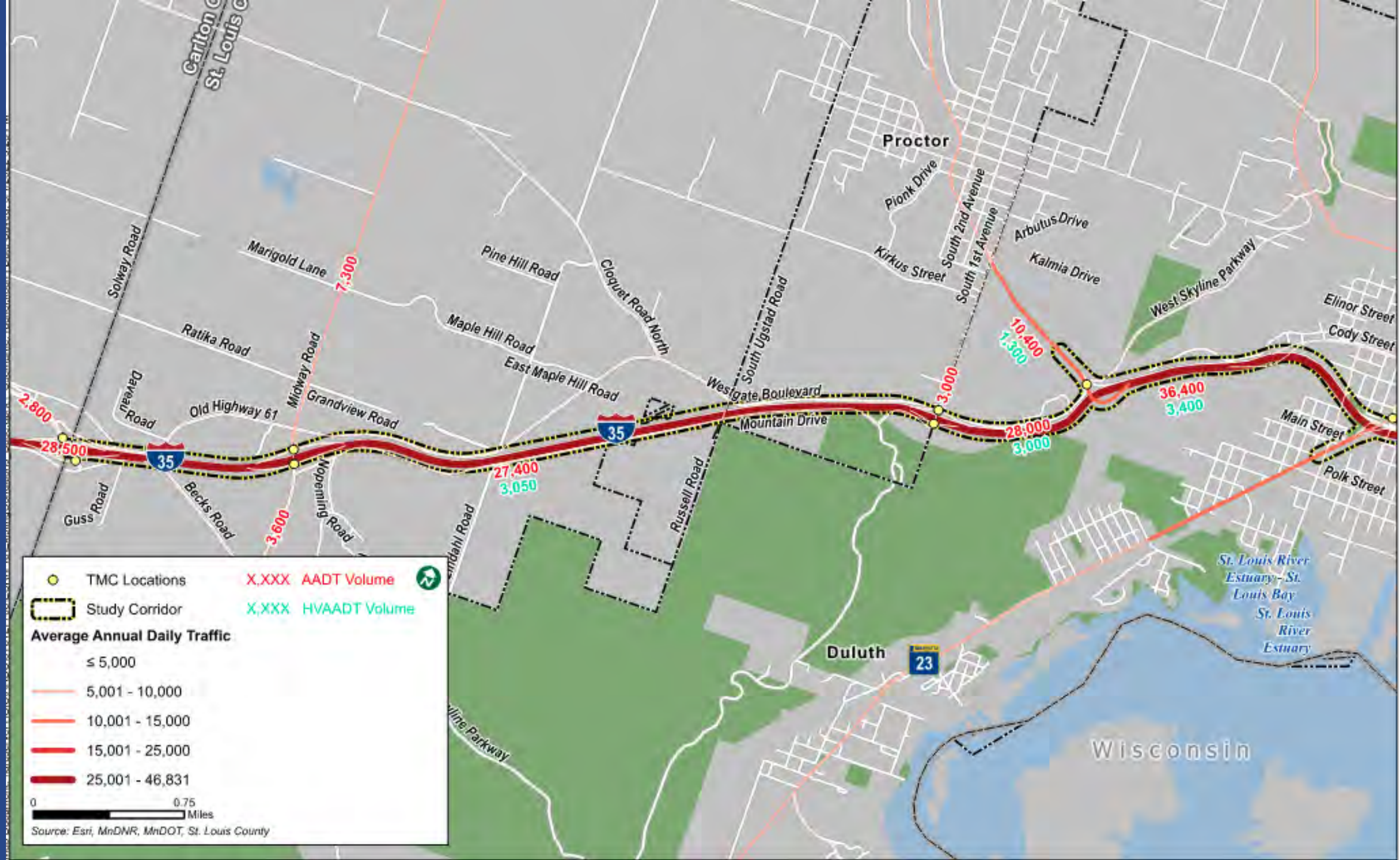
- One site of "outstanding biodiversity" identified
  - Between Midway Ave and Boundary Ave
- Several protected species present in the region



FUNCTION

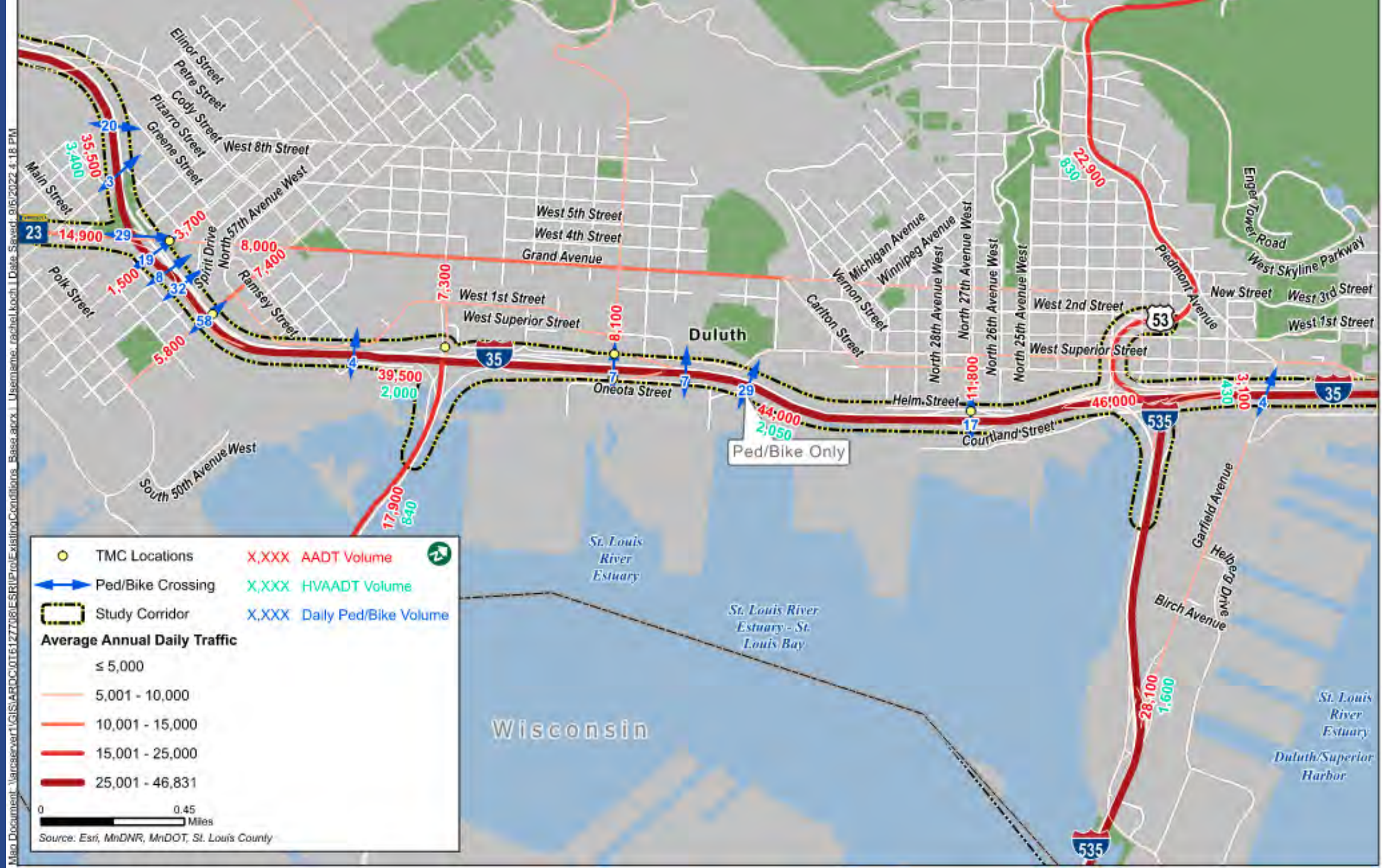
I-35 Connects

RURAL SEGMENT



I-35 Connects

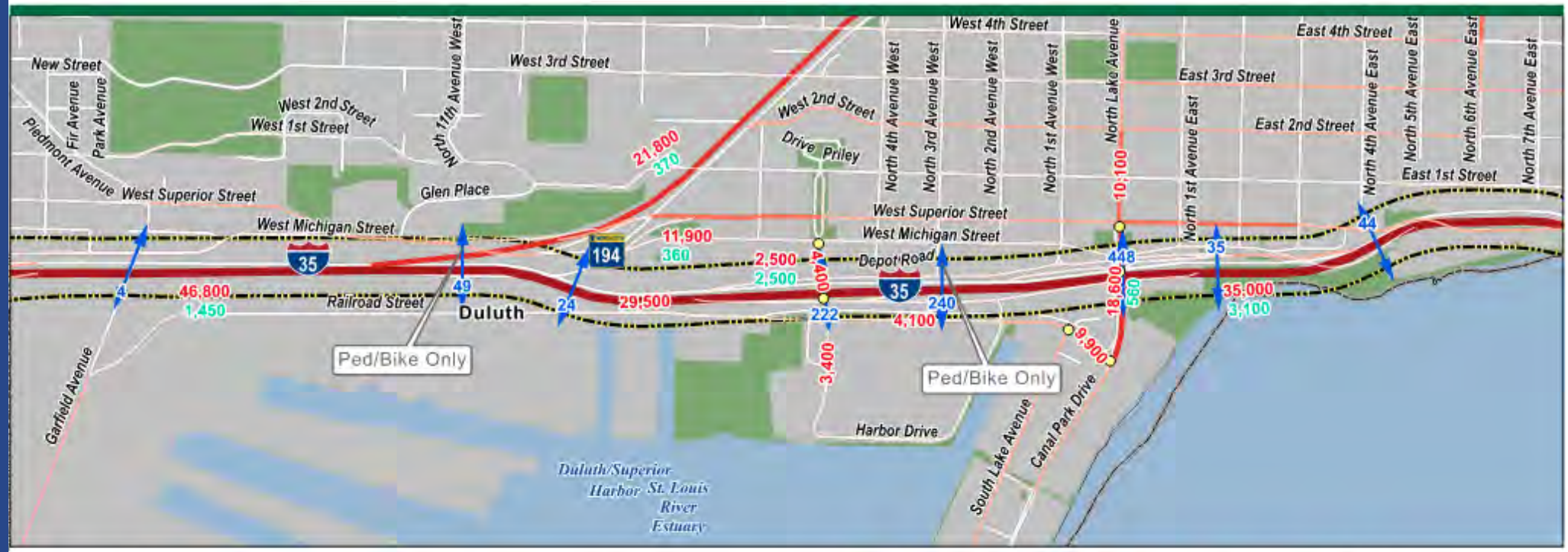
URBAN SEGMENT

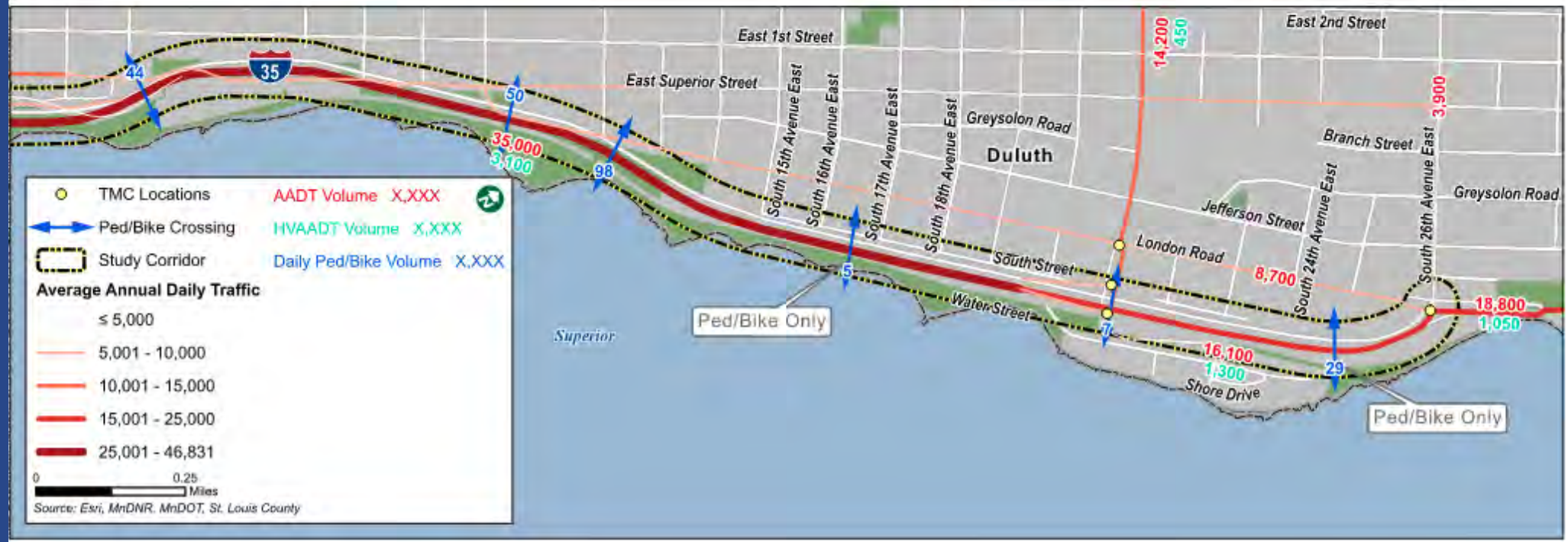


I-35 Connects

Map Document: \\arcserver1\GIS\ARDC\0T6127708\ESRI\Pro\ExistingConditions_Base.aprx | Username: rachel.koch | Date Saved: 9/6/2022 4:18 PM

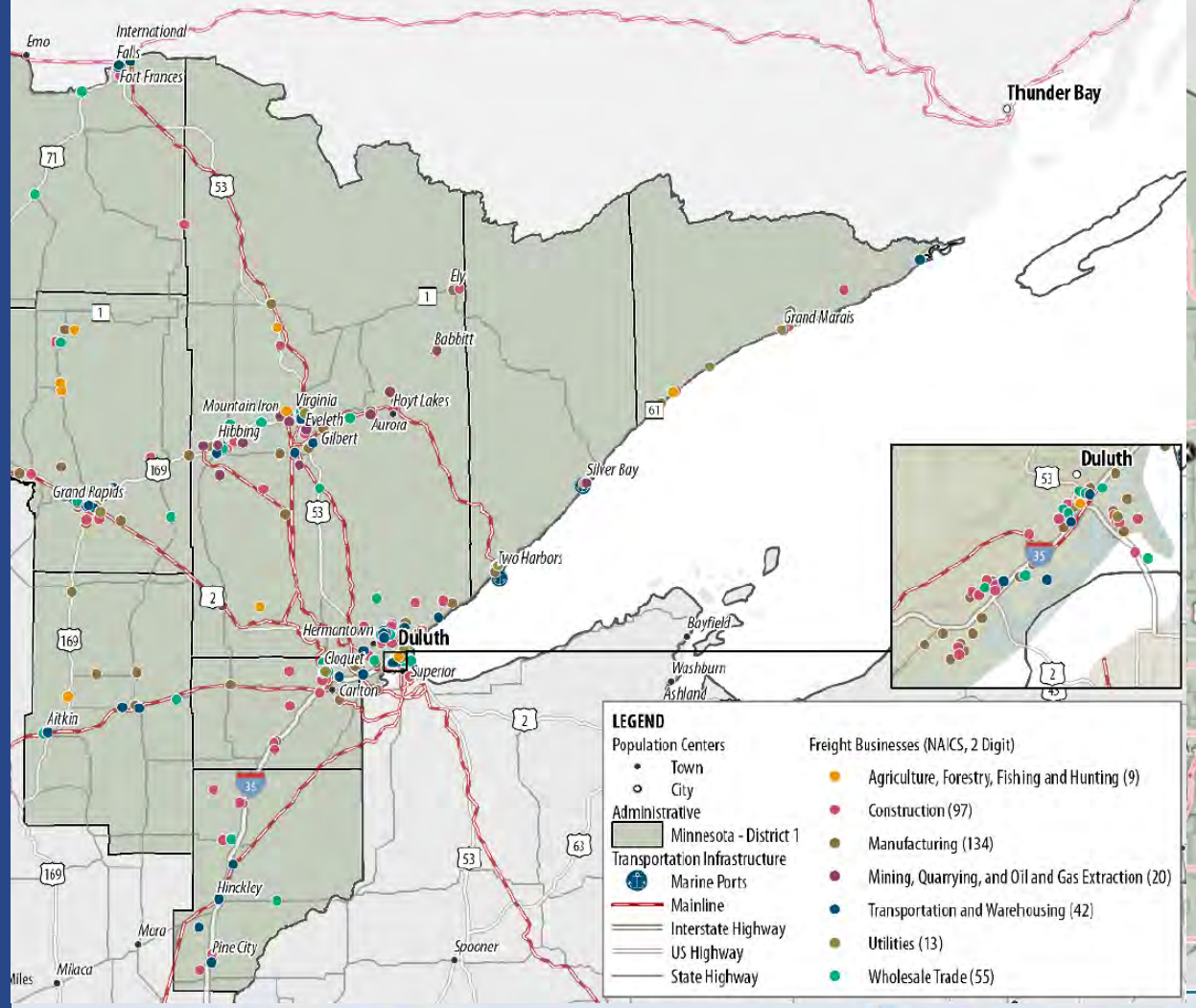
DOWNTOWN SEGMENT

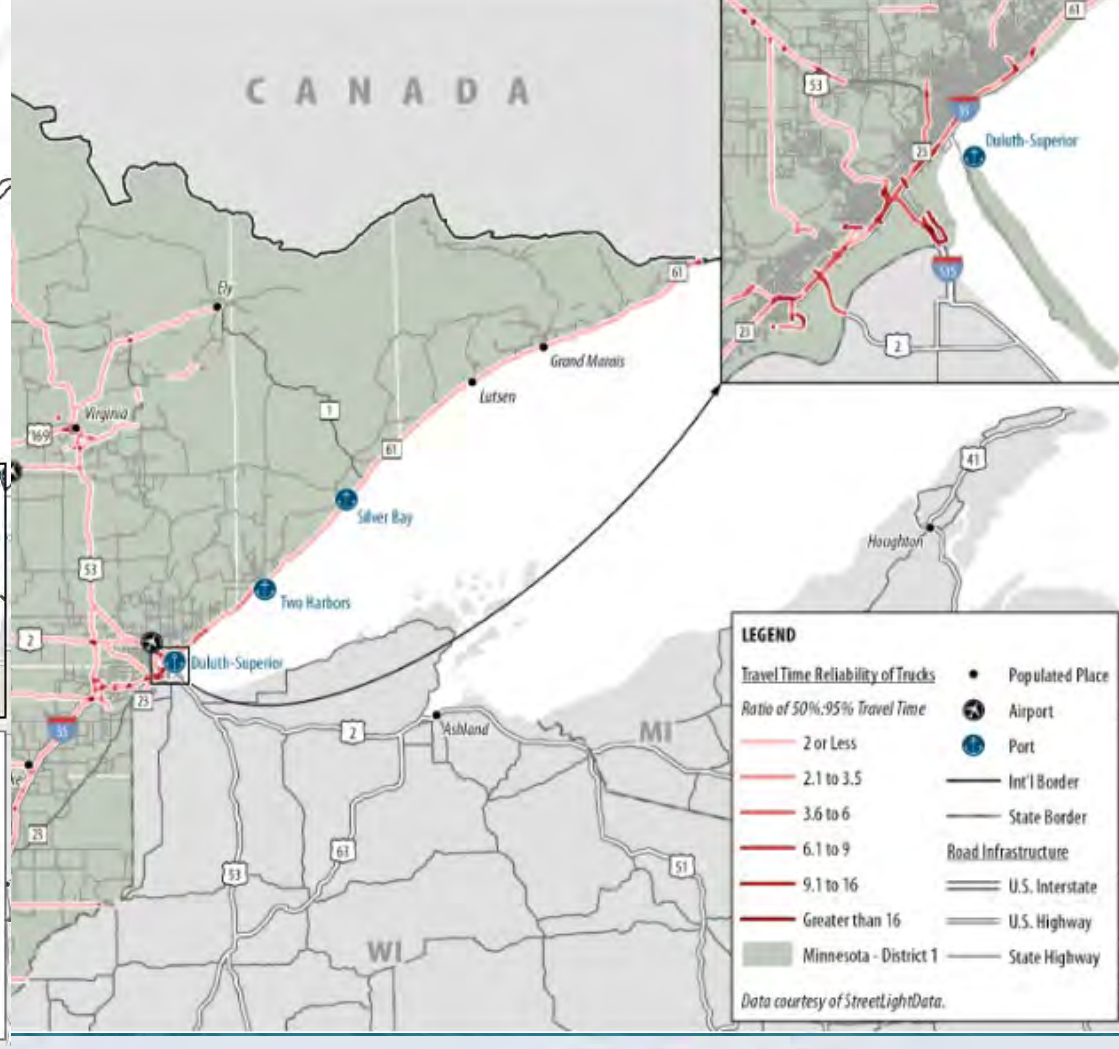




I-35 Connects

FREIGHT





45%

District 1 GDP generated by freight-relevant industries

$6.75b

District 1 GDP generated by freight-relevant industries

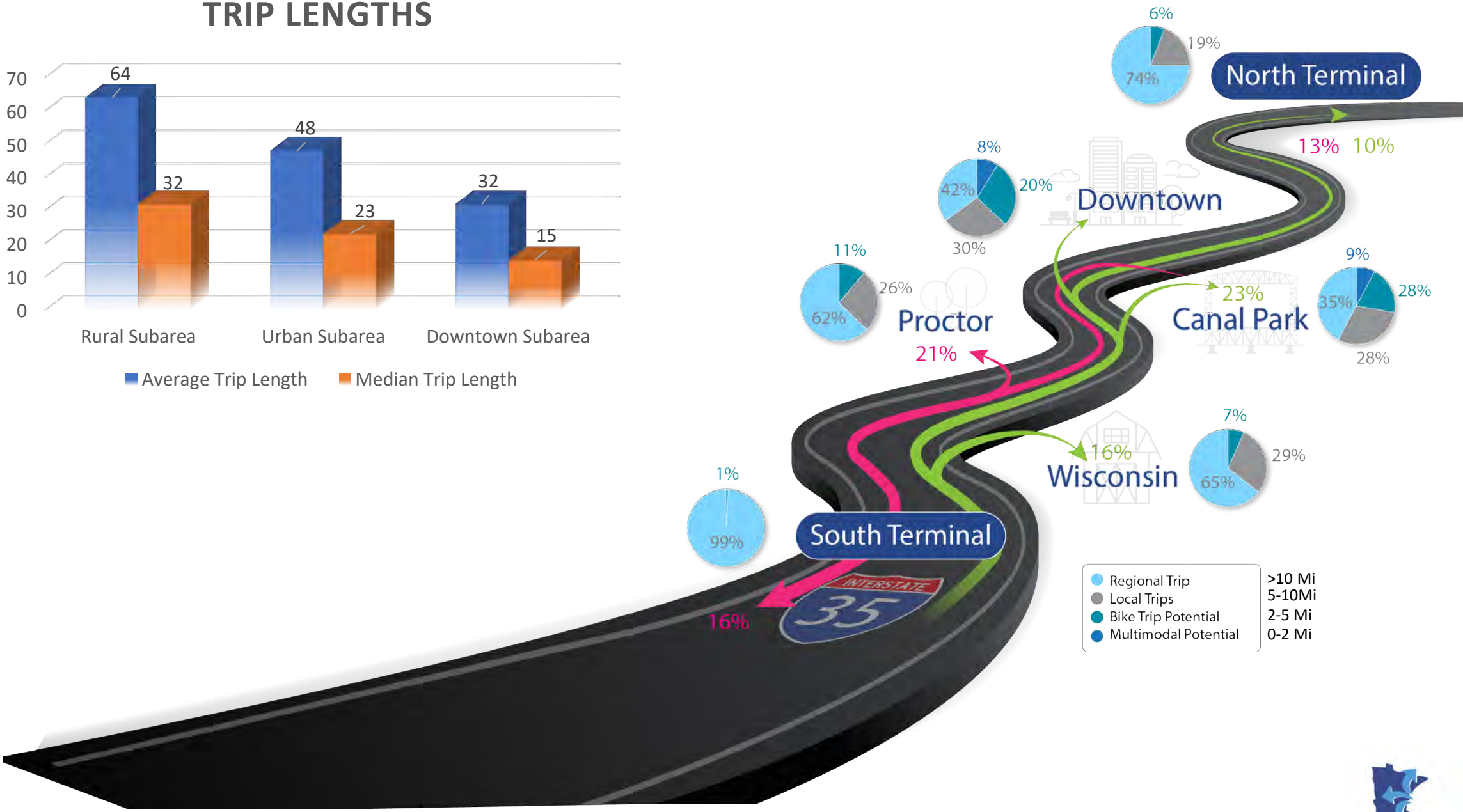
29%

District 1 workers employed by freight-relevant industries

I-35 Connects

TRIP ROUTING

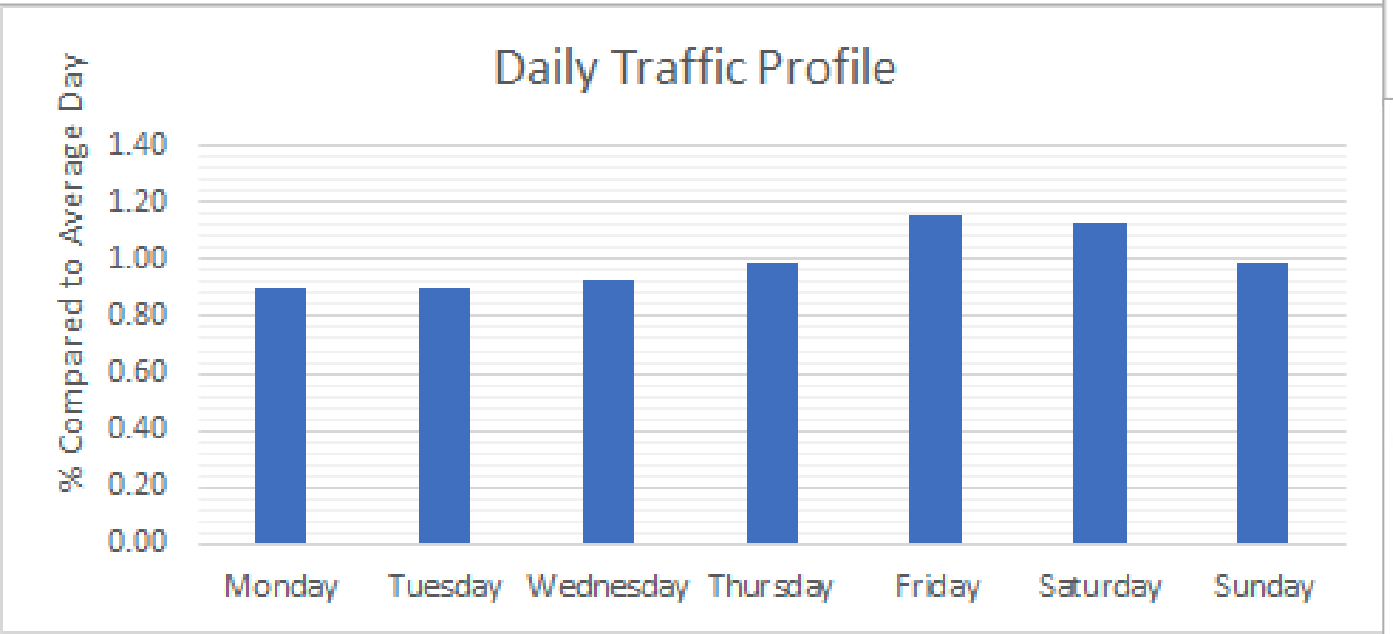
TRIP LENGTHS

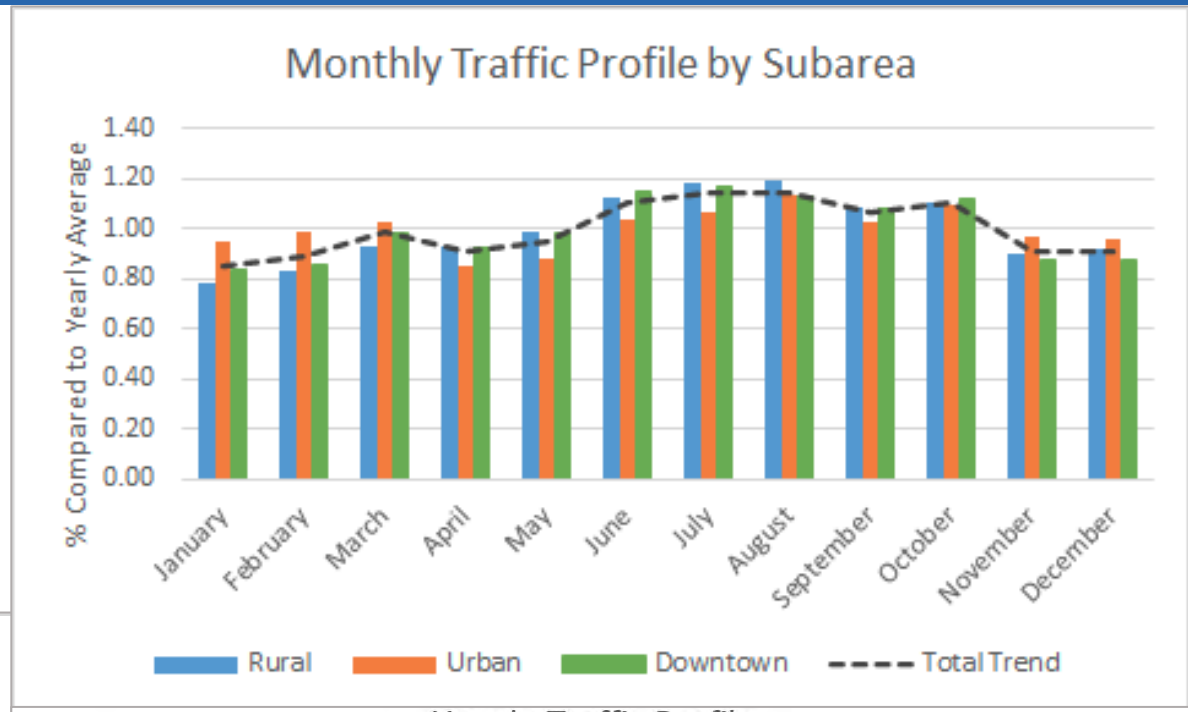


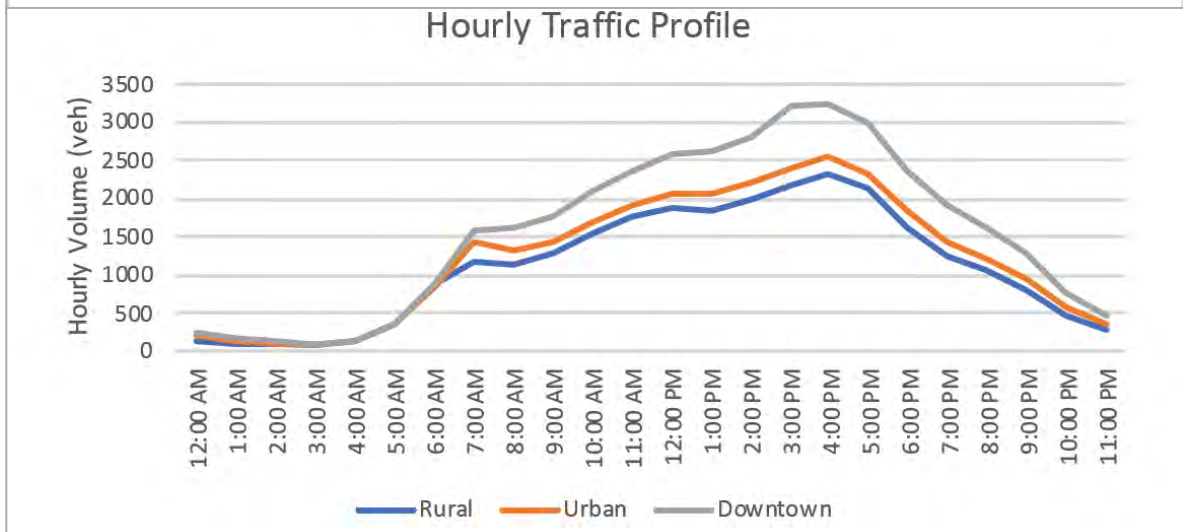
I-35 Connects

VARIABILITY

- Rural area sees greatest monthly fluctuations
- Urban area is the most stable
- June-October 10%+ increase from annual average
- December-February 10% decrease from annual average
- Friday 16% higher than weekly average
- Monday & Tuesday 10% lower than weekly average

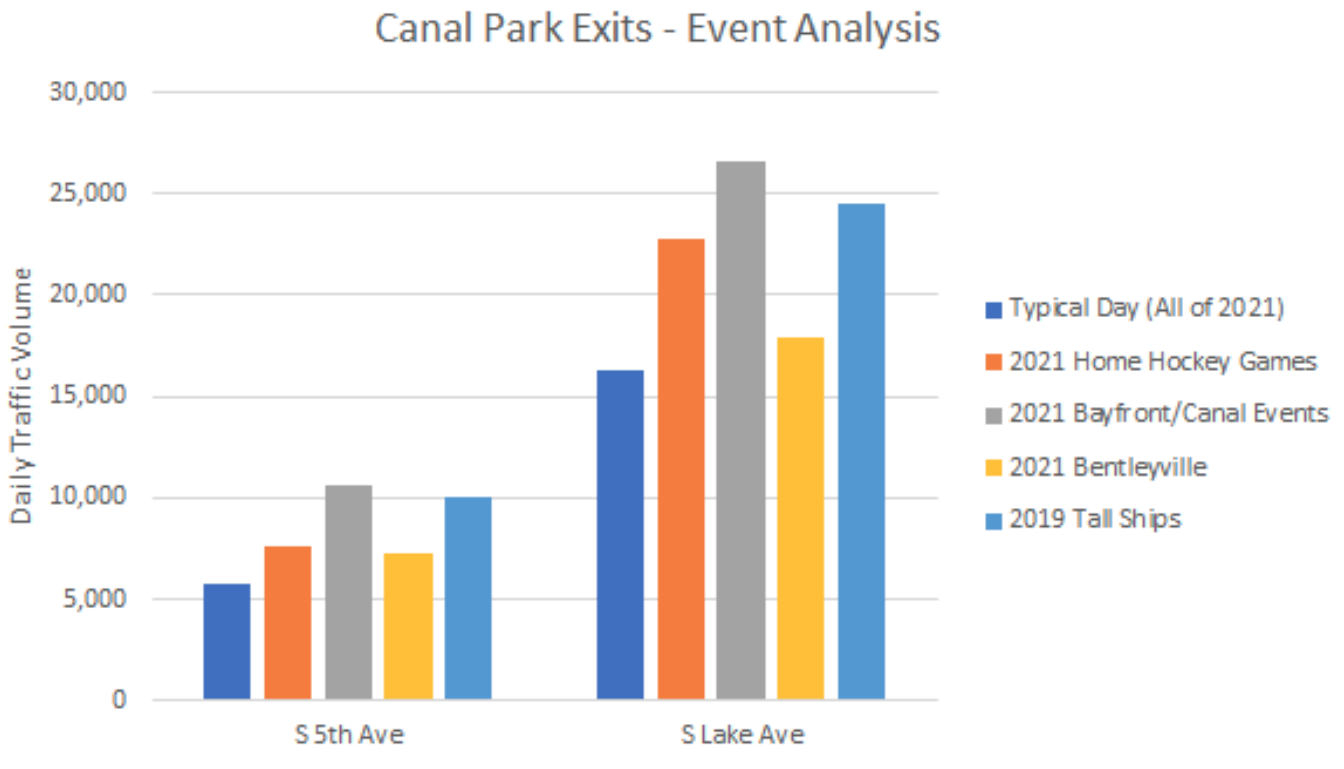






EVENT SCENARIOS

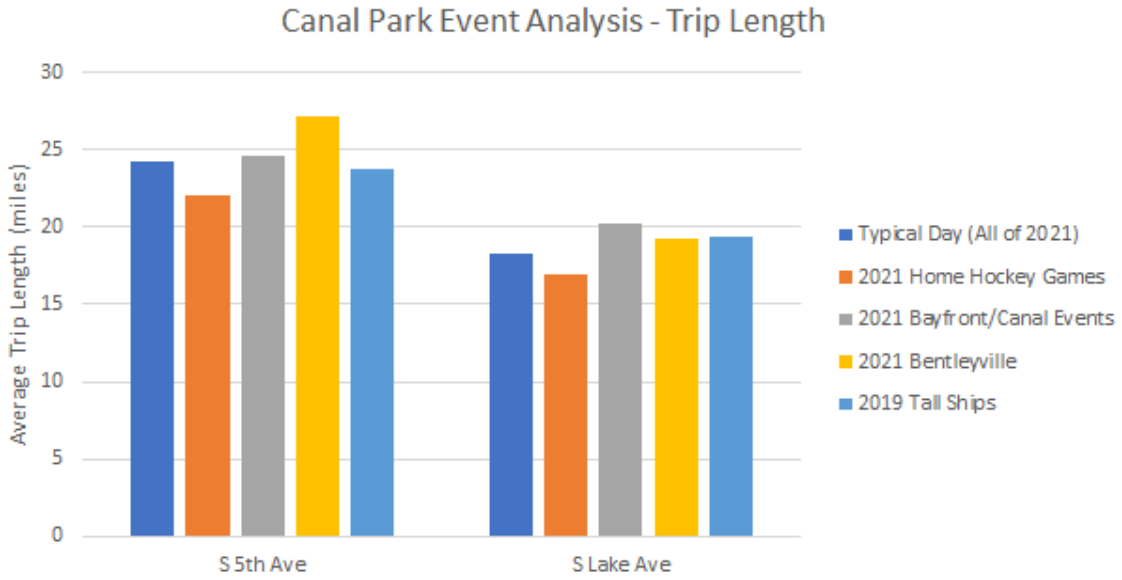
- Canal Park
- Bayfront Park
- Amsoil Arena
- Duluth Entertainment Convention Center
- Great Lake Aquarium
- Wade Stadium
- Downtown
- Spirt Mountain

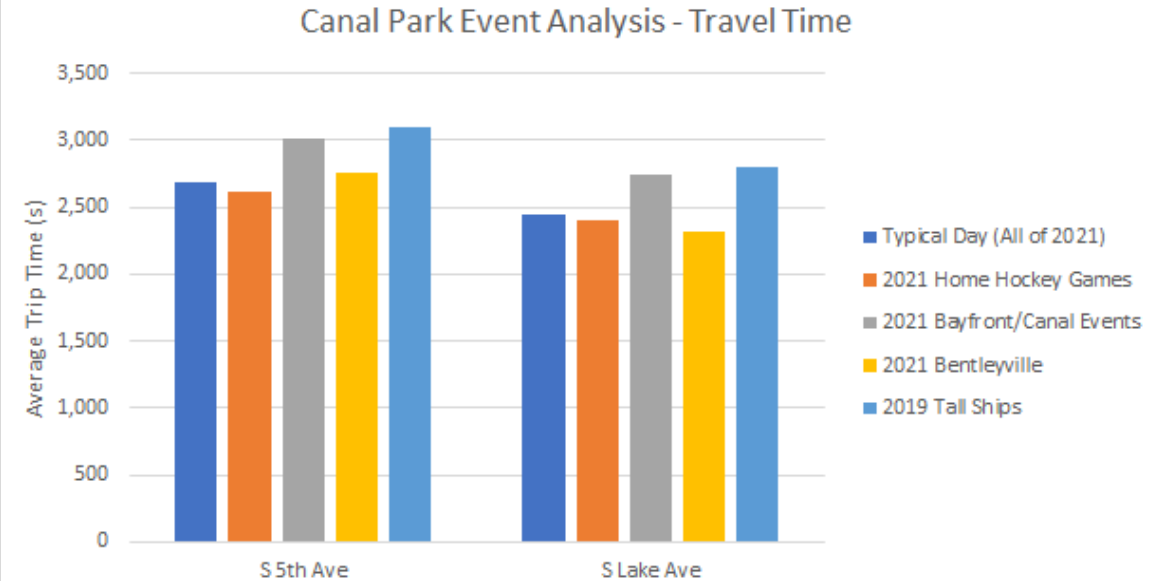


EVENT CONDITIONS

- UMD Hockey a local attraction
- Bentleyville and Canal Park/Bayfront events cause largest increase in length
- Events Add Delay to the System

Top origin zip codes for Canal Park/Bayfront Events via StreetLight Insight





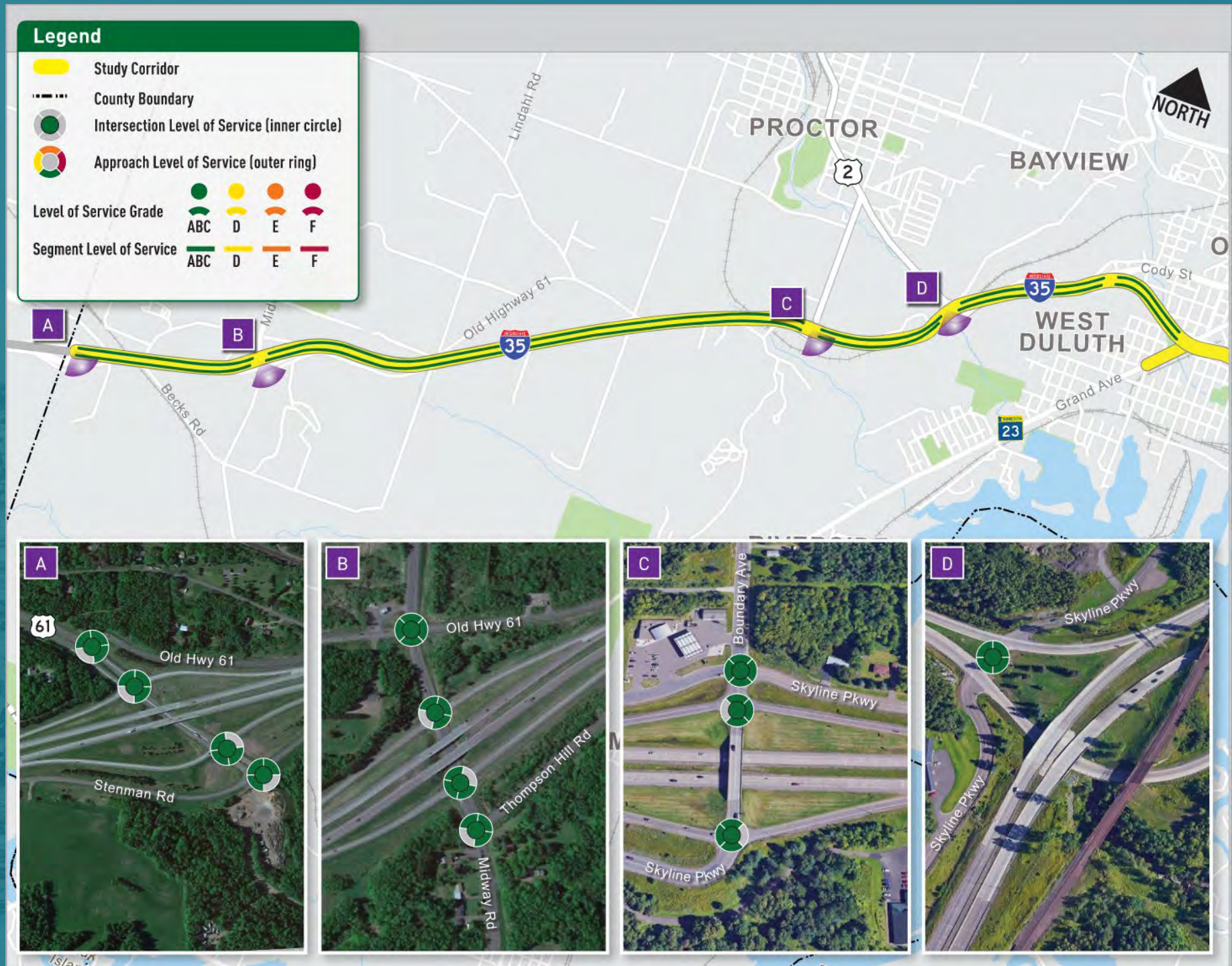
I-35 Connects

UTILITY

I-35 Connects

RURAL SEGMENT

- All segments LOS C or better
- All intersections, approaches LOS C or better
- Minimal queuing



I-35 Connects

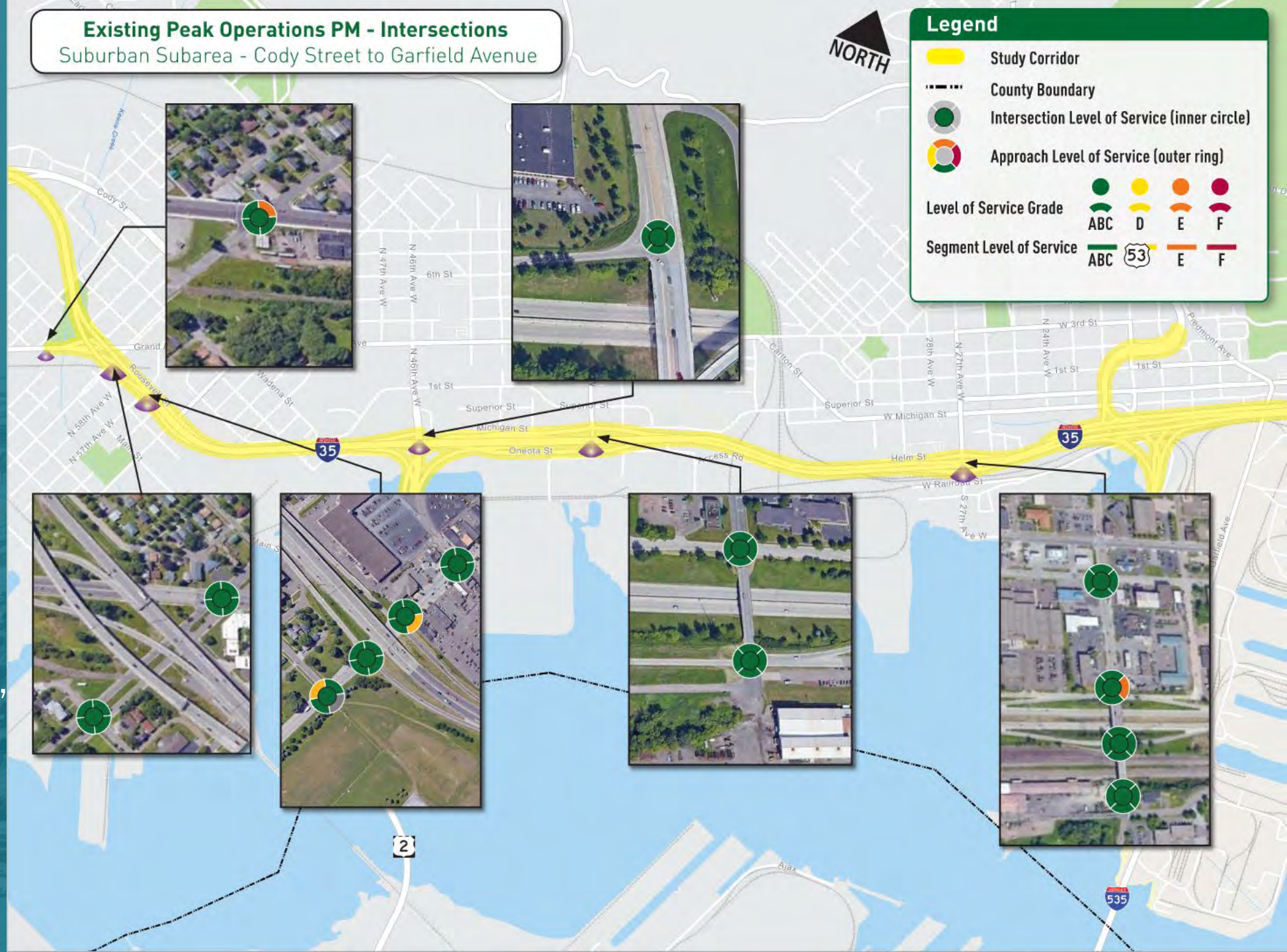
URBAN SEGMENT — AM

- NB Thompson Hill to Central Ave at LOS E
- All intersections LOS C or better
- Few approaches LOS D-E
- Average queues minimal throughout area

I-35 Connects

URBAN SEGMENT — PM

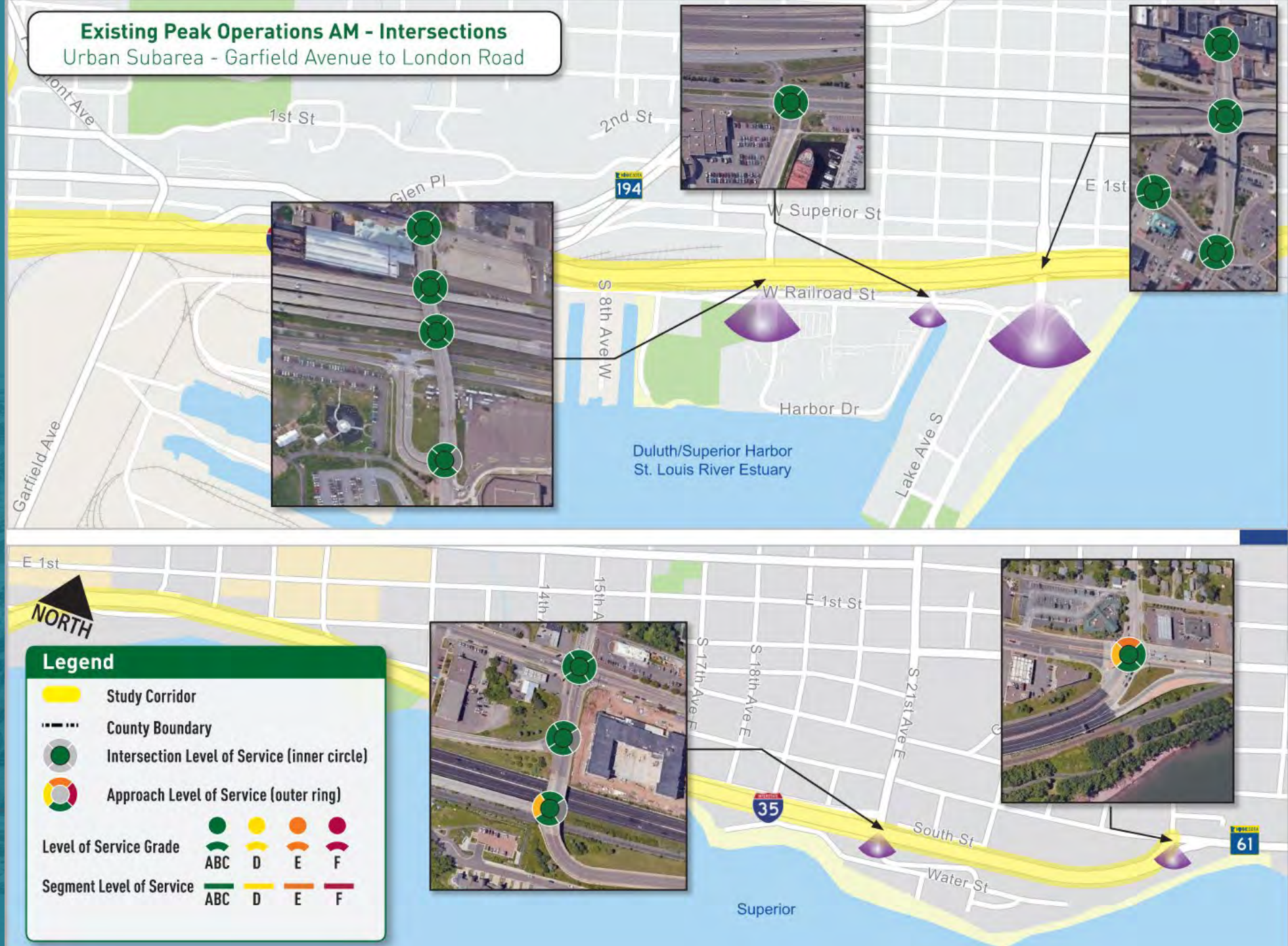
- All segments LOS or better
- All intersections LOS C or better overall
- Select approaches LOS D-E
- Queue issues at Central Ave, 27th Ave W



I-35 Connects

DT SEGMENT — AM

- NB TPI to Garfield Ave LOS E
- All intersections LOS C or better overall
- Select approaches LOS D-E
- Periodic queuing issues in Canal Park area
- Notable average queues at 26th Ave E



I-35 Connects

DT SEGMENT — PM

- NB 21st Ave to London Rd LOS E
- Lake Ave at Superior St – LOS D overall
- All other intersections LOS C or better overall
- Select approaches LOS D-E
- Periodic queuing issues in Canal Park area
- Notable average queues at 26th Ave E/TH 61

I-35 Connects

DAILY OPERATIONS

I-35 Connects

Overall Intersection LOS by Time of Day

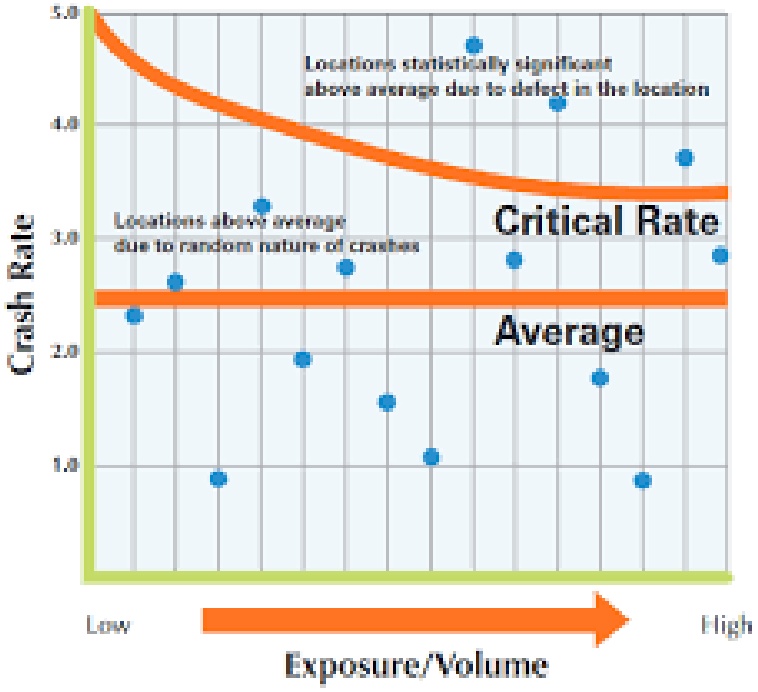
Intersection	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
5th Ave & Railroad St	B	A	A	A	A	A	A	A	B	B	B	A
Harbor Dr & 5th Ave	A	A	A	A	A	A	A	A	A	A	A	A
S I-35 & 5th Ave/Harbor Dr	B	B	B	B	B	B	B	B	B	B	B	B
N I-35 & 5th Ave/Harbor Dr	B	B	B	B	B	B	B	B	B	B	B	B
5th Ave & Michigan St	A	A	A	A	A	A	A	A	A	A	A	A
I-35 & Railroad St/Harbor Dr	A	A	A	A	A	A	A	A	A	A	A	A
Railroad St & Lake Pl Dr/Lake Ave	A	A	A	A	B	B	B	B	B	B	C	B
Railroad St & Lake Ave/Canal Park Dr	B	B	B	B	B	B	B	B	B	C	C	B
I-35 & Lake Ave	A	A	A	A	A	A	A	A	A	B	A	A
Lake Ave & Superior St	B	B	B	B	B	B	B	C	C	D	C	B

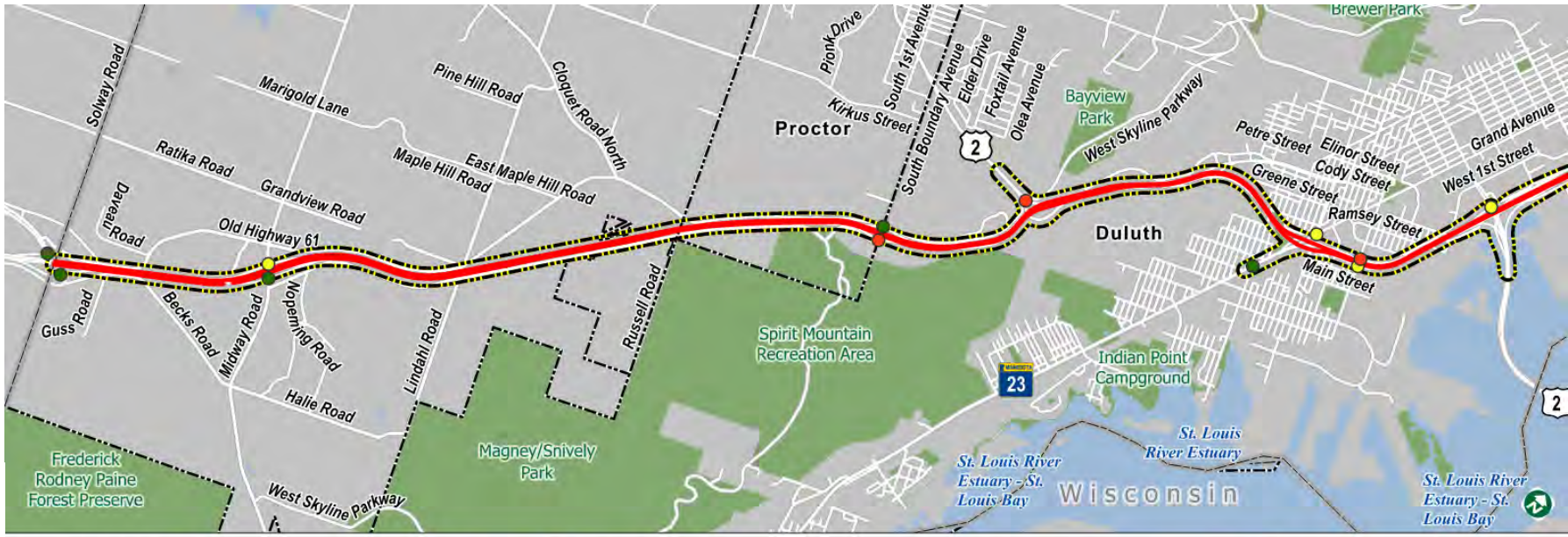
Limiting Movement LOS by Time of Day

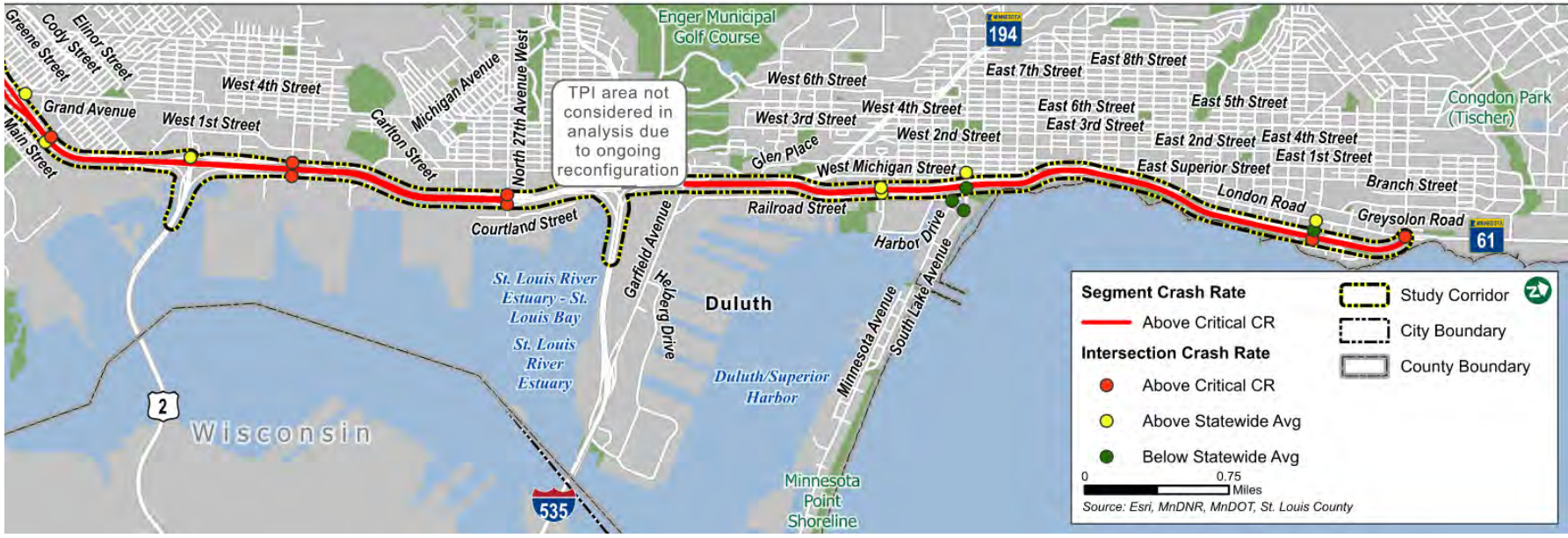
Intersection	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
5th Ave & Railroad St	B	B	B	A	B	B	B	B	B	C	B	A
Harbor Dr & 5th Ave	A	A	A	A	B	B	B	B	B	B	B	B
S I-35 & 5th Ave/Harbor Dr	C	B	B	B	B	B	C	C	C	C	D	B
N I-35 & 5th Ave/Harbor Dr	C	C	C	C	C	C	C	C	C	C	D	C
5th Ave & Michigan St	B	B	A	A	B	B	A	B	B	B	B	A
I-35 & Railroad St/Harbor Dr	C	C	C	C	C	C	C	C	D	D	D	C
Railroad St & Lake Pl Dr/Lake Ave	D	E	D	D	E	D	D	D	D	D	D	E
Railroad St & Lake Ave/Canal Park Dr	D	D	D	D	D	D	D	D	D	D	D	D
I-35 & Lake Ave	C	C	C	C	C	C	C	C	C	D	D	C
Lake Ave & Superior St	C	C	C	C	C	C	C	D	D	E	D	C

CRASH RATES

- All segments above statewide average Critical Crash Rate
- Segments with highest crash rates
  - 5th Ave-Lake Ave
  - Thompson Hill-Central Ave

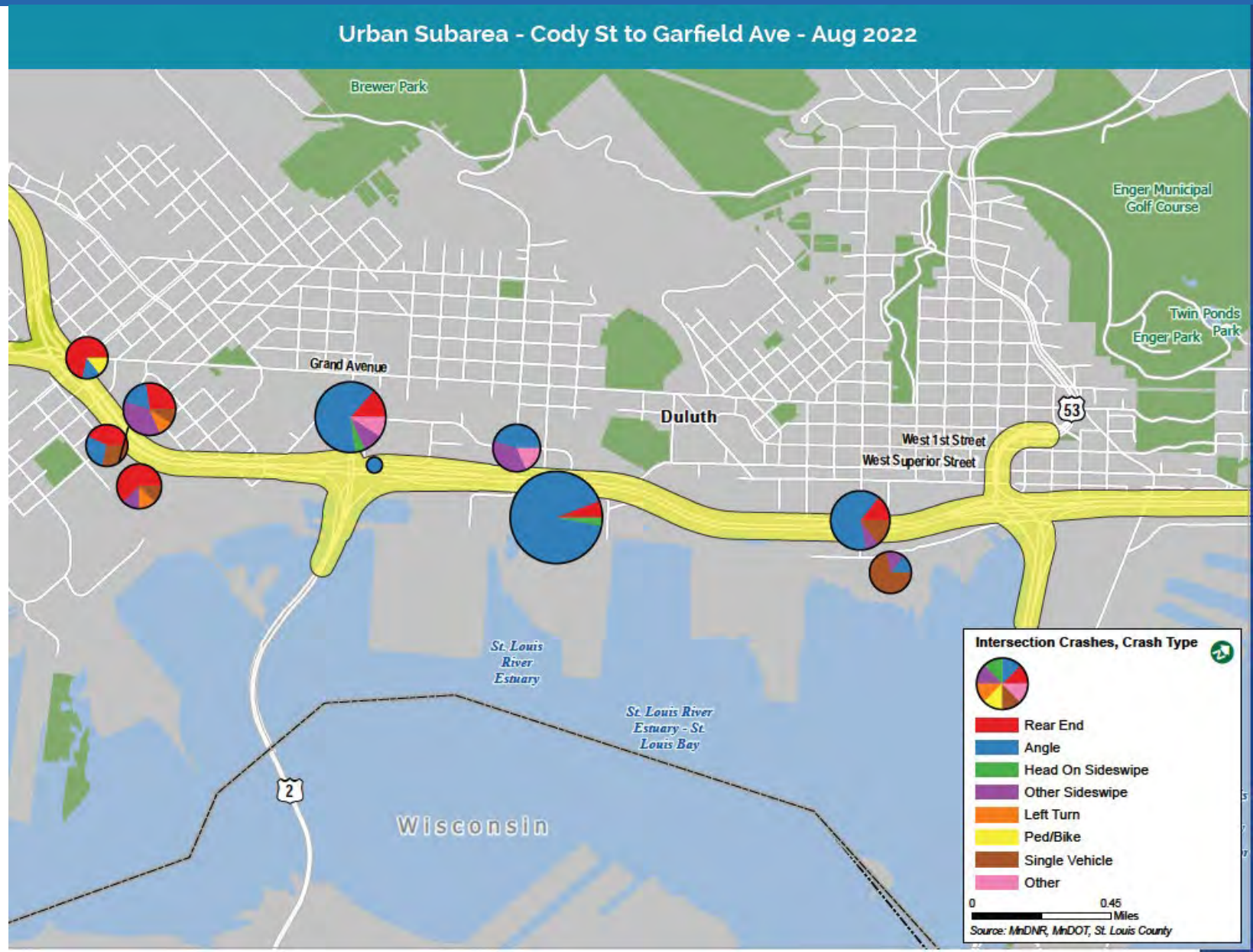






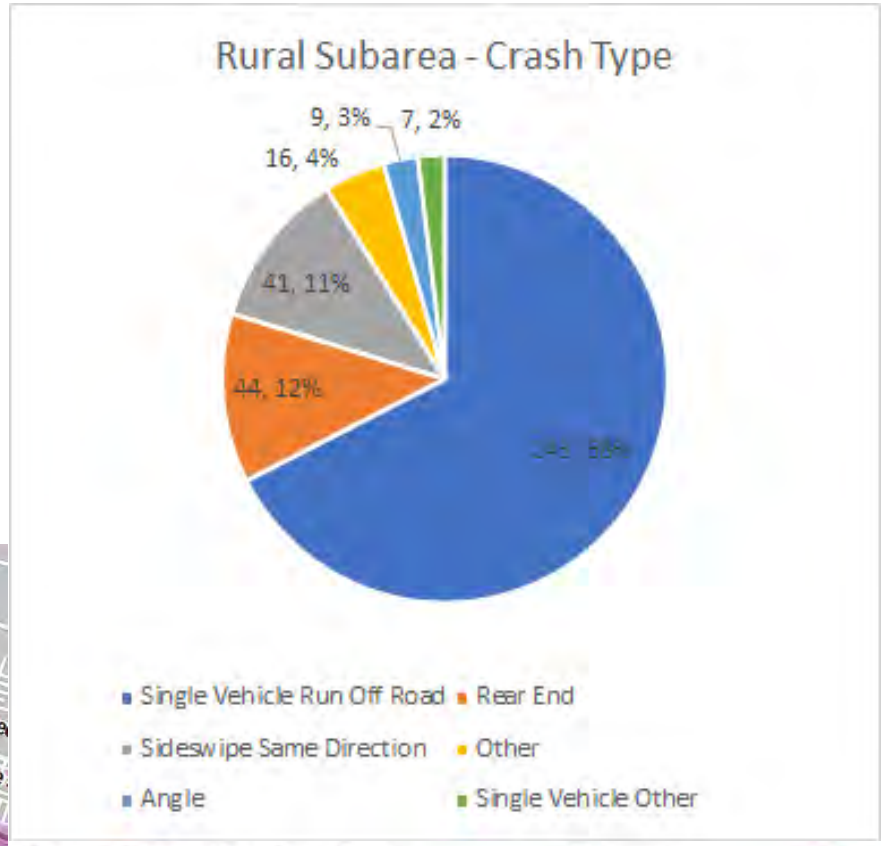
CRASH RATES

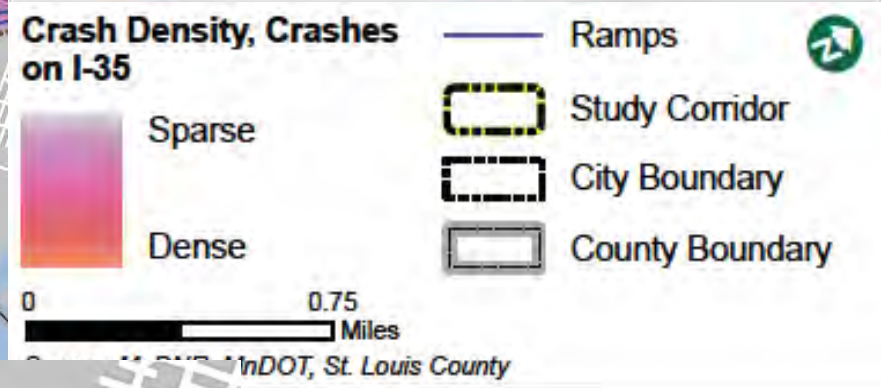
- 17/23 (74%) intersections above statewide average crash rates
- 9/23 (39%) intersections with above critical
- Intersections most above critical index
  - 40th Ave/W Michigan at I-35 SB Ramp
  - 27th Ave/Helm St at I-35 SB Ramp
  - Central Ave at I-35 SB Ramp



RURAL SEGMENT SAFETY

- 68% run off road crash type
  - 75% of officer reports use the phrase "lost control"
- 60% occur November – February
  - These months see the lowest traffic volumes!
- 1/3 occur under snow/ice covered roadway conditions
- 7% involve trucks



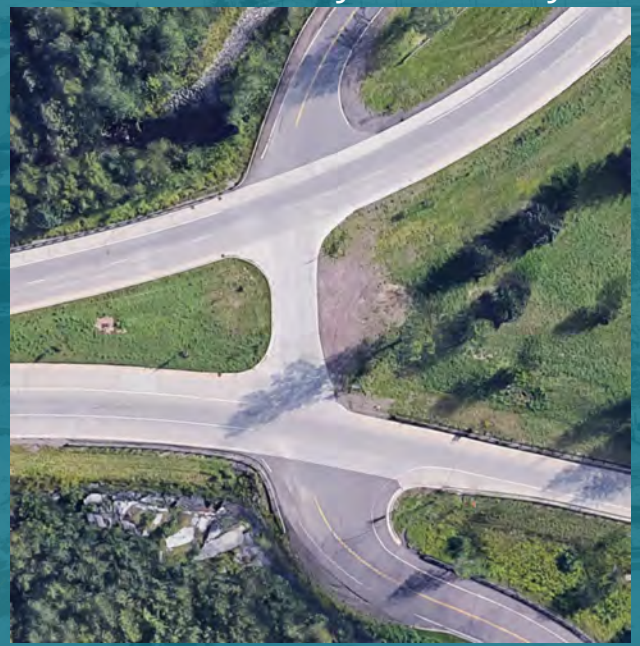


RURAL HOTSPOTS

Boundary Ave/Skyline Pkwy at I-35 NB

- 60% right angle/left turn crash type
- Critical index = 1.02
- Skew/curvature of south leg limiting sight distance
- Uncontrolled southbound approach may cause confusion

US 2 at Skyline Pkwy

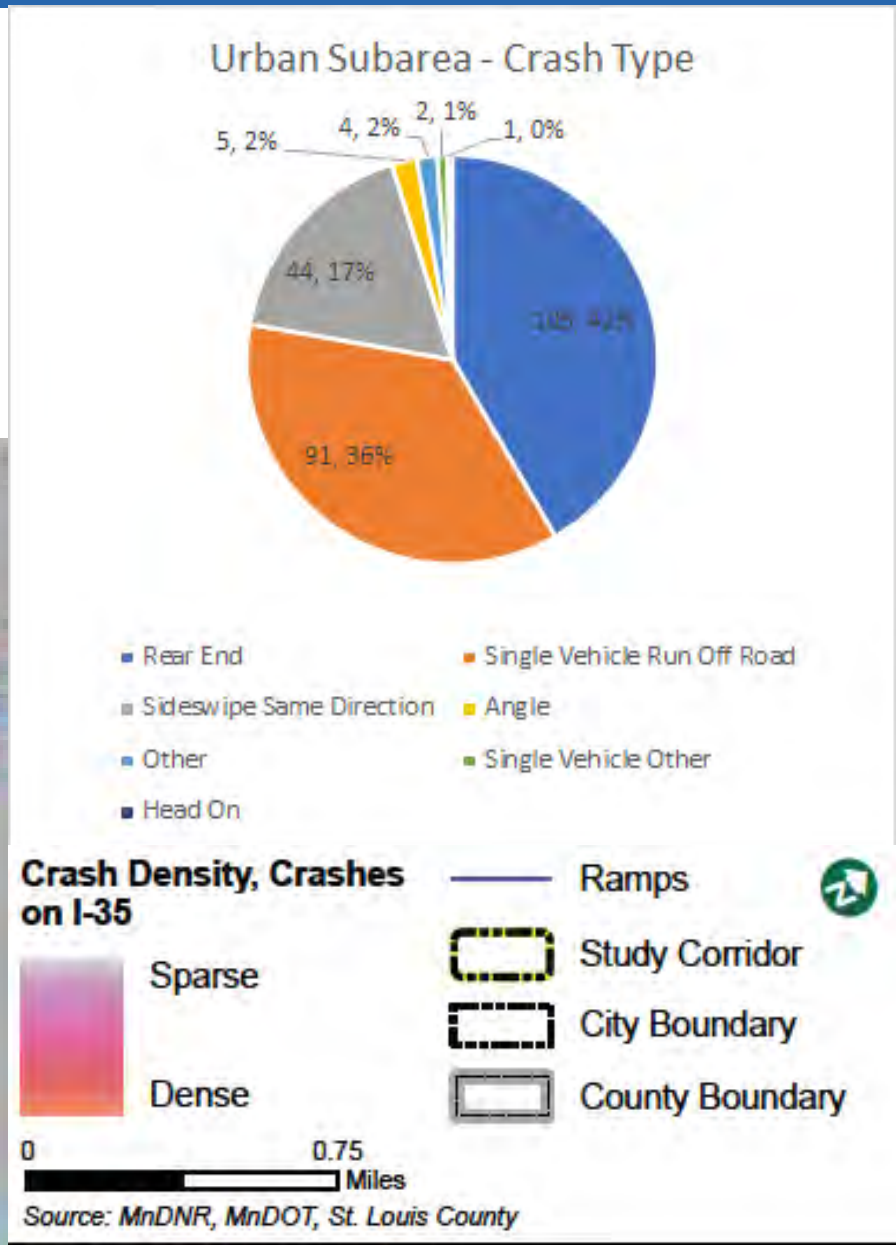


- 50% of crashes during nighttime hours
  - Lighting is present
- 50% occur December-January
- 1/3 sideswipe same direction crash type
- Critical index = 1.47

I-35 Connects

URBAN SEGMENT SAFETY

- Rear end, run off road, sideswipe same crash types
- 35% occur December – January
- 50% occur under snow/ice/rain covered roadway conditions



URBAN HOTSPOTS

Central and Grand Avenues

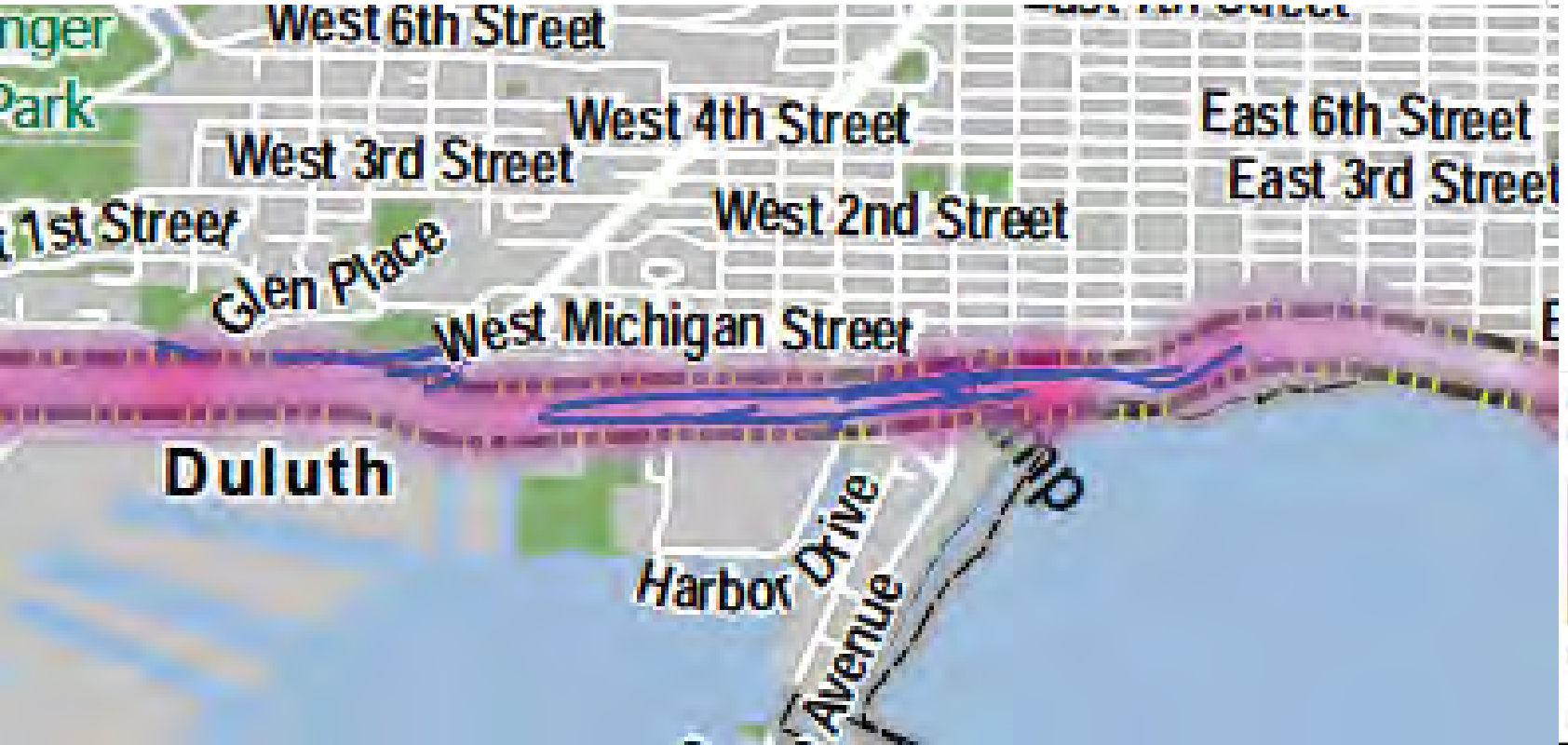
- 15% involve merge/diverge maneuver – LEFT ENTRANCE/EXIT
- 50% occur 6 AM – 10 AM
- Crashes on elevated ramps very common during winter weather
- Central Ave at I-35 SB
  - Critical index = 1.73

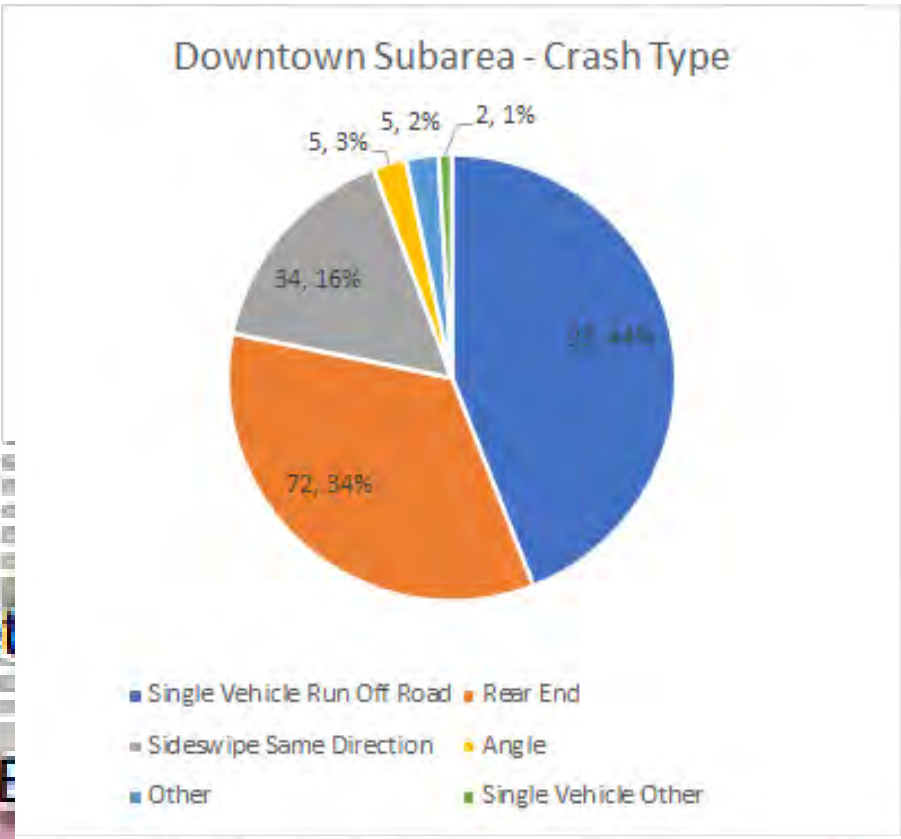
40th Ave Ramps

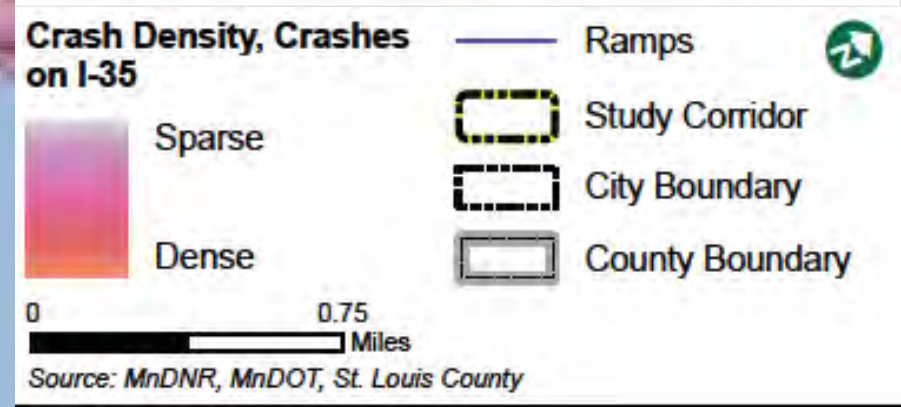
- 75% right angle crash type
- Sight distance challenging
  - Vegetation and curvature of bridge
- Spacing, Merging, and Directional Interchange Issues
- SB Ramp Critical index = 4.15

DOWNTOWN SEGMENT SAFETY

- Run off road, rear end, sideswipe same crash types
- 52% occur December – February
- 42% occur 2 PM – 6 PM
- 52% occur under snow/ice/rain covered roadway conditions







DOWNTOWN HOTSPOTS

5th Ave Ramps

- 54% right angle crash type
- Failure to comply with signals common
- 1 ped crash

Lake Ave Ramps

- 43% rear end crash type
- 47% occur from 2 PM - 6 PM
- 2 ped/bike crashes

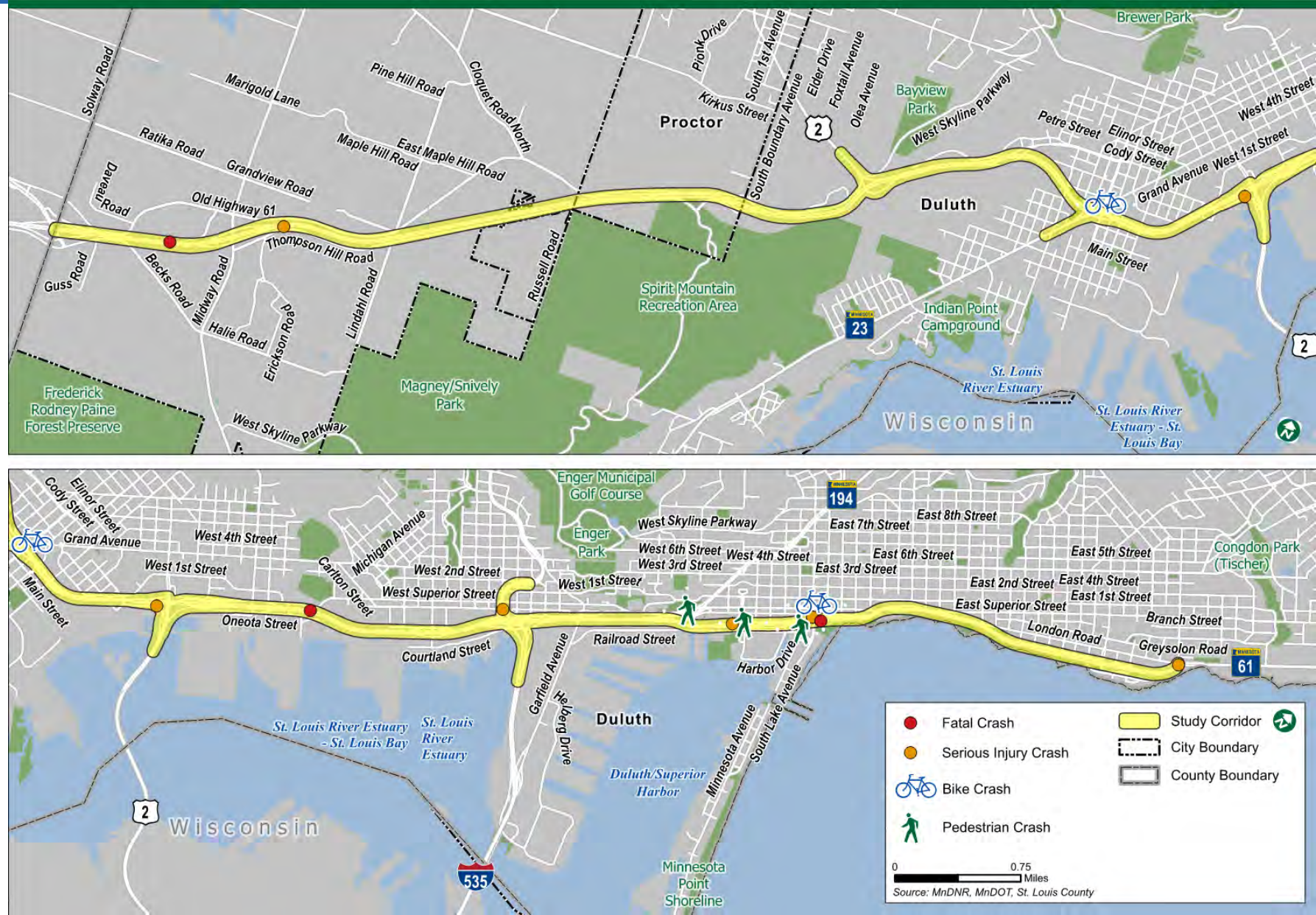
21st Ave Ramps

- NB rear ends predominant type and direction
- Aligns with delays/queues
- SB Ramp Critical index = 1.48

I-35 Connects

SERIOUS CRASHES

- 4 fatal, 18 severe injury in 10 years
- 3 fatals – wrong way drivers on I-35
- 50% during nighttime hours
- 50% occur June-September
  - Opposite of winter crash trend
- 50% involve a DWI
- 72% occur in downtown subarea



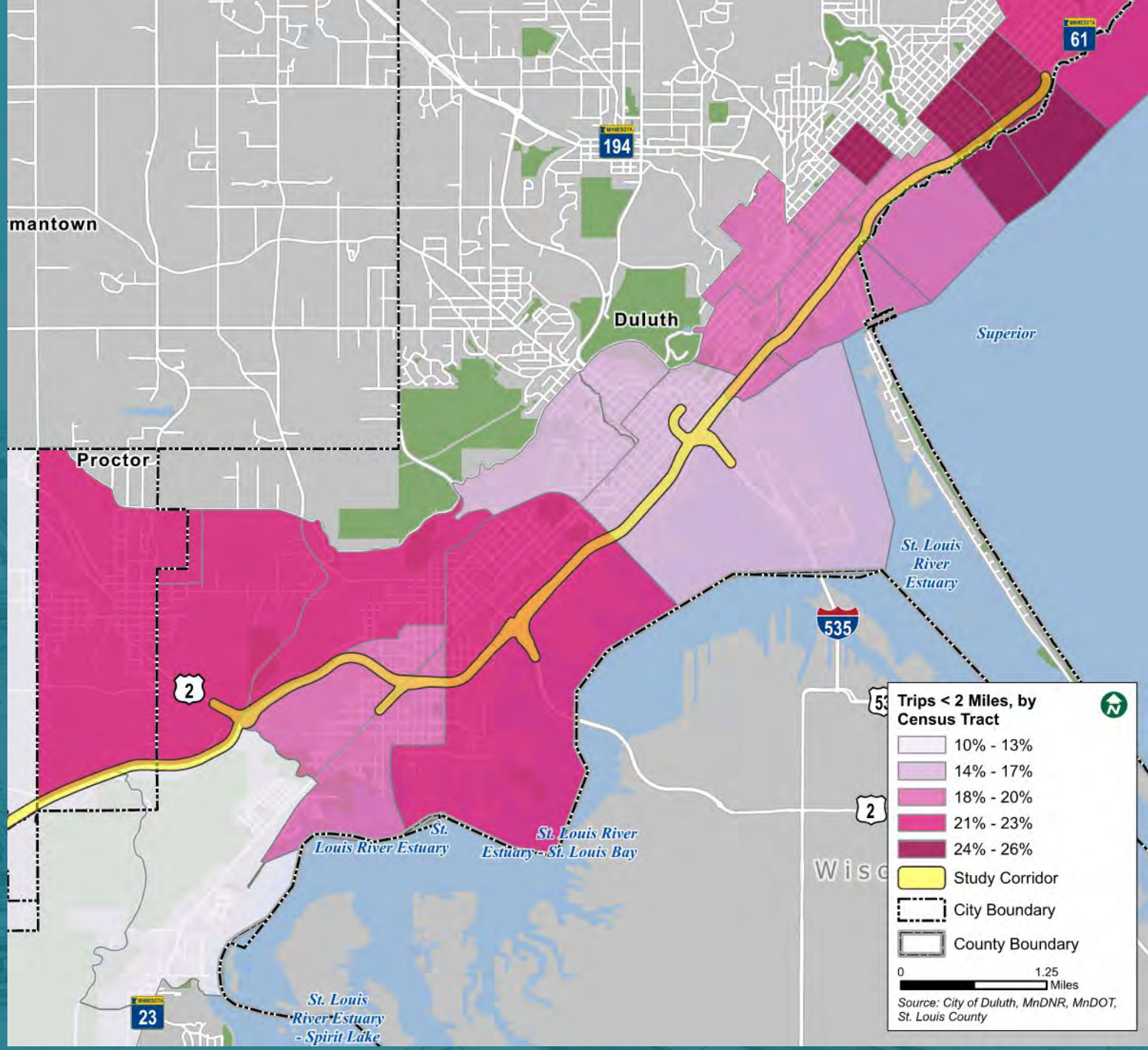
CONNECTIVITY

I-35 Connects

MULTIMODAL OPPORTUNITIES

DEMAND

- 23 grade-separated crossing locations
- Lake Ave and 5th Ave highest volume crossings
- 10 locations carry 10> users/day
- 91% of trips using these are 2 miles or less in length

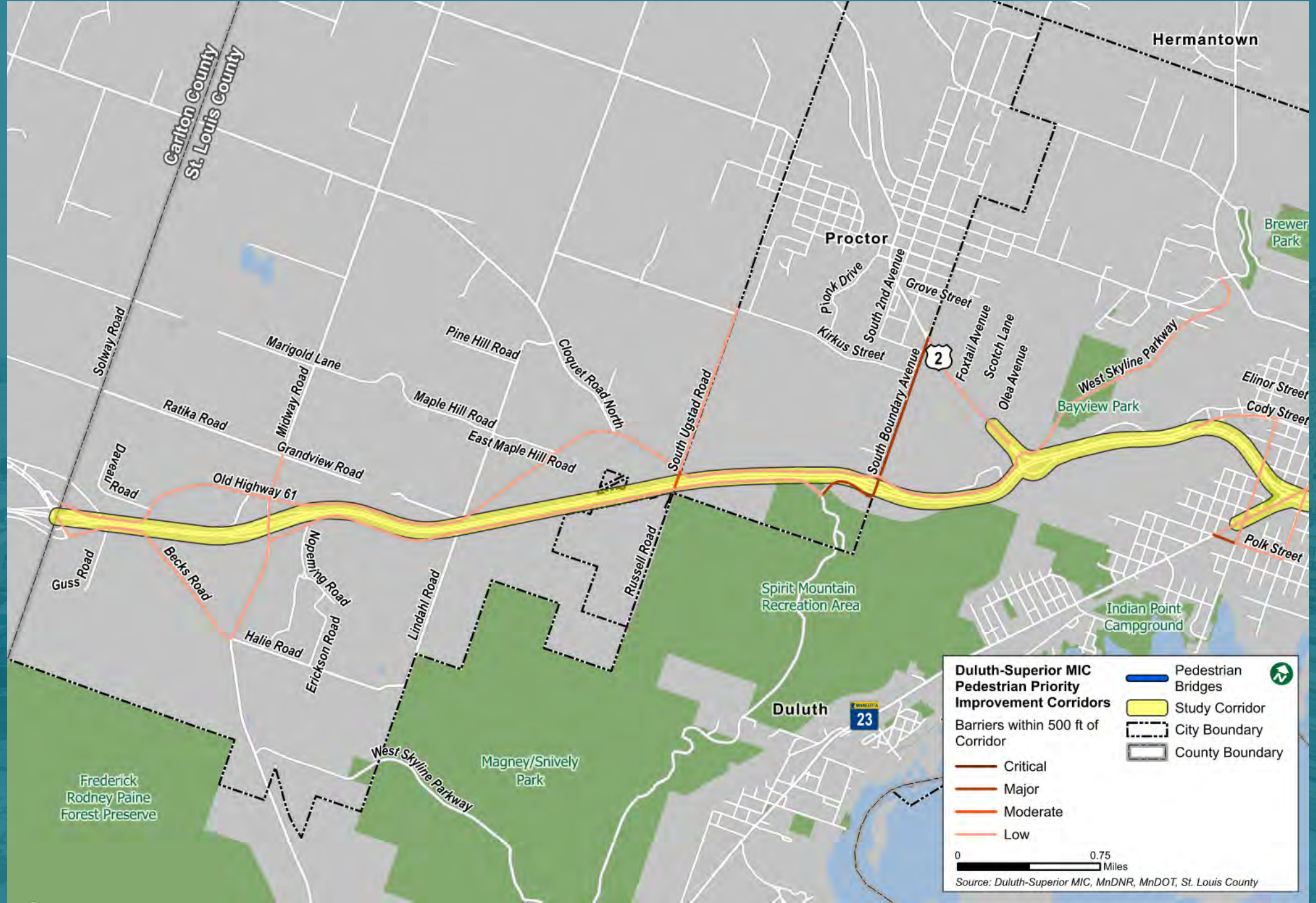


I-35 Connects

RURAL AMMENITIES

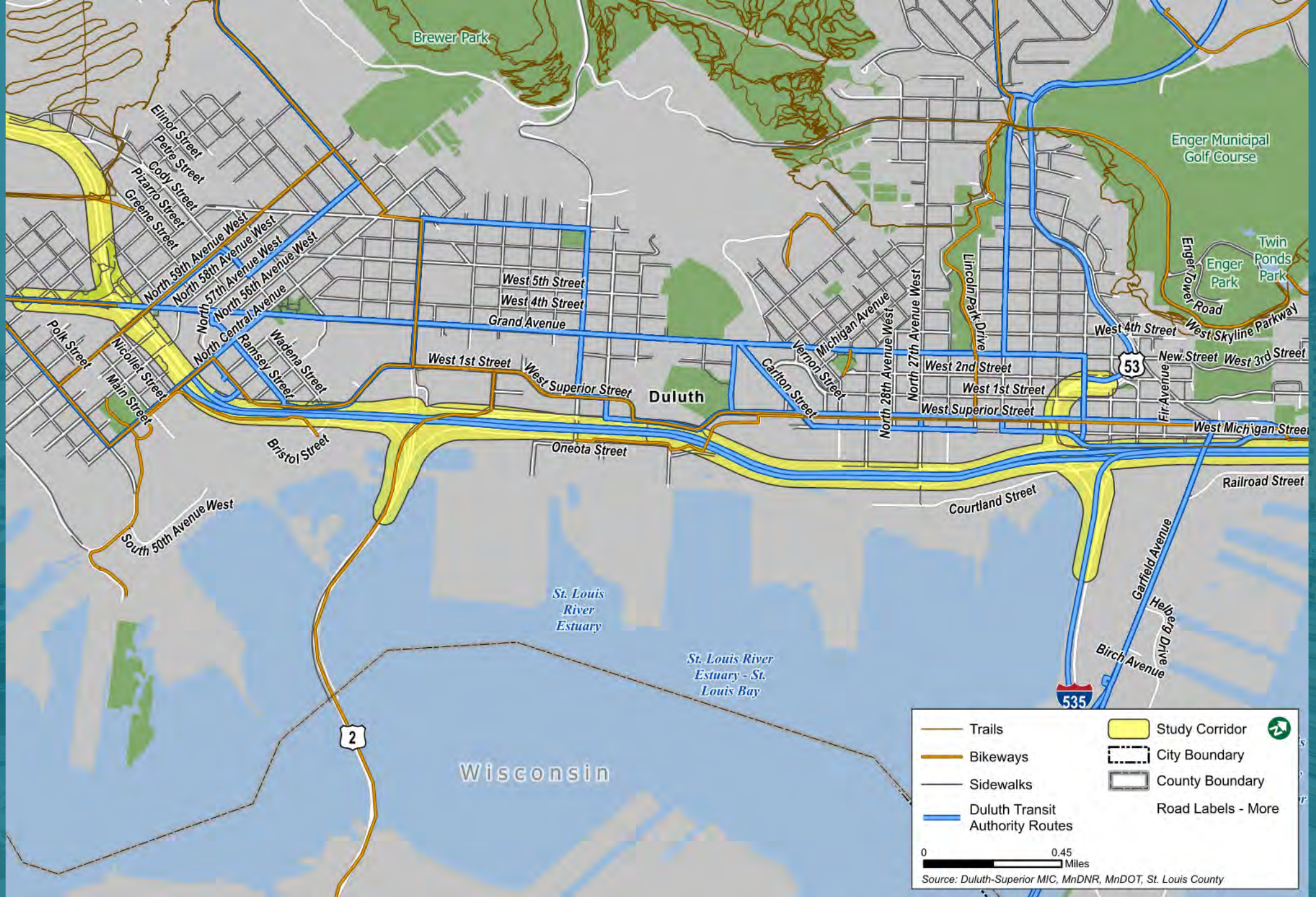
I-35 Connects

RURAL BARRIERS



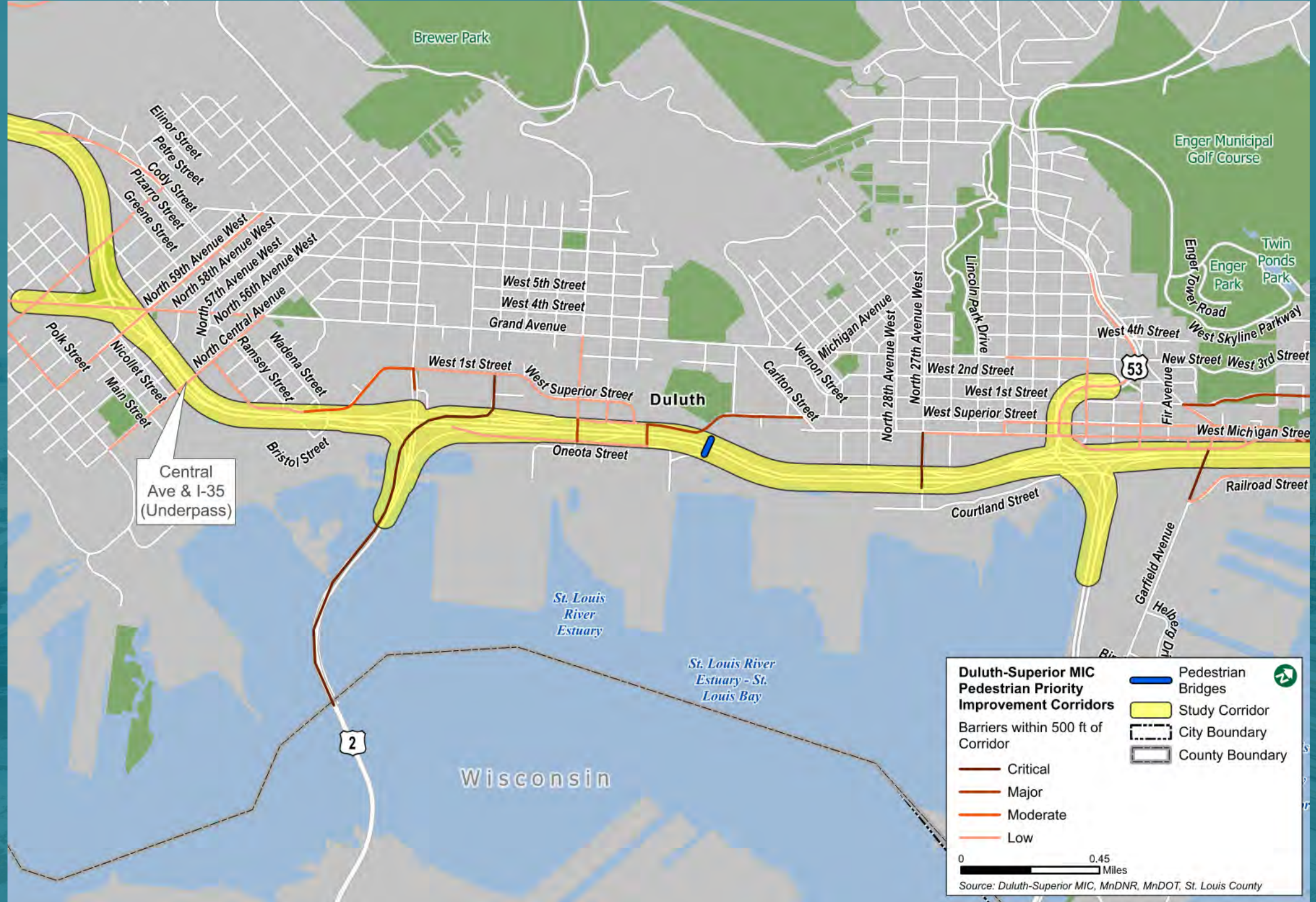
I-35 Connects

URBAN AMMENITIES



I-35 Connects

URBAN BARRIERS



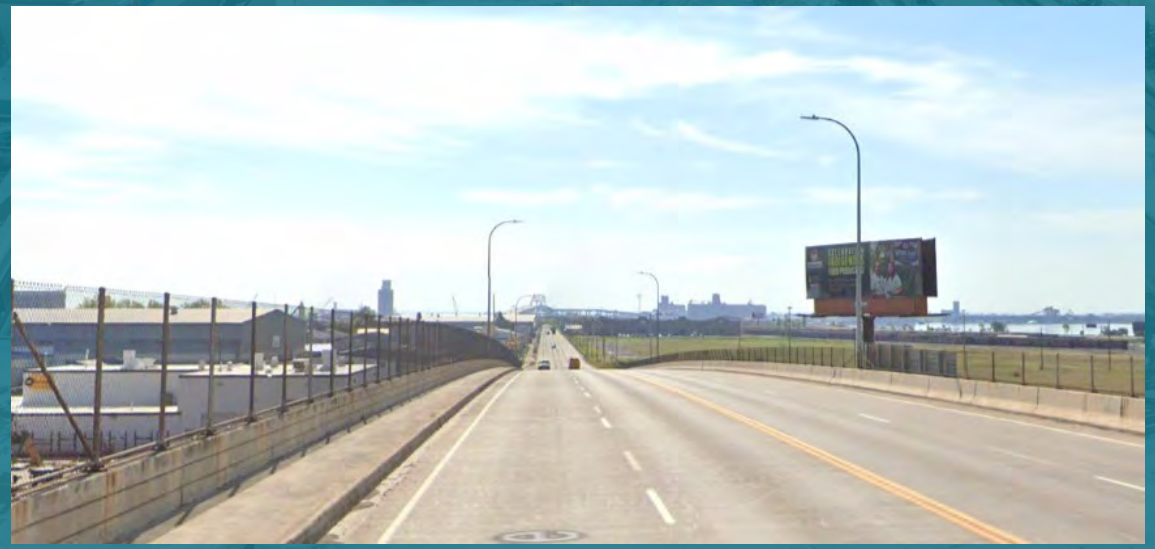
I-35 Connects

URBAN CHALLENGES

Grand Ave - Central Ave

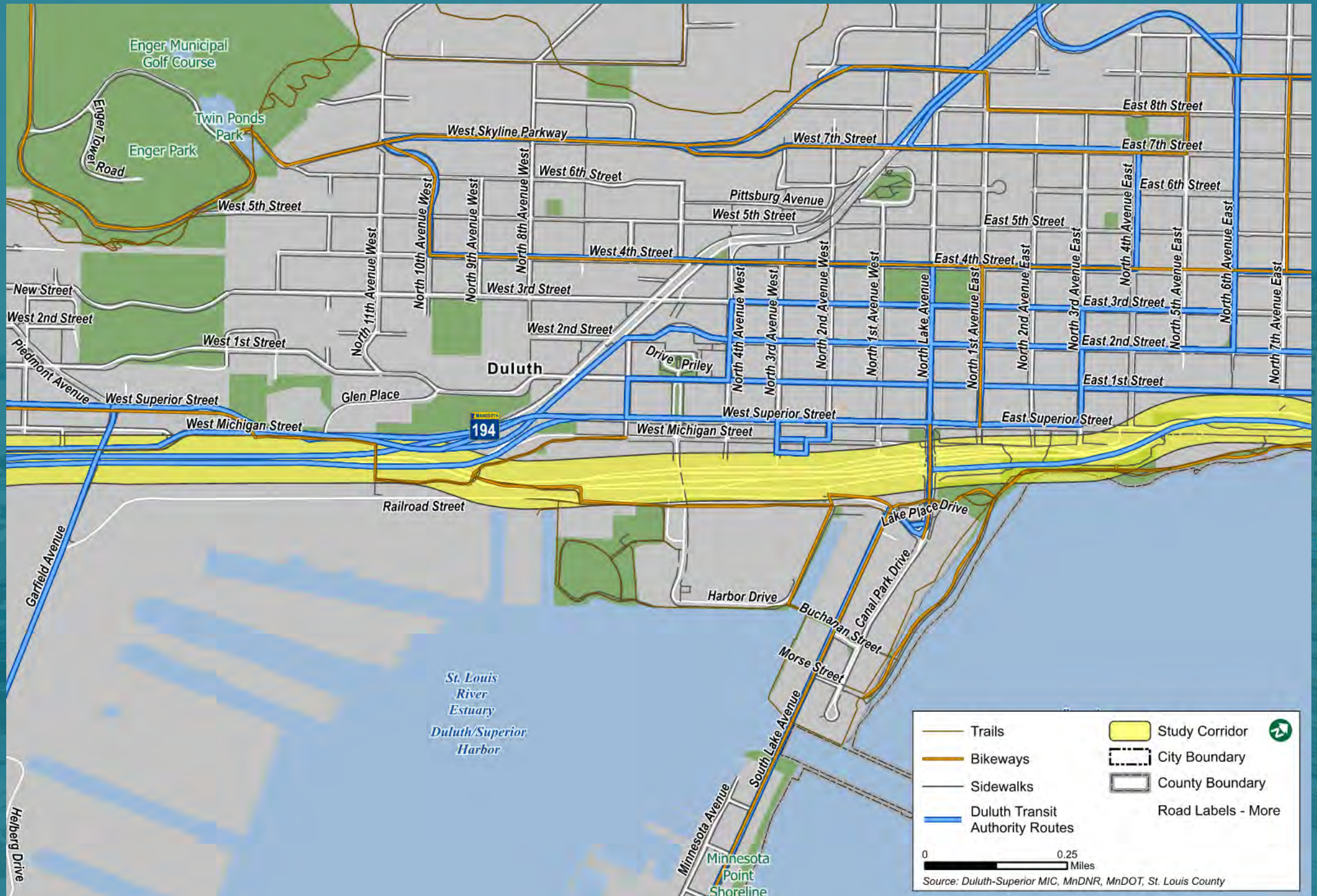
- No signals, minimal curb ramps
- Heavy truck traffic
- Long crossing distances
- Some crossings unmarked

Garfield Ave



- 4-lane undivided section
- Heavy truck traffic
- 5' sidewalk on one side

DOWNTOWN AMMENITIES

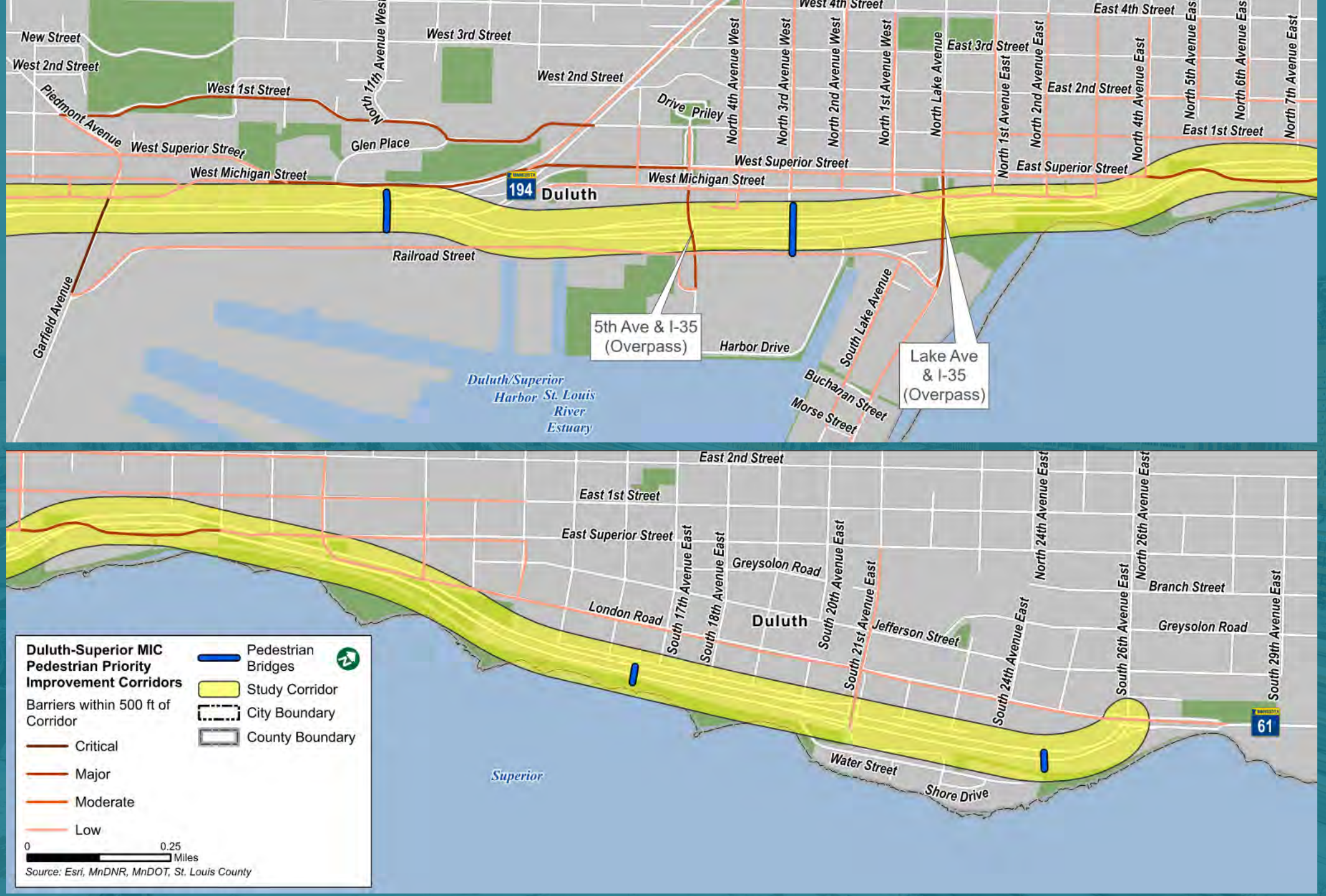


I-35 Connects

DOWNTOWN AMMENITIES

I-35 Connects

DOWNTOWN BARRIERS



I-35 Connects

DT CHALLENGES

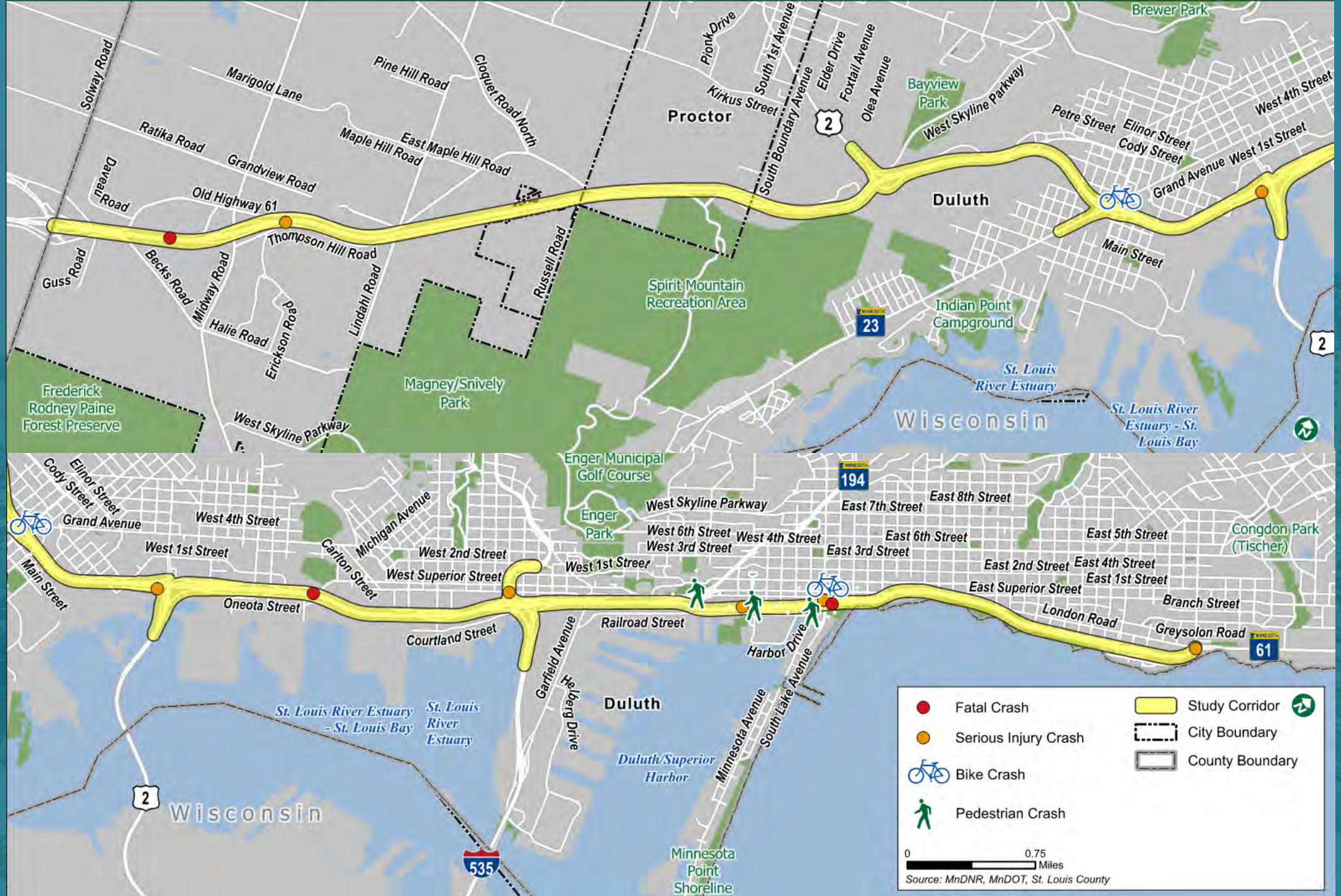
Lake Ave

- Signalized SPUI
  - Channelized ramps
  - Signal & yield controlled crossings
- 448 peds/day recorded
- 2 ped/bike crashes reports

5th Ave W

- Signalized terminals
- 10' walk on one side
- Key Bayfront-Downtown connection
- 222 peds/day recorded
- 1 pedestrian crash reported

CRASH DATA



I-35 Connects

FOCUS AREAS

WHAT NOT TO STUDY

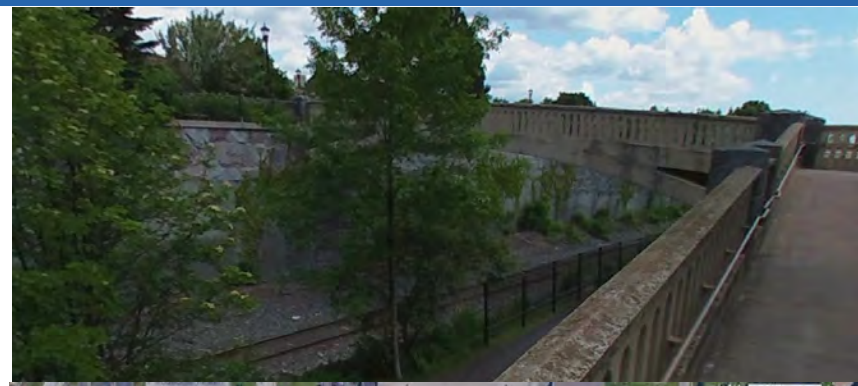
$750,000,000+

TO CONSTRUCT

INTERSTATE 35

from Thompson Hill to 26th Ave E

(in 2022 dollars)



FOCUS AREAS

1. Thompson Hill
2. Central Avenue to Grand Avenue
3. 5th Avenue to Lake Avenue

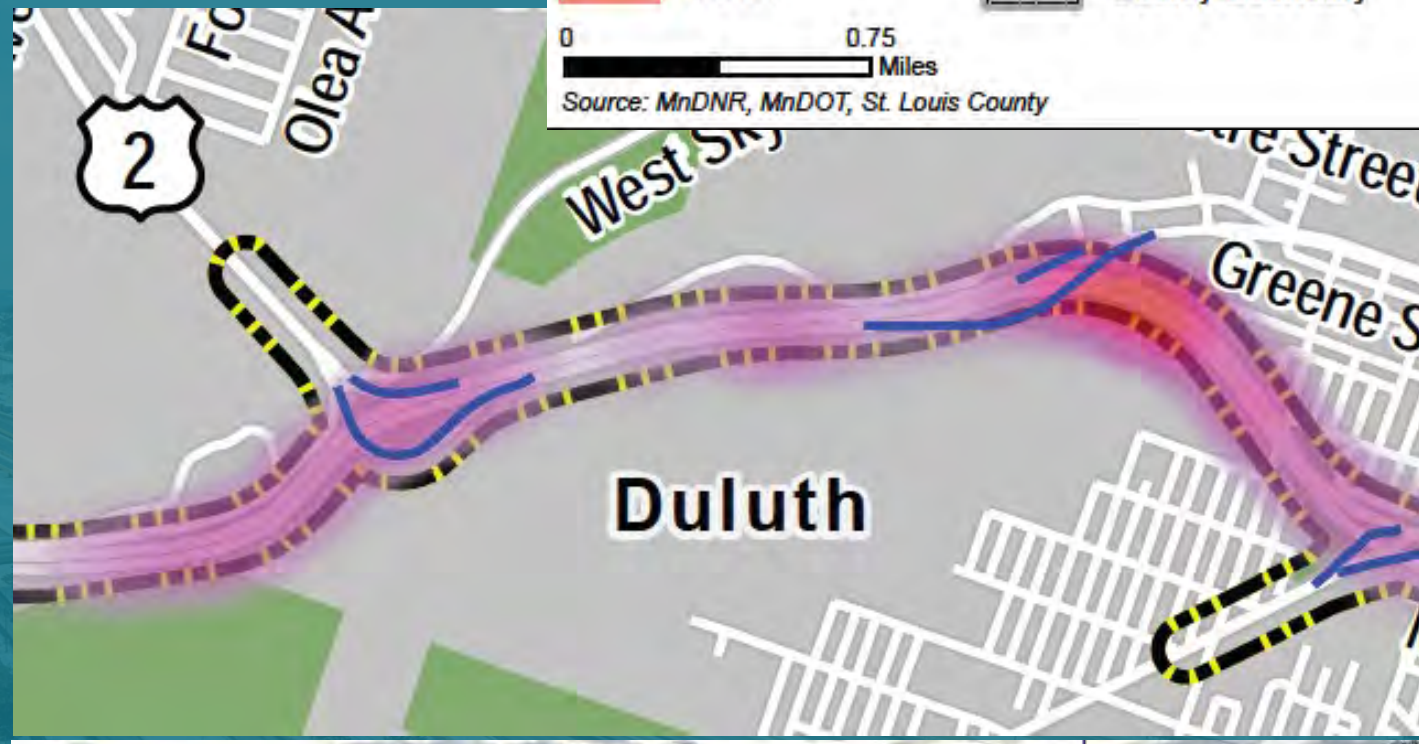
I-35 Connects

RURAL: PRESERVE

Thompson Hill

- $24M-32M programmed in CHIP for 2028
- End of Useful Life of Pavement
- Highest Crash Rates due to Weather, Horizontal, and Vertical Curvature
- Substandard shoulder widths present

- Small-Scale Safety Improvements at US 2 and Boundary Avenue
  - Traffic Control and Turns Lanes



I-35 Connects

URBAN: REVITALIZE

Central-Grand Avenues

Safety

- Spike in crash rate due to closely spaced ramps
- Left exits – FHWA no longer permits
- Major intersections skewed along Grand Ave

Multimodal Crossings

- Uncomfortable Crossings
- Unprotected Crossings

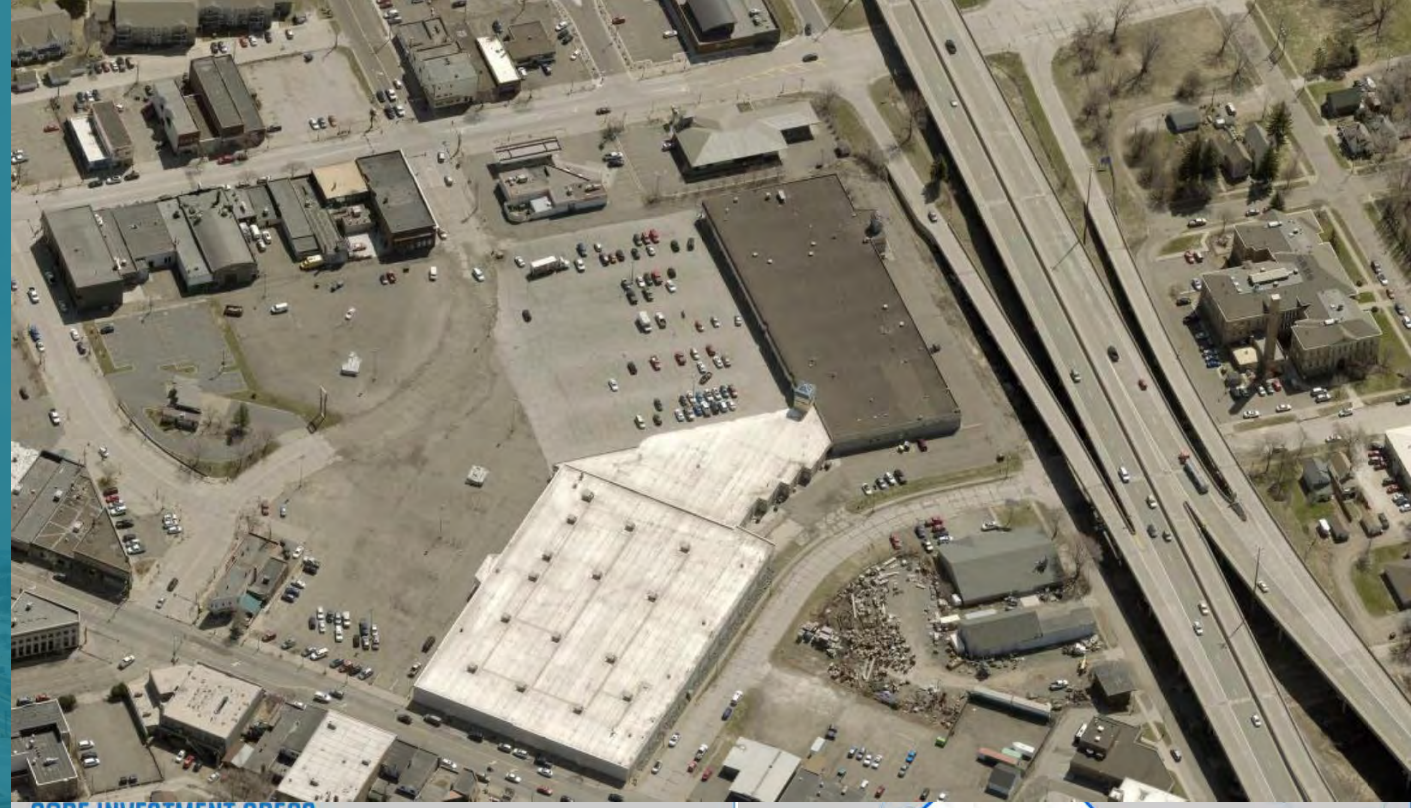
I-35 Connects

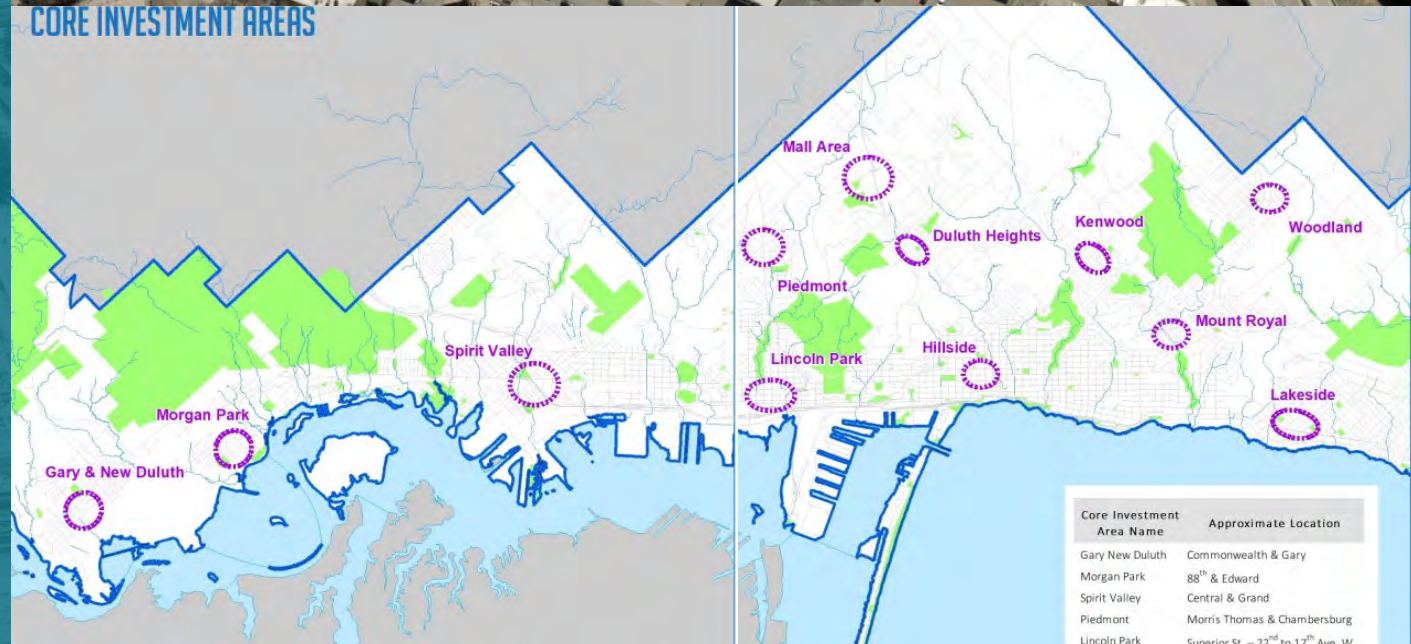
URBAN : REVITALIZE

Central-Grand Avenues

Redevelopment and Infill Potential

- West Duluth/Spirit Valley Community Node
  - >27 acres in the Grand/Center/I-35“Triangle”
  - Possible TOD opportunity with 6+ DTA routes
  - Large/medium site infill strategies





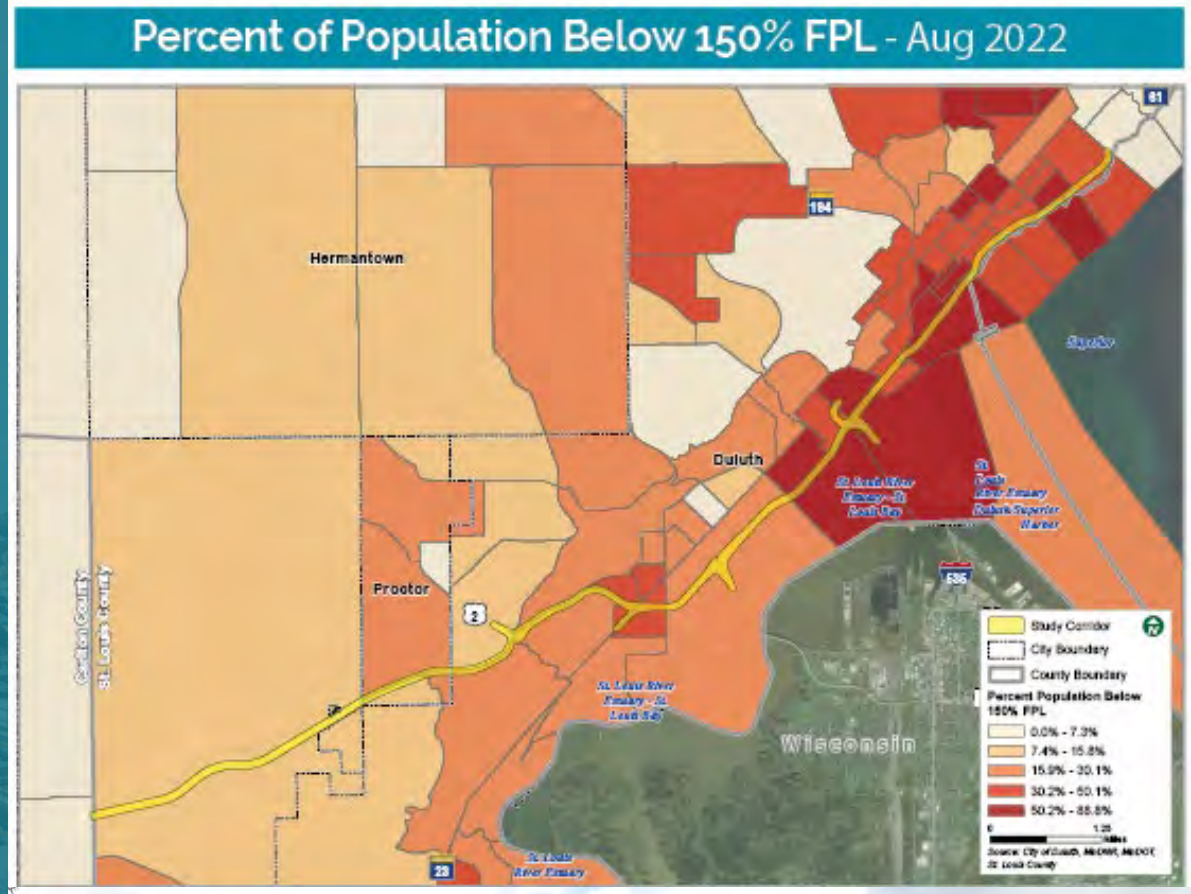
I-35 Connects

URBAN: REVITALIZE

Central-Grand Avenues

Environmental Justice

- Elevated % of those without access to a vehicle
- Elevated % of those living in poverty
- Community split by interstate construction
- Air and environmental quality issues

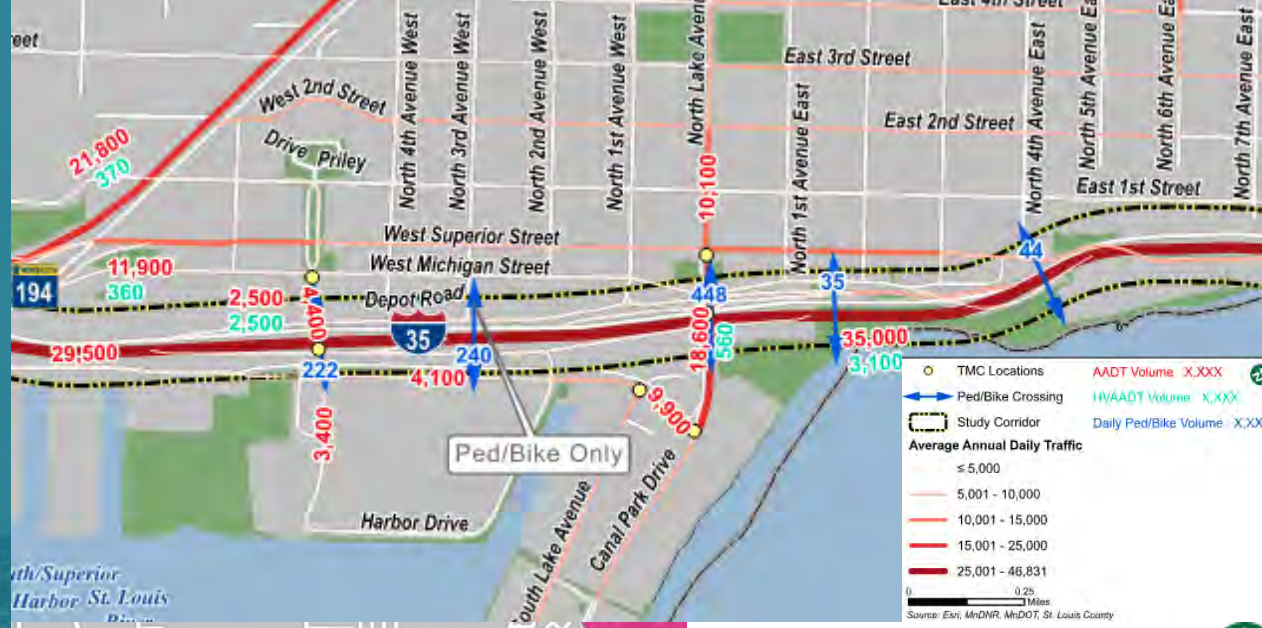


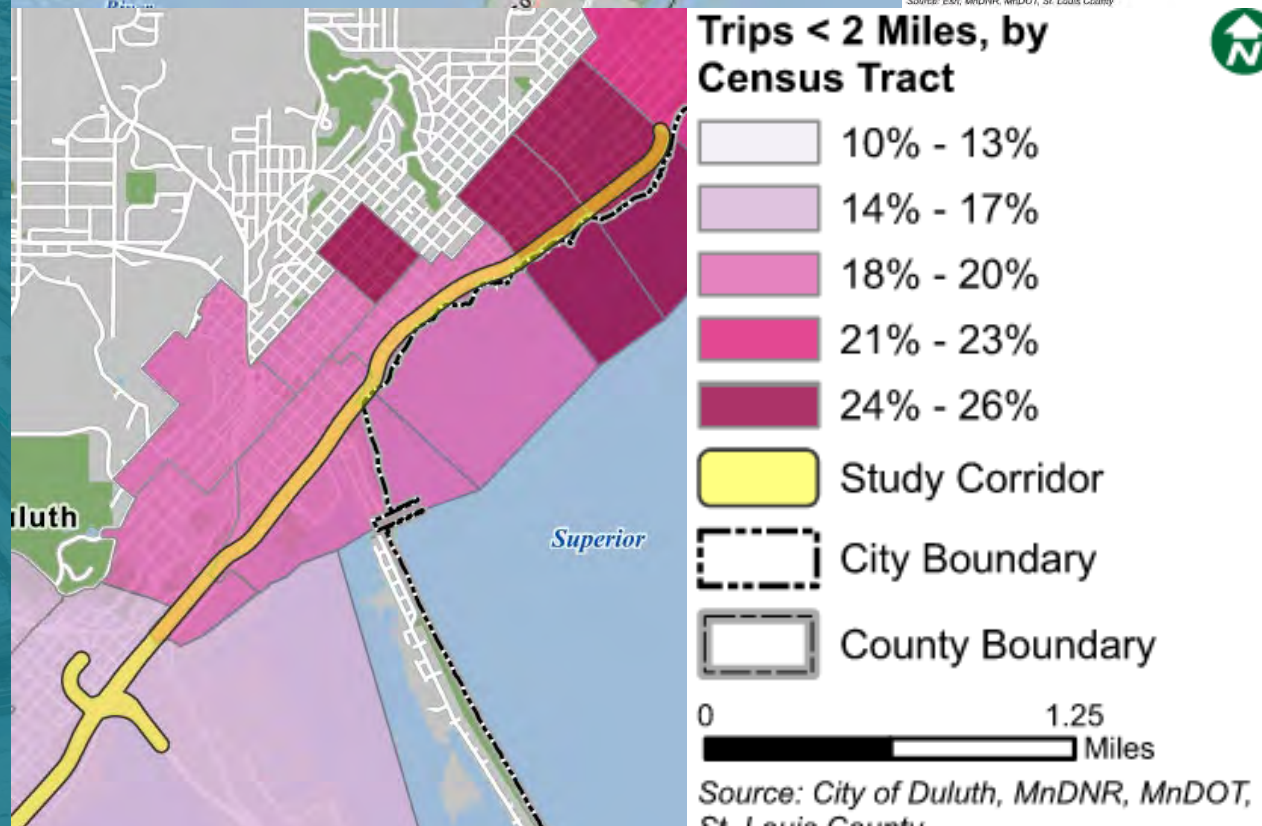
I-35 Connects

DOWNTOWN: RECONNECT

5th-Lake Avenues

- Notable Barriers and Gaps
  - 5th Avenue interchange
  - Garfield Ave overpass
  - E Superior St – 4th Ave to 8th Ave
- Ped/Bike crashes recorded at 5th Ave, Lake Ave, Canal Park Dr
- High likelihood of Latent Demand throughout
  - (>20% trips 0-2 miles in length)





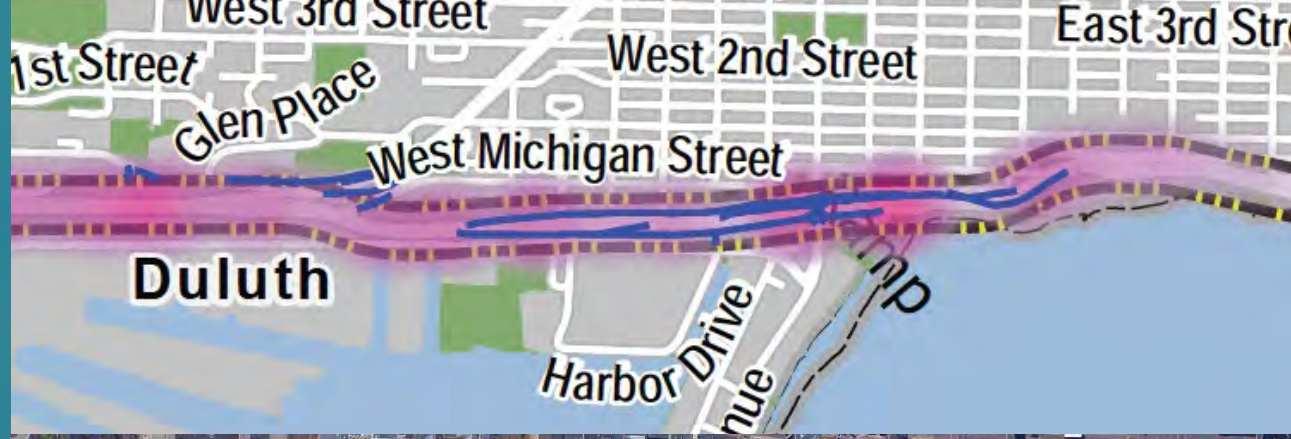
I-35 Connects

DOWNTOWN: RECONNECT

5th-Lake Avenues

Evaluate Reconfiguration Opportunities

- Critical Crash Rate Based on Configuration
- Excess Capacity throughout Entire Day
- Highest Taxable Land in Study Area
- Disproportionate Number of Jobs in Downtown



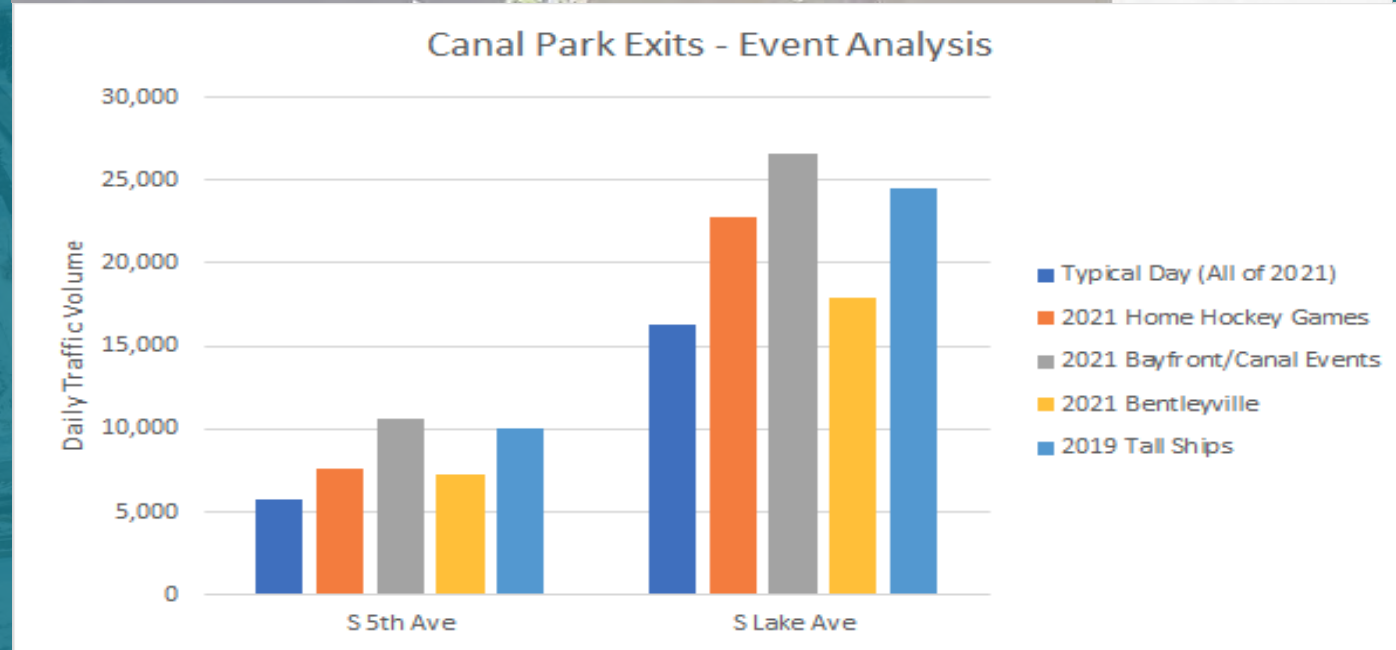
I-35 Connects

DOWNTOWN: RECONNECT

5th-Lake Avenues

Manage Events

- 6.7M Annual Tourists Concentrated in Canal Park Area
- 15-50% Increase in Traffic During Events
- Leverage Technology, Way-Finding, Marketing, and Infrastructure Solutions



I-35 Connects

OTHER RECOMMENDATIONS

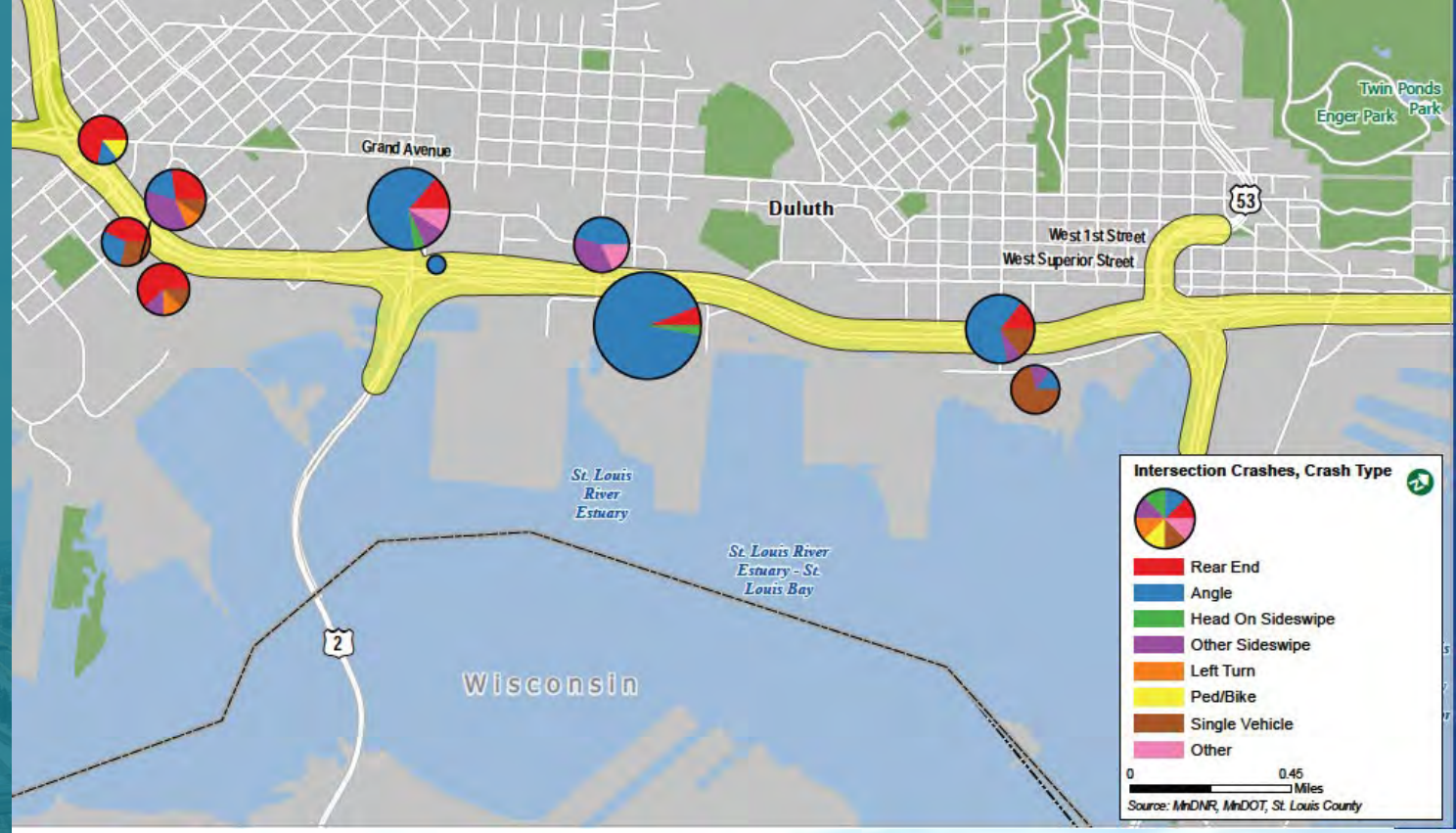
Spot Safety Improvements

- Traffic Control
- Turn Lanes
- Access Management

Spot Crossing Improvements

- Sidewalk/Path Width
- Traffic Control

Spot Design Deficiencies



FUTURE SCENARIOS WORKSHOP

I-35 Connects

GROWTH FACTORS

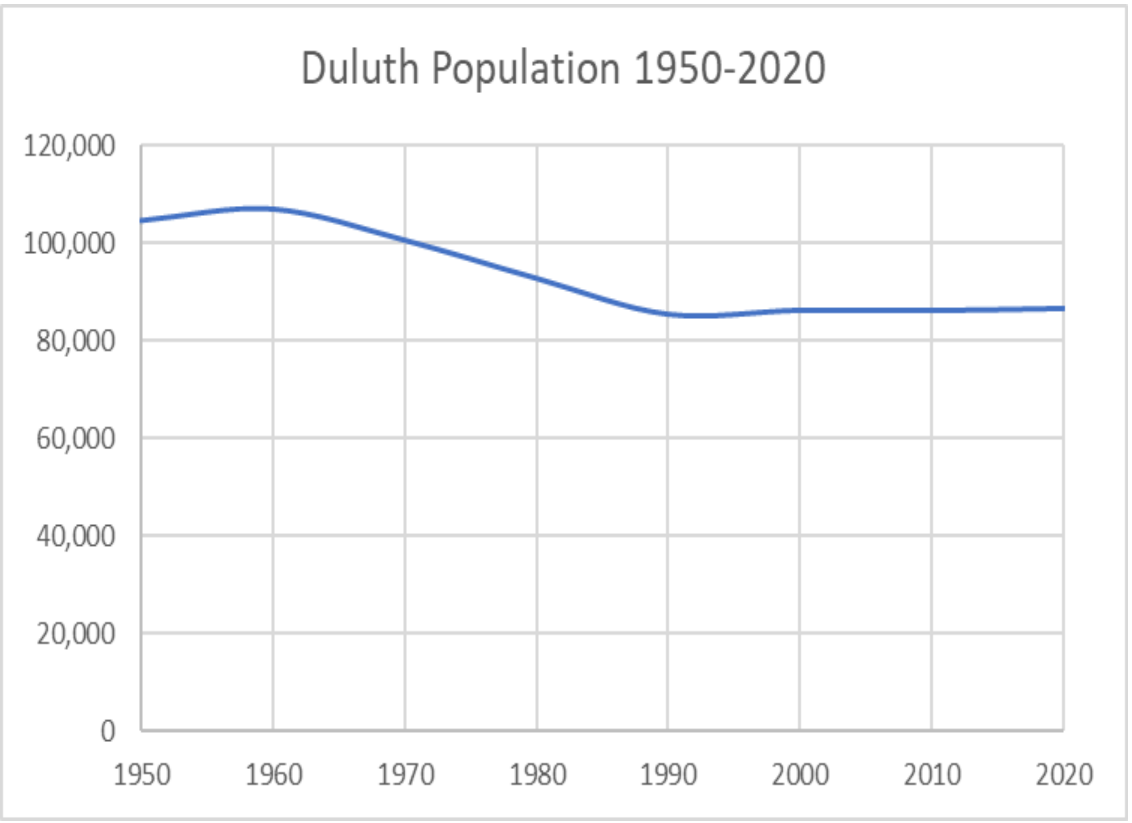
Metropolitan Growth

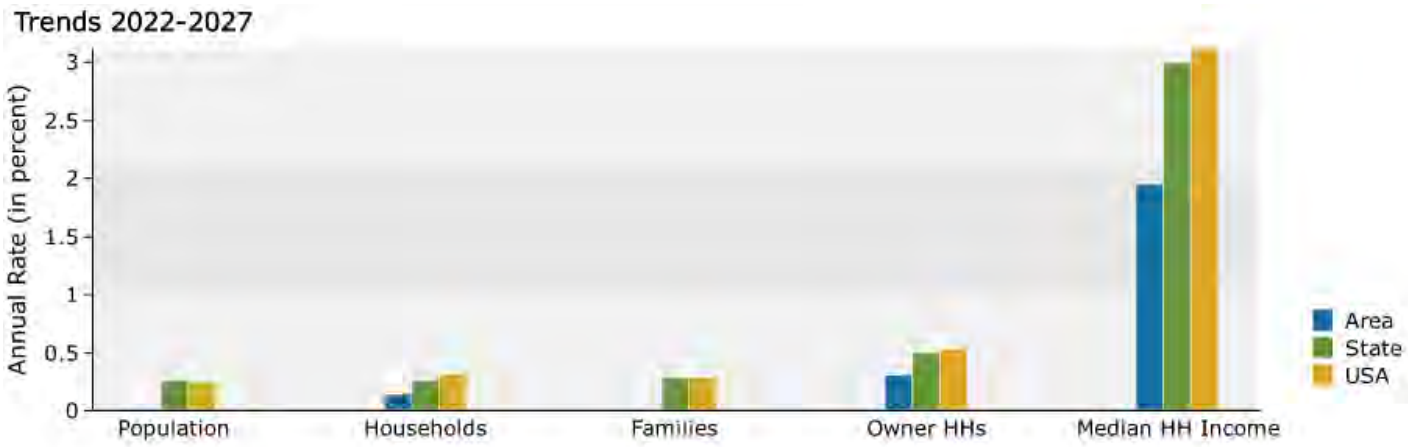
Targeted Local Growth

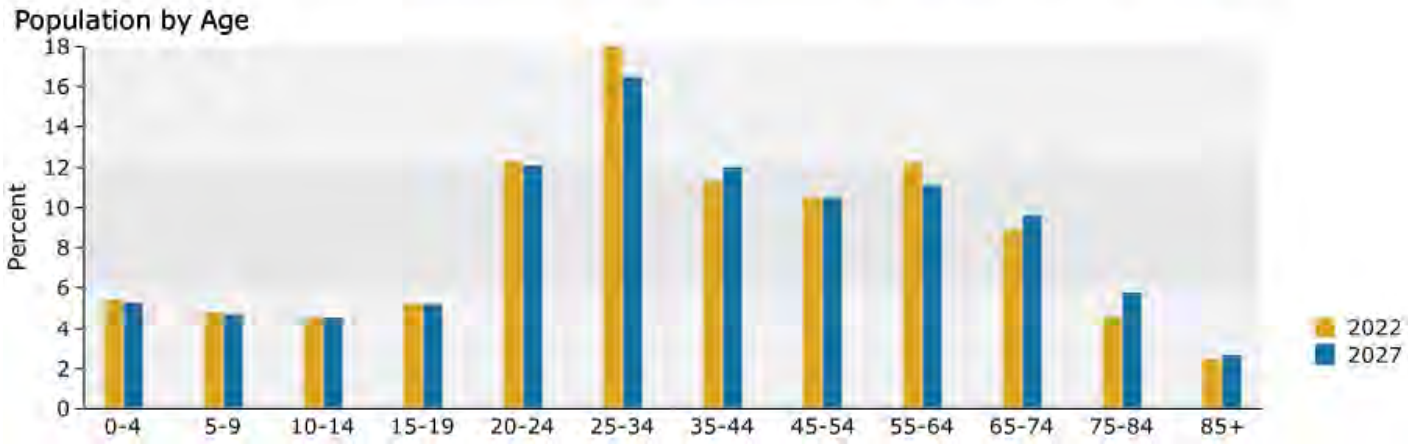
Regional and Freight Growth

I-35 Connects

Metropolitan Growth



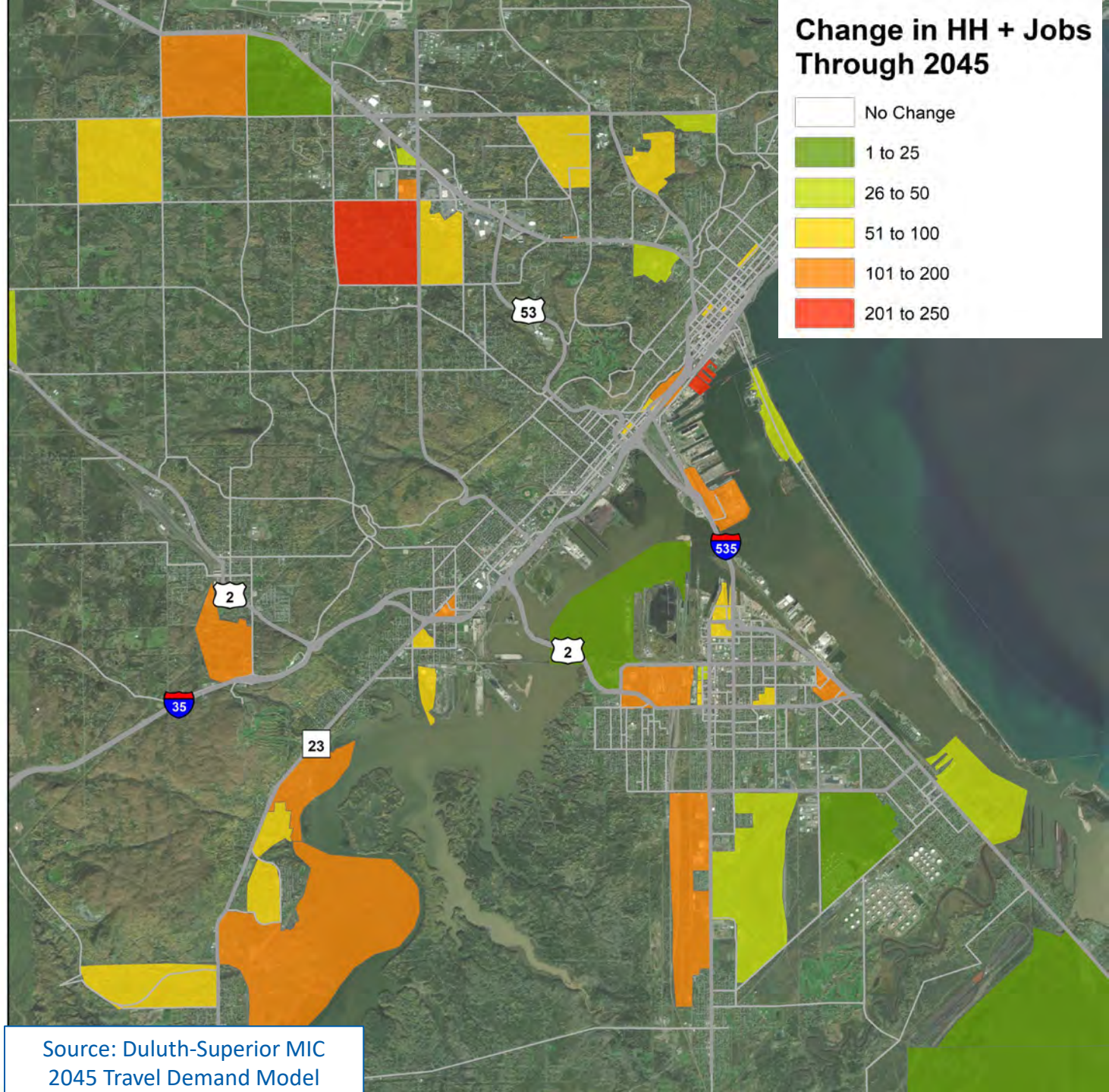




Metro Growth

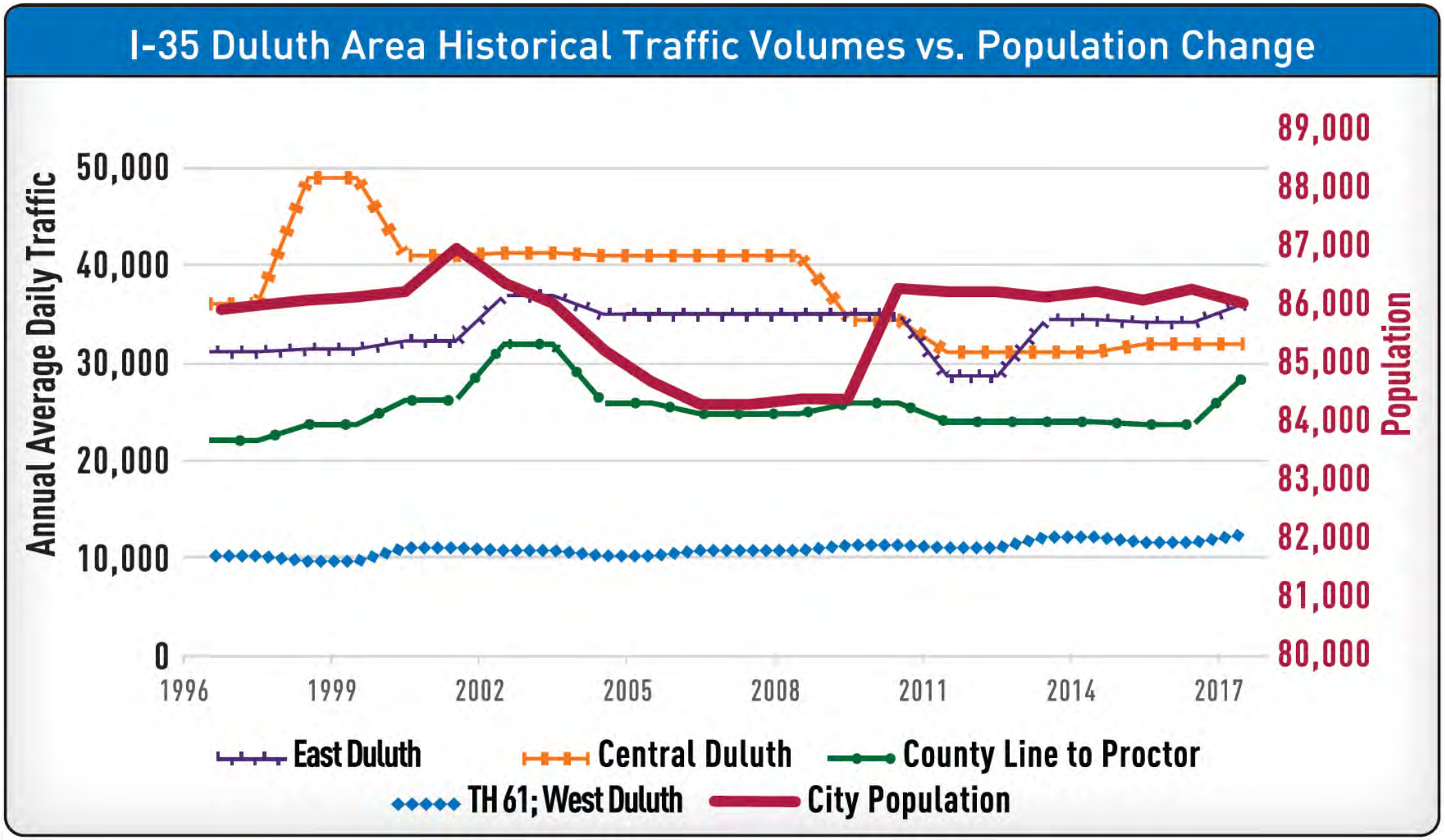
Year	Households*	Employment*
2018	70,439	78,075
2045	72,868 (+3.4%)	80,208 (+2.7%)

Source: Duluth-Superior MIC 2045 LRTP
*Data is for entire planning area



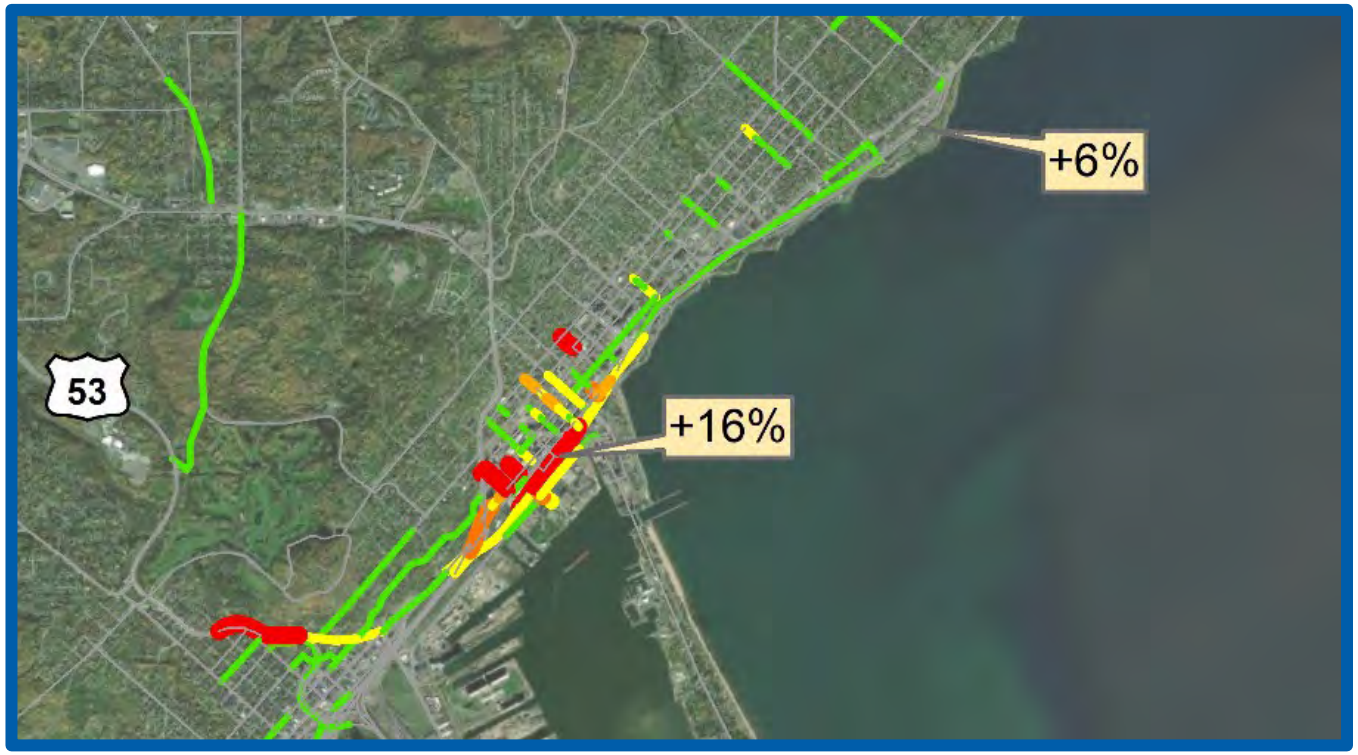
Source: Duluth-Superior MIC 2045 Travel Demand Model

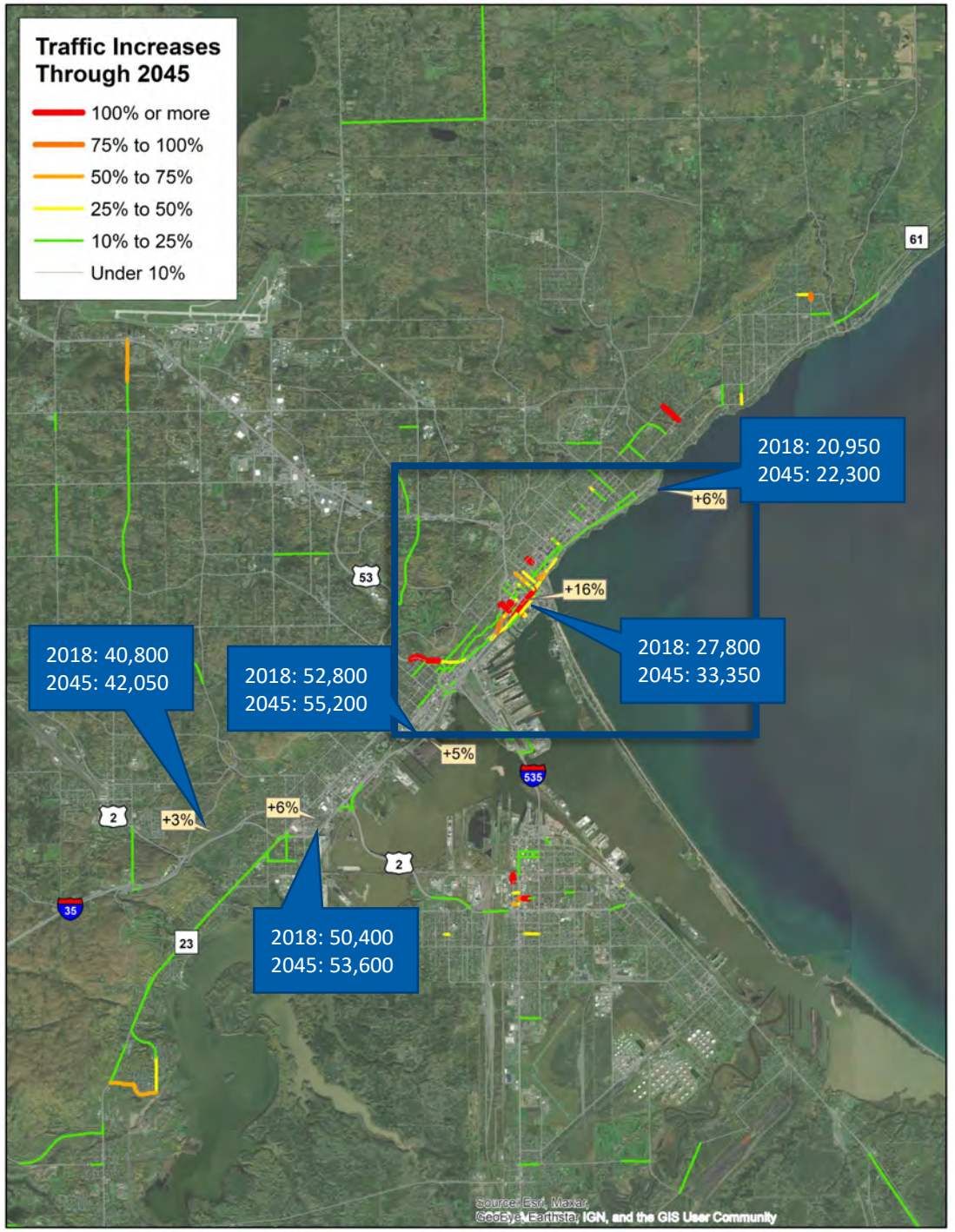
Metropolitan Growth



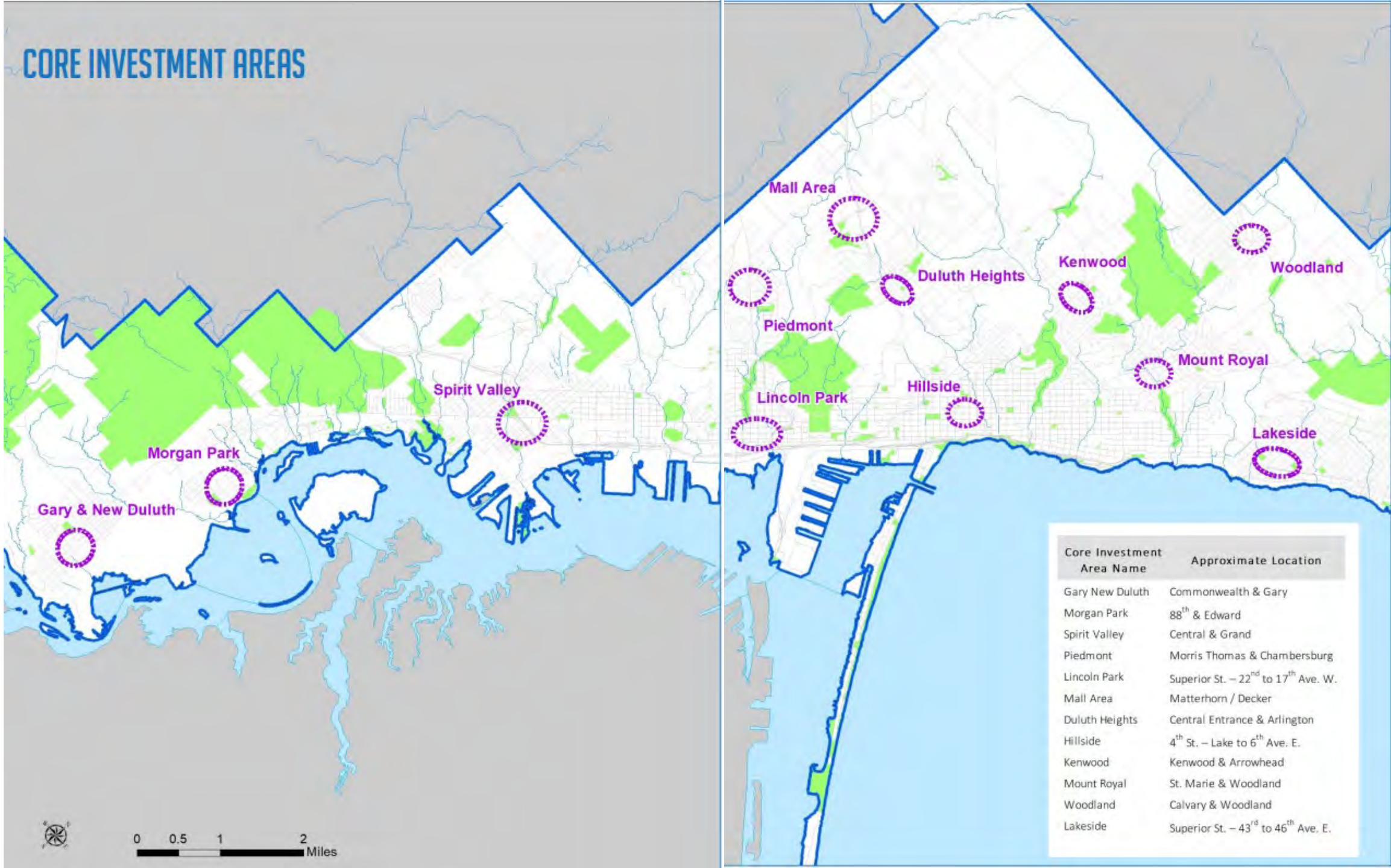
Metropolitan Growth

- On I-35, traffic growth is expected to be highest in the downtown area
  - 15 to 20% increase compared to existing conditions
- Growth is expected to be lower elsewhere
  - Around 5% increase compared to existing conditions



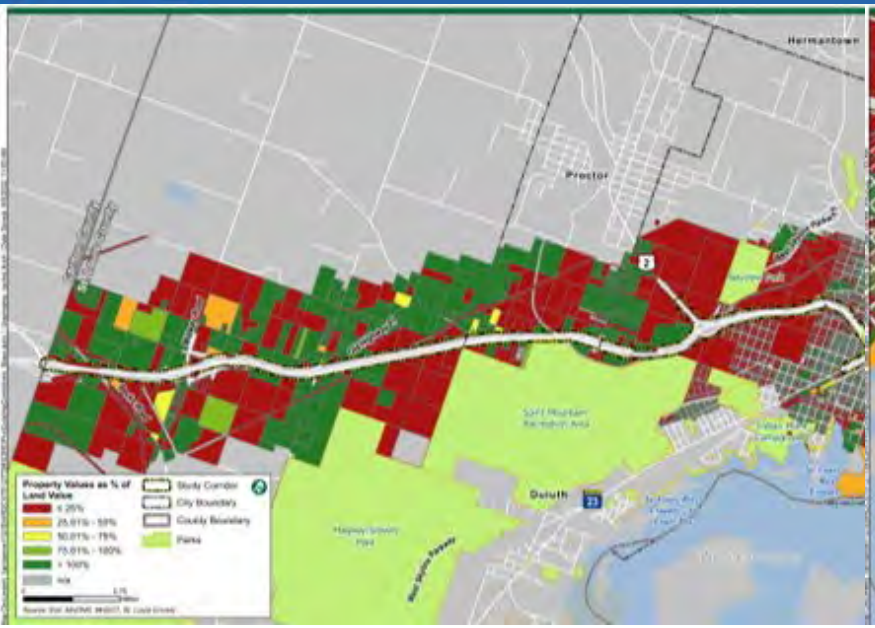


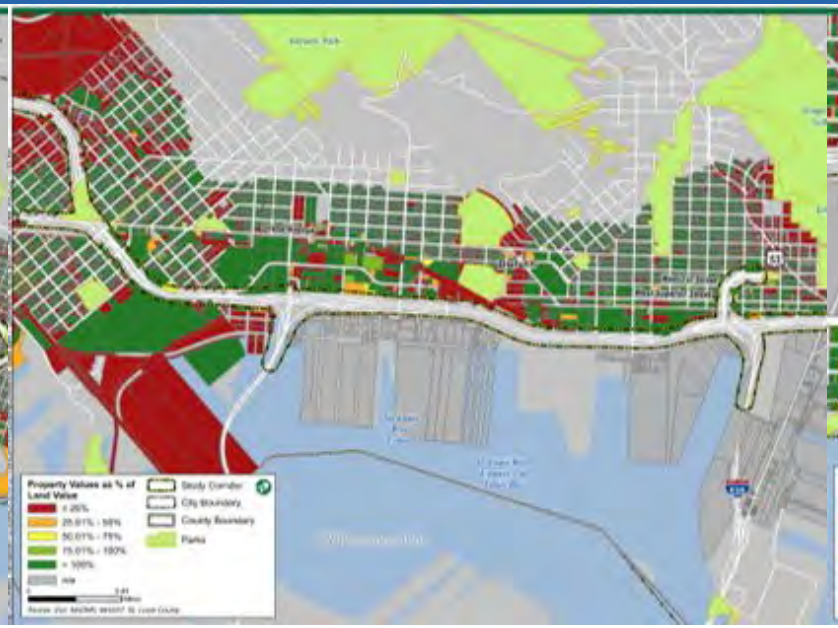
Targeted Local Growth



Core Investment Area Name	Approximate Location
Gary New Duluth	Commonwealth & Gary
Morgan Park	88th & Edward
Spirit Valley	Central & Grand
Piedmont	Morris Thomas & Chambersburg
Lincoln Park	Superior St. – 22nd to 17th Ave. W.
Mall Area	Matterhorn / Decker
Duluth Heights	Central Entrance & Arlington
Hillside	4th St. – Lake to 6th Ave. E.
Kenwood	Kenwood & Arrowhead
Mount Royal	St. Marie & Woodland
Woodland	Calvary & Woodland
Lakeside	Superior St. – 43rd to 46th Ave. E.

Targeted Local Growth





RURAL SUBARA | LIKELY BARRIERS

- Lack of density for efficient transportation and utilities
- Challenging topography that makes development either expensive or infeasible
- Land use policies or protections

URBAN SUBARA | LIKELY BARRIERS

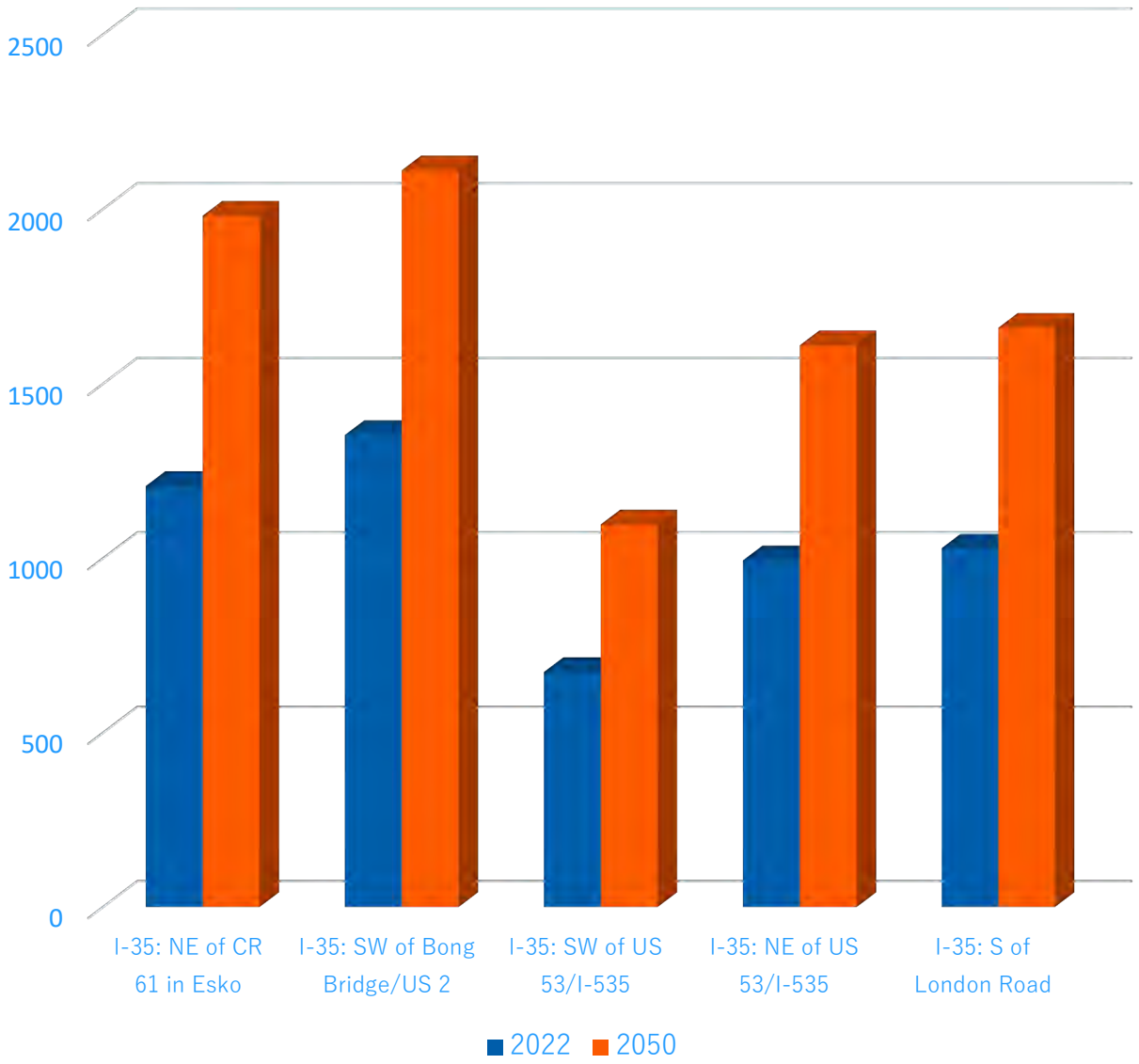
- Challenging geography, geology, and weather
- Limited stock of flat, greenfield sites
- Land use policies or protections

DOWNTOWN SUBARA | LIKELY BARRIERS

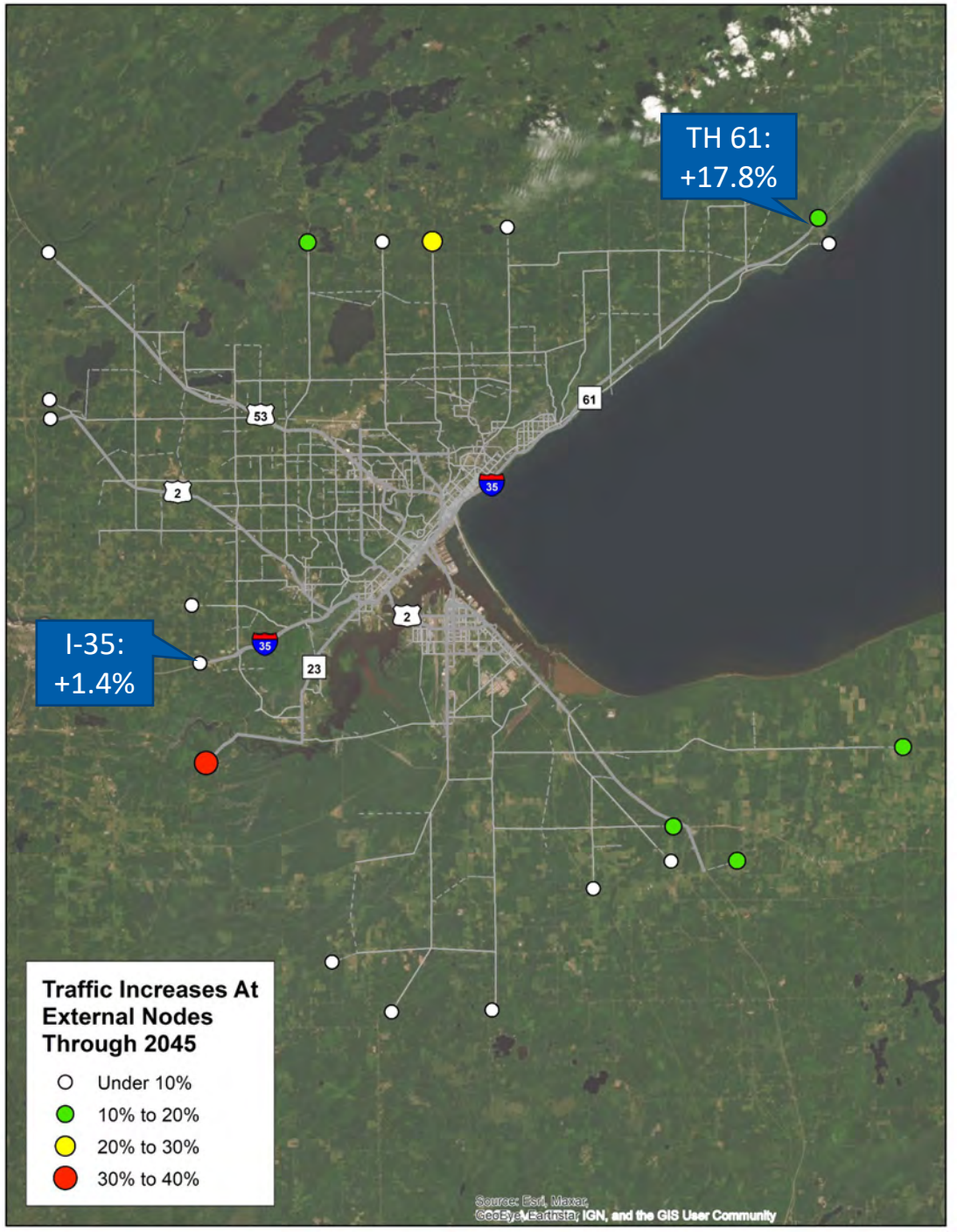
- Challenging geography, geology, and weather
- Challenging topography that makes development either expensive or infeasible
- Limited stock of flat, greenfield sites
- Land use policies or protections

Regional and Freight Growth

Truck Traffic Forecasts

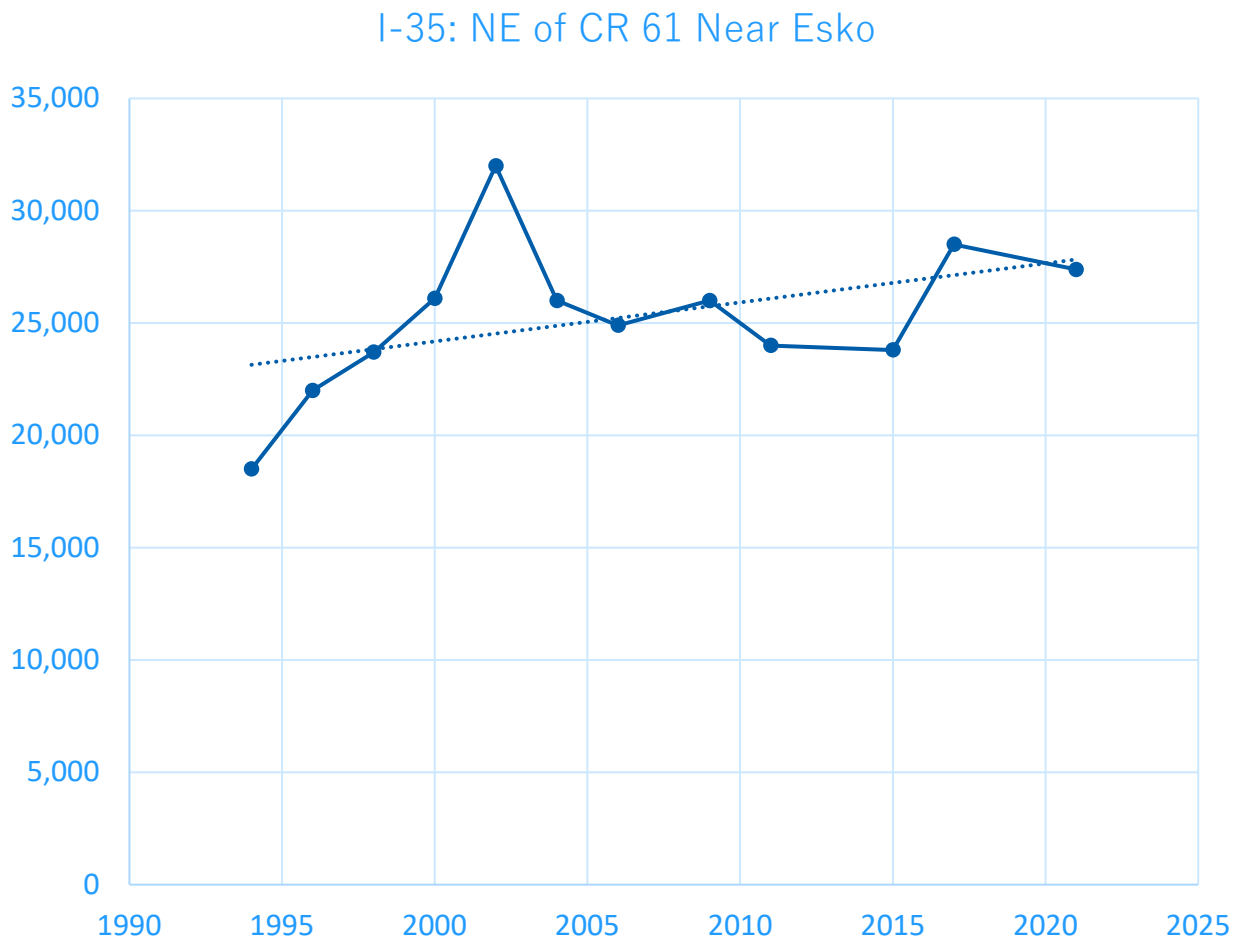


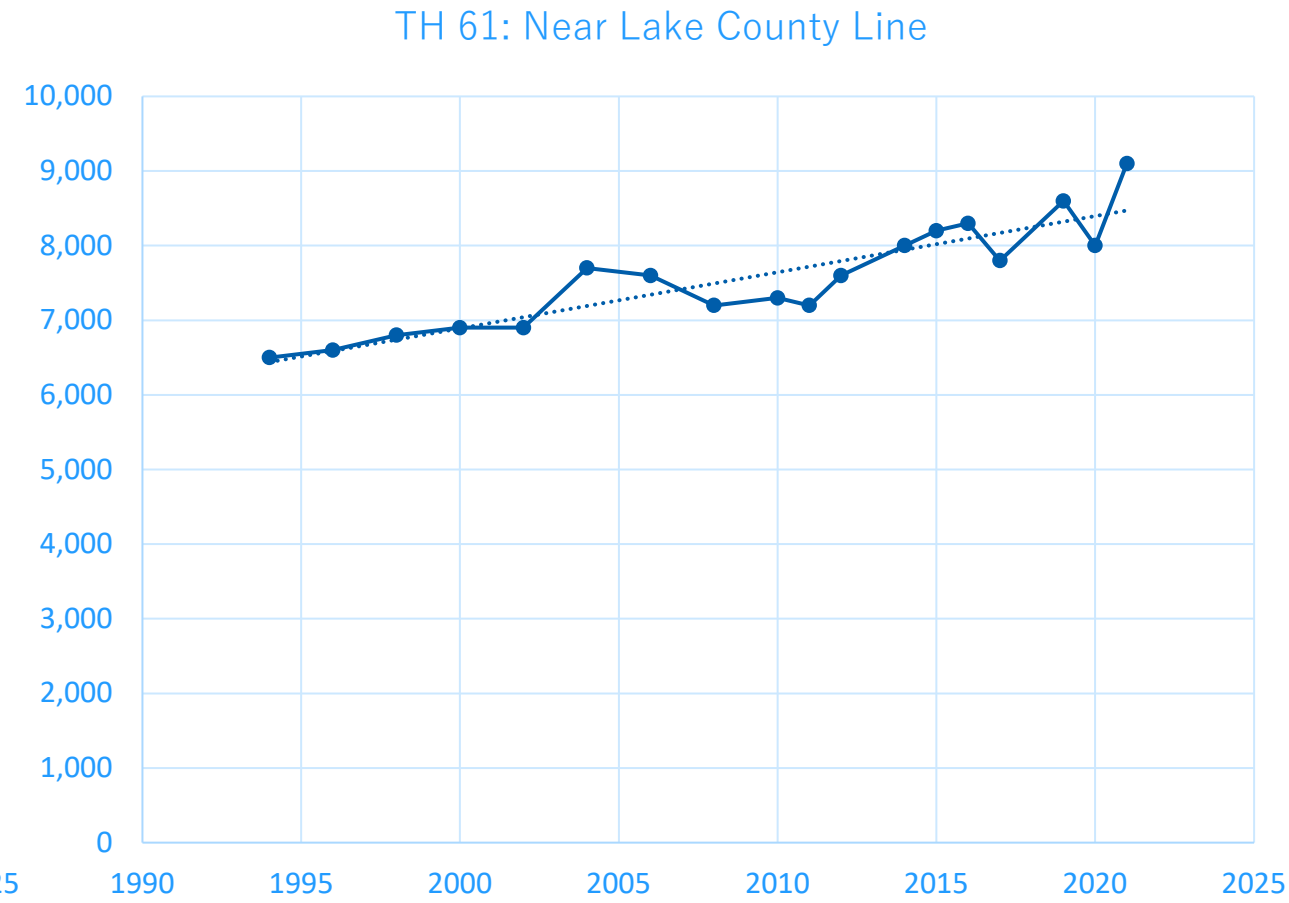
Source: FHWA/BTS Freight Analysis Framework (Version 5)



Regional and Freight Growth

Daily Traffic Trends on Edges of Study Area





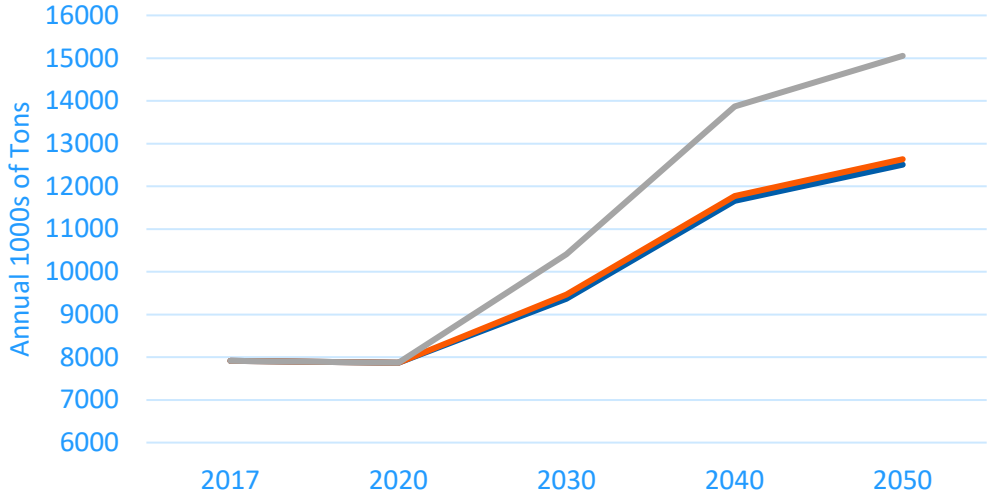
Source: MnDOT Traffic Data

Regional and Freight Growth

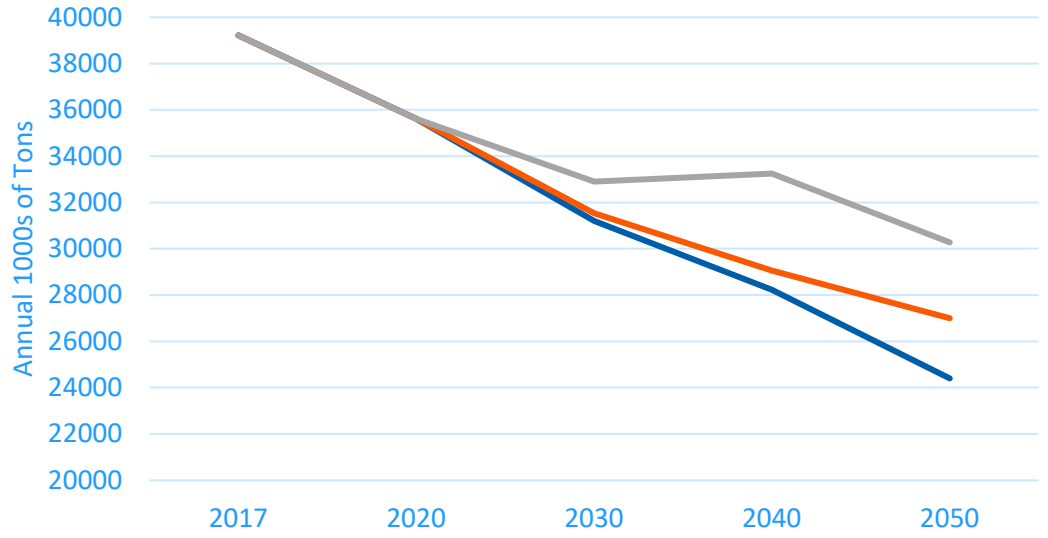
National Freight Outlook (All Commodities)

Source: FHWA/BTS Freight Analysis Framework (Version 5)

Outstate MN Logging:



Outstate MN Metallic Ores:



GAME CHANGERS

Mode Choice

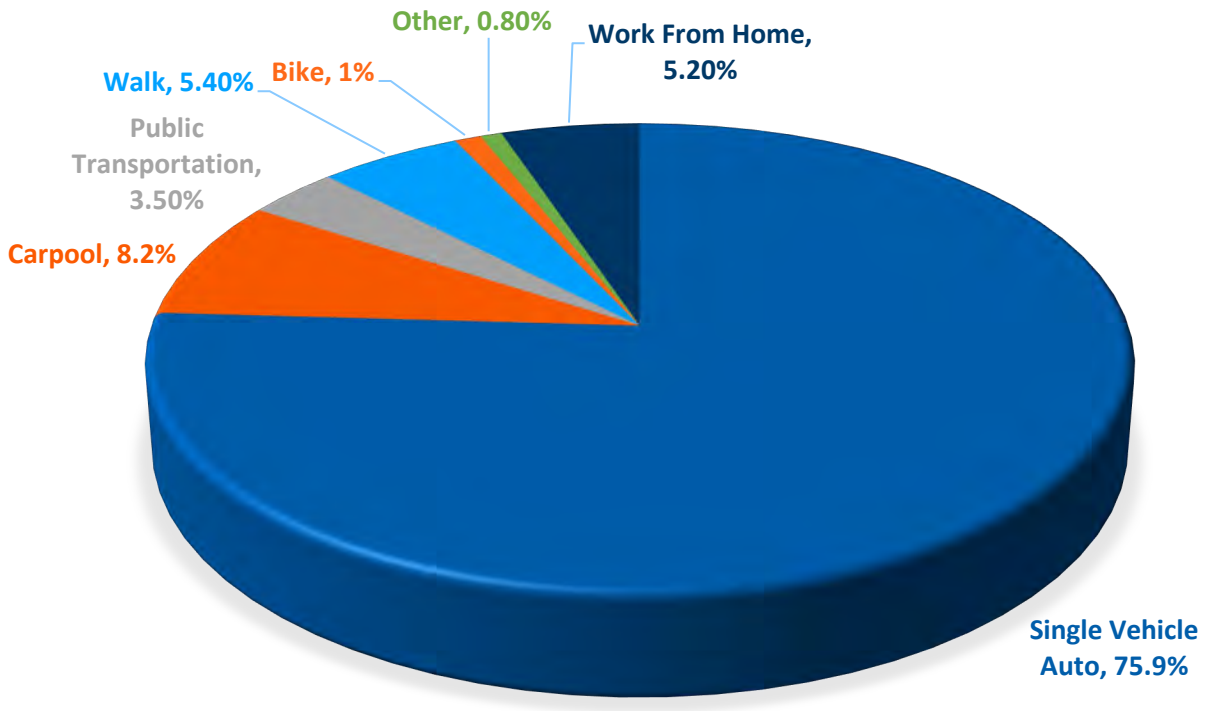
Connected/Autonomous Vehicles

Regional Infrastructure Change

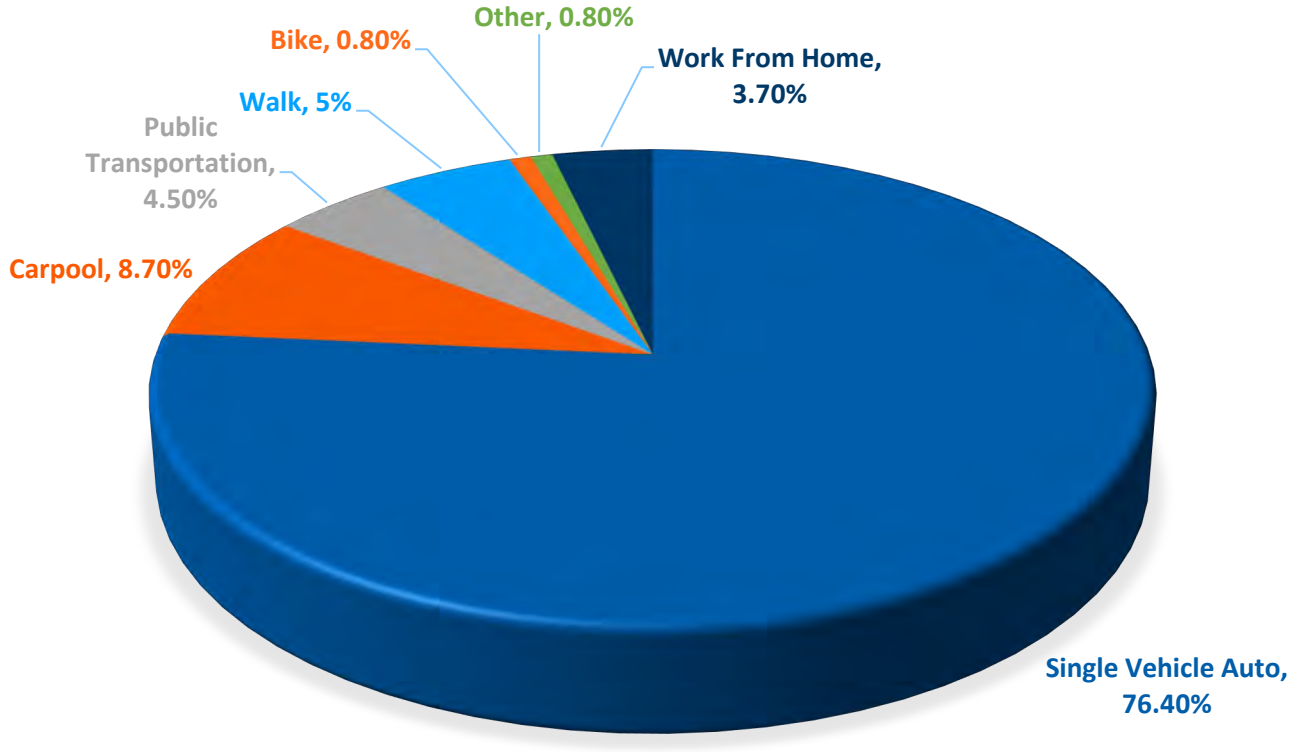
I-35 Connects

Mode Choice

2020 MEANS OF TRANSPORTATION TO WORK - DULUTH



2010 MEANS OF TRANSPORTATION TO WORK - DULUTH



Source: American Community Survey 5-Year Estimates, Table S0801

Mode Choice

Figure 1.1.1 - Percent of All Trips by Walking or Biking

Between 2009 and 2017 there was a statistically significant increase in walking trips as a percentage of all trips, increasing from 10.5% of all trips to 11.9% of all trips. Bicycling did not see a similar increase.

Chart: The League of American Bicyclists • Source: USDOT National Household Travel Survey • Get the data • Created with Datawrapper

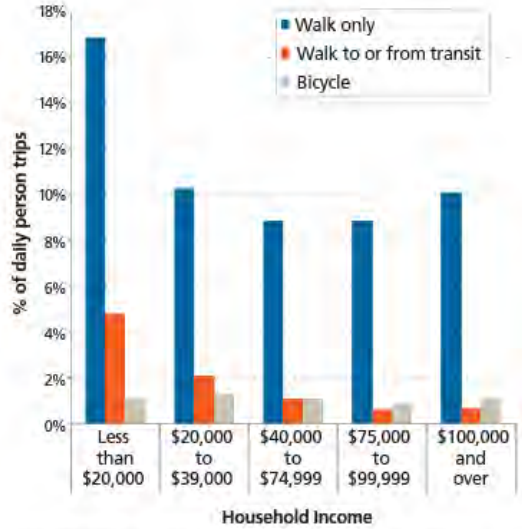


FIGURE 2 Percent of daily person trips, by income.

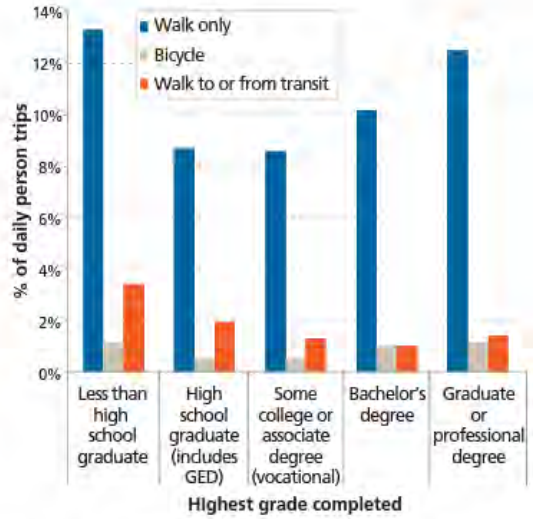
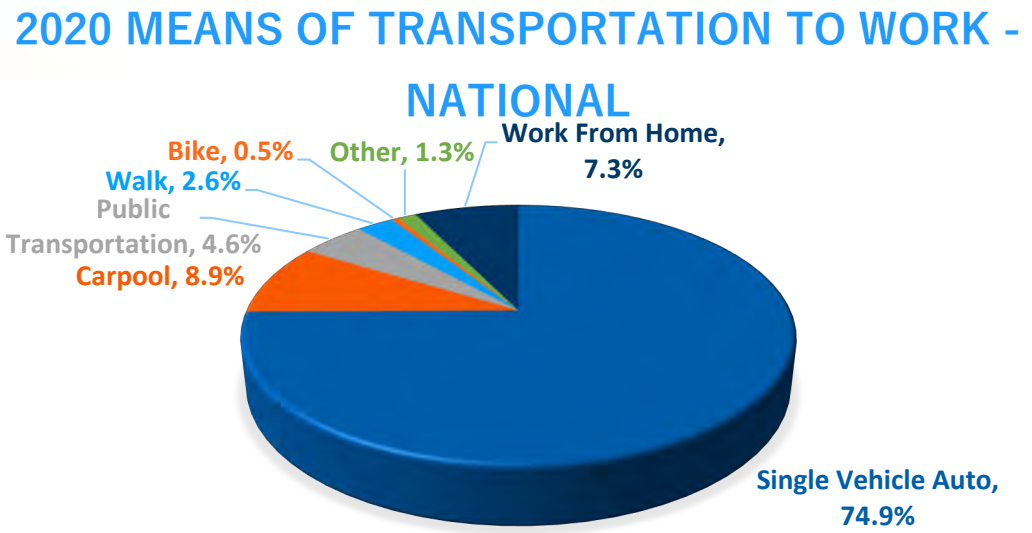
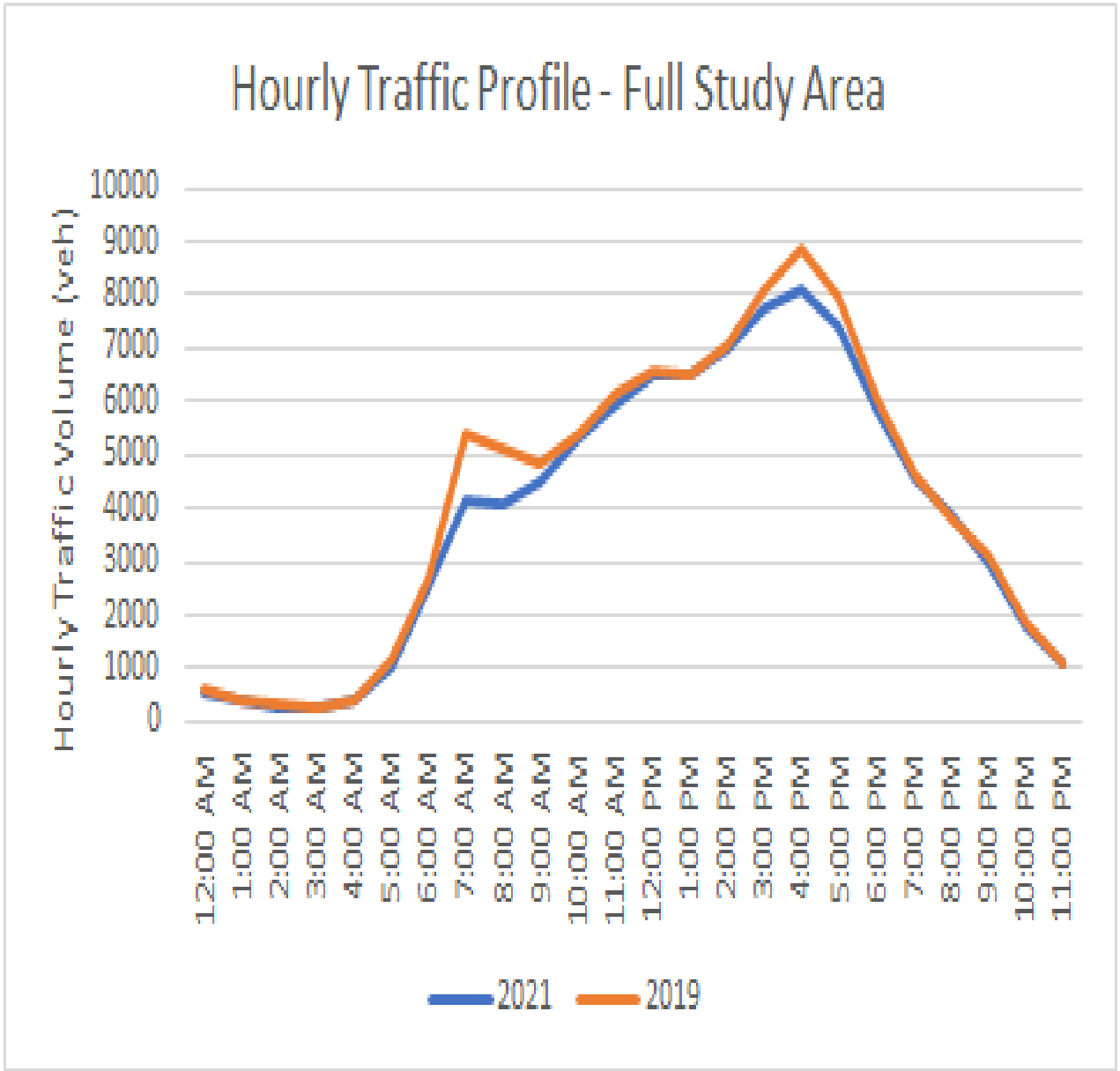
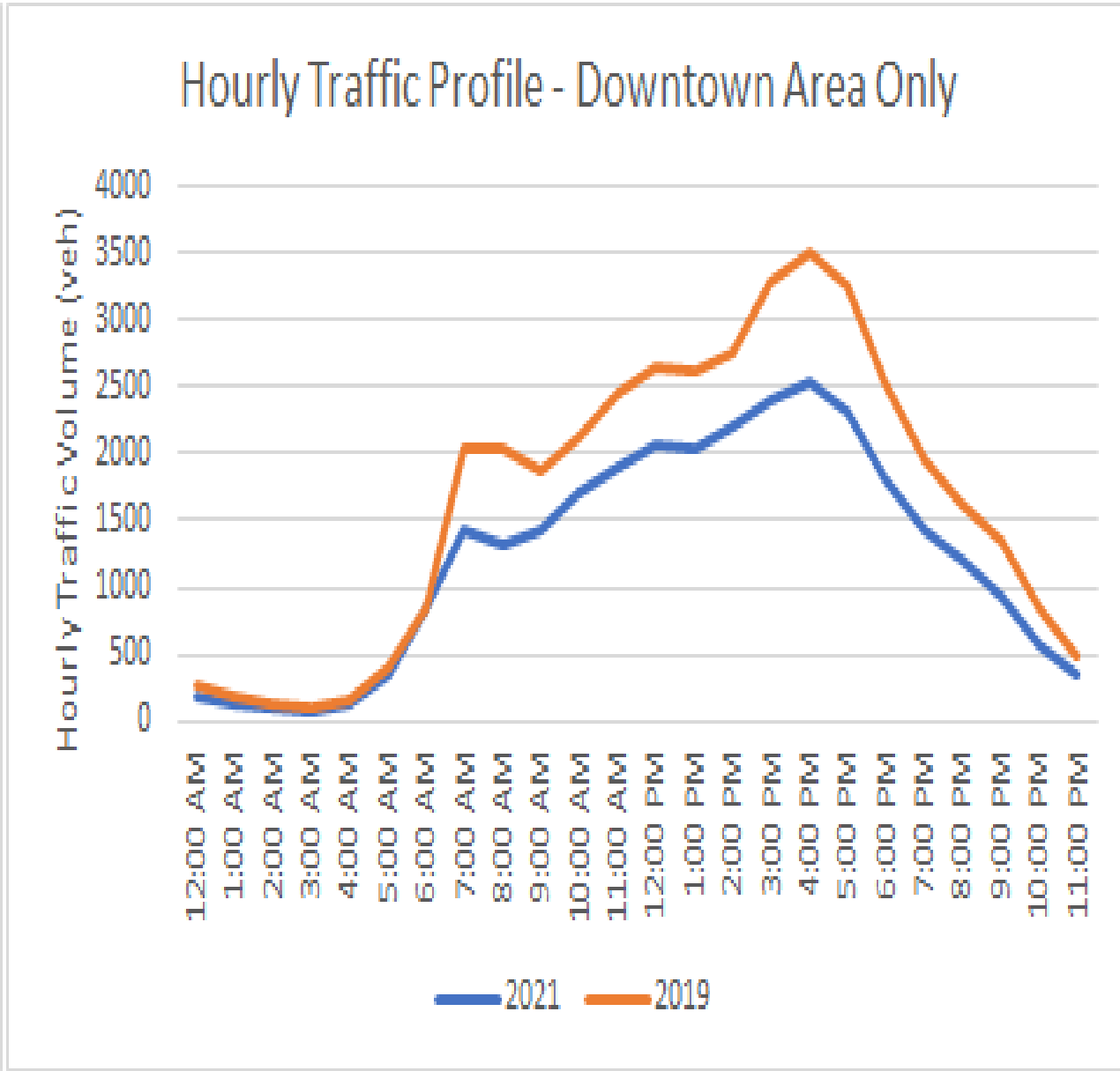


FIGURE 3 Percent of daily person trips, by education.



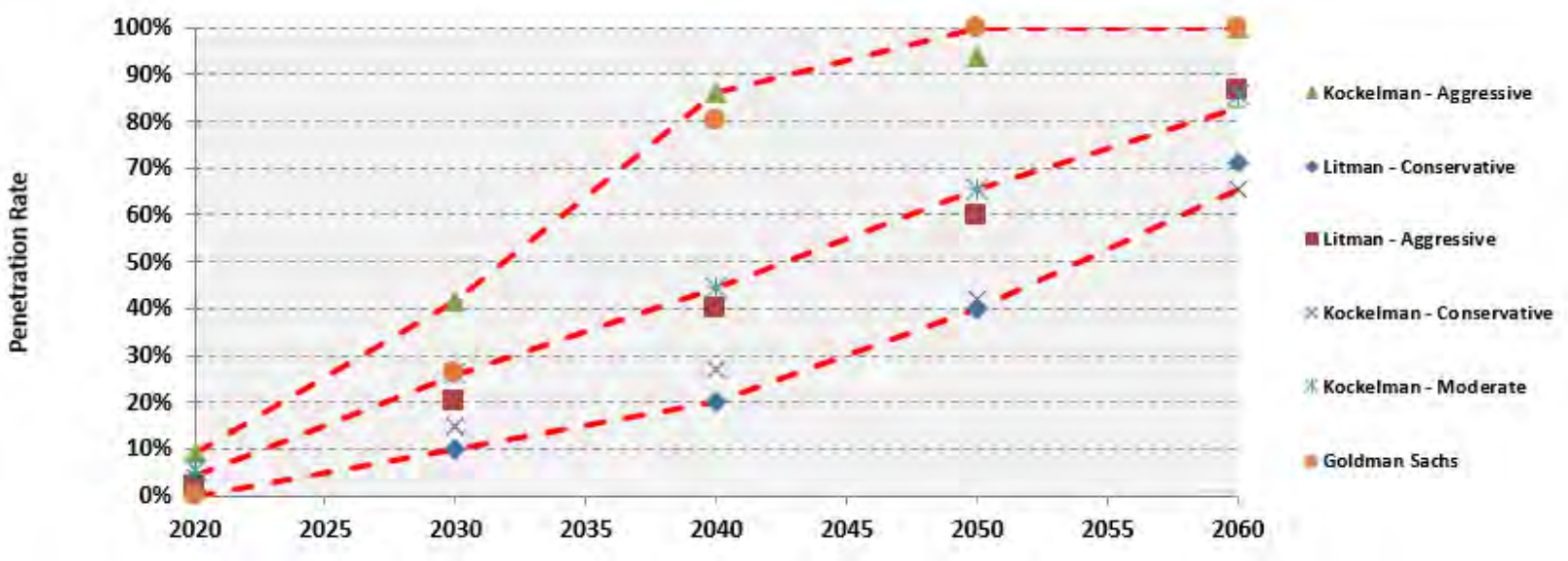
Mode Choice


Hourly Traffic Profile - Full Study Area
Hourly Traffic Volume (veh)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
2021
2019

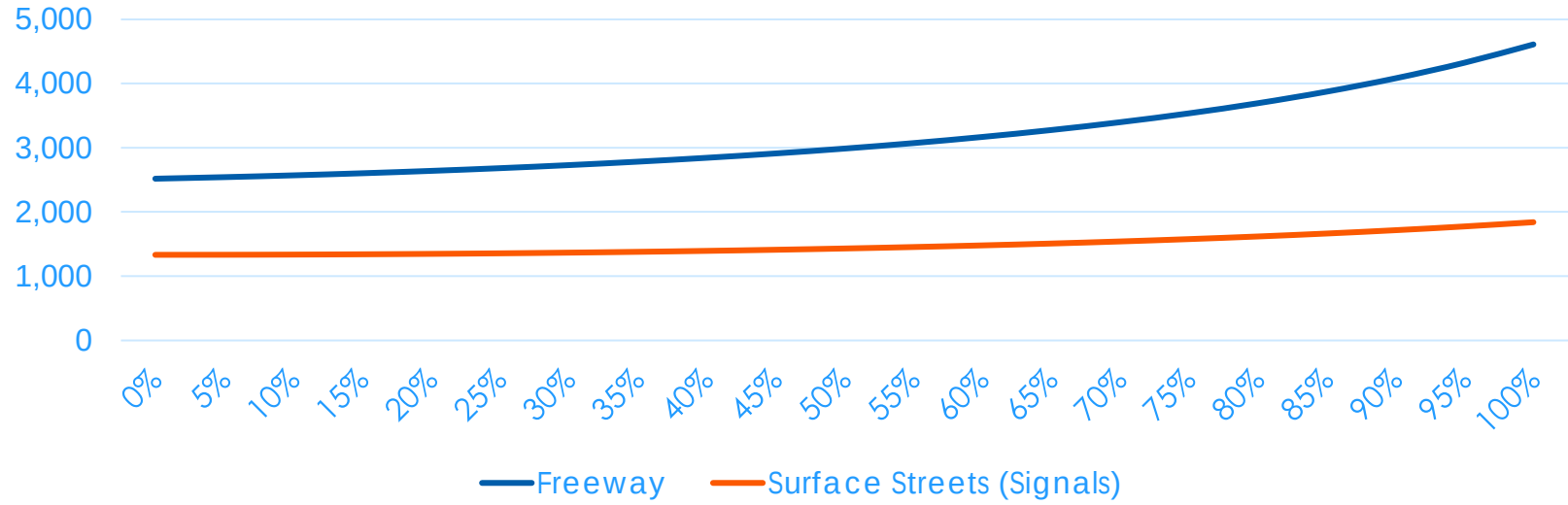

Hourly Traffic Profile - Downtown Area Only
Hourly Traffic Volume (veh)
4000
3500
3000
2500
2000
1500
1000
500
0
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
2021
2019

Connected/Autonomous Vehicles

- Adoption Rates Forecasted to be 25%-90% by 2045
- 38% Capacity Increase on Surface Streets
- 83% Capacity Increase on Freeways

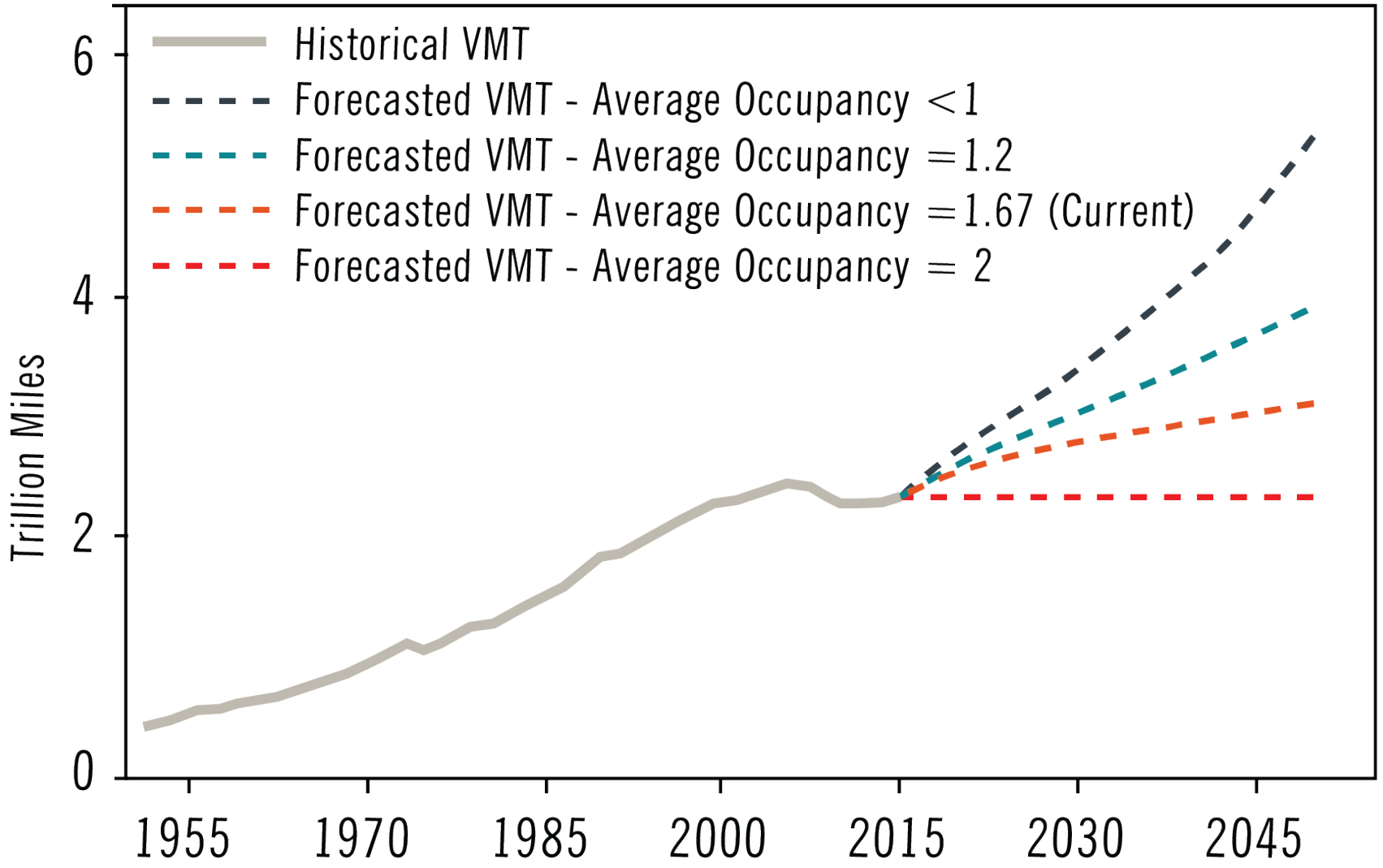


Capacities At Various AV Percentages*



Connected/Autonomous Vehicles

- Vehicle Miles Travelled Expected to Grow by >2 Times
- Contrasting Projections of Shared or Private Ownership
- Nearly 94% of fatal crashes caused by human factors



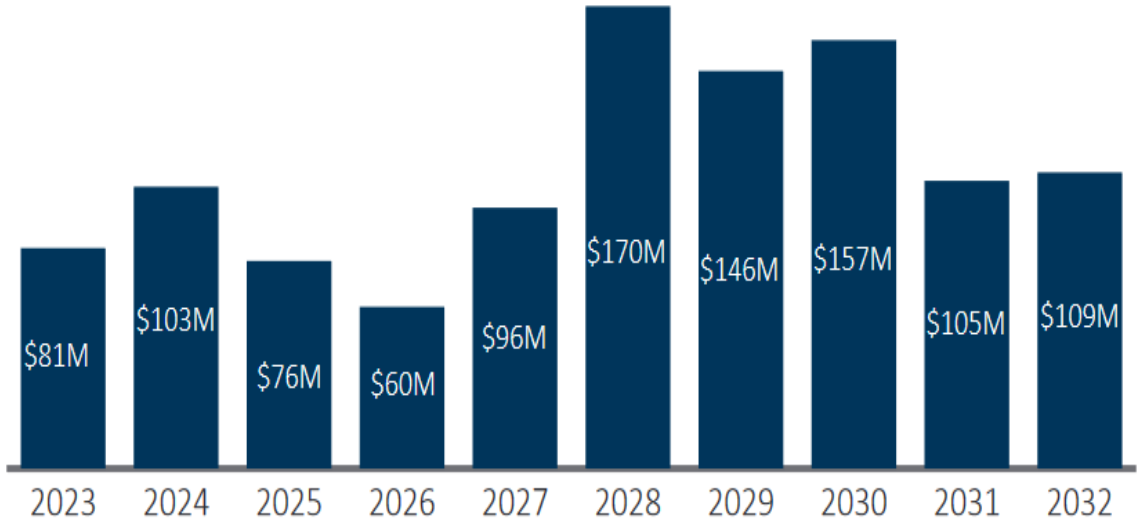
Connected/Autonomous Vehicles

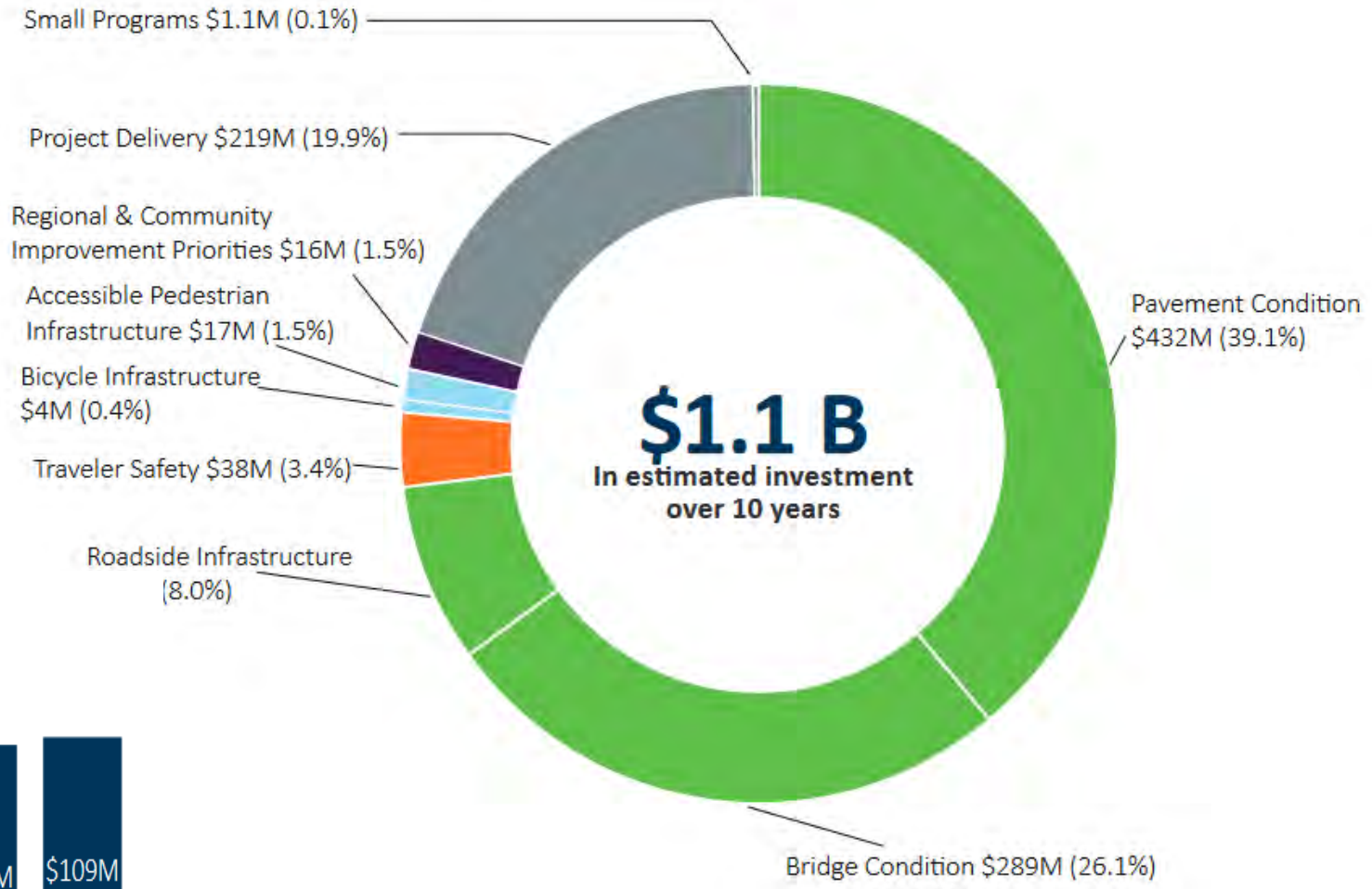
Connected/Autonomous Vehicles

Regional Infrastructure Change

Funding outlook:

- MnDOT D1 CHIP 2023-2032
  - Average of around $125,000,000 per year of funding across the district



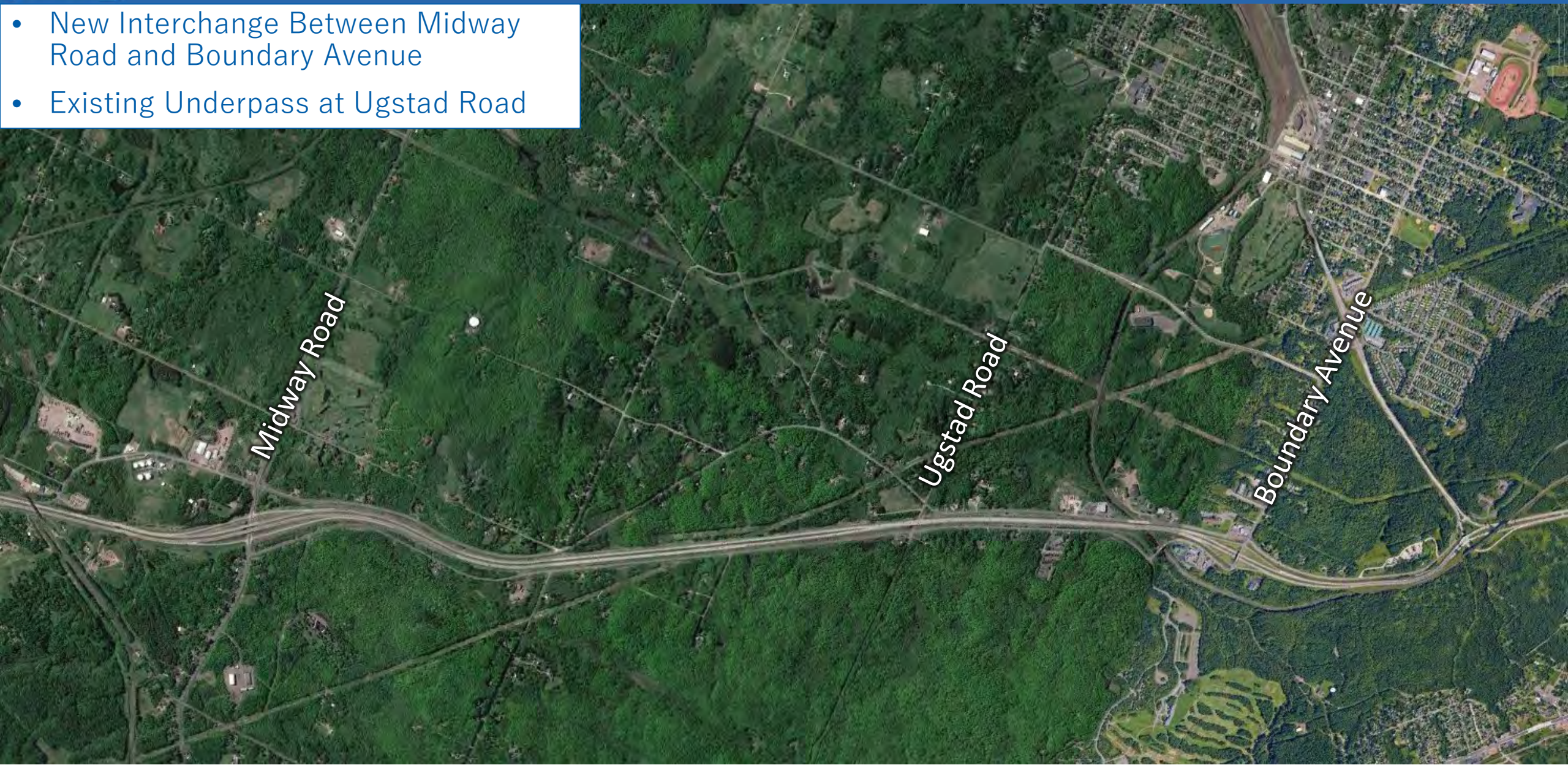


Regional Infrastructure Change

Source: Duluth Waterfront Collective

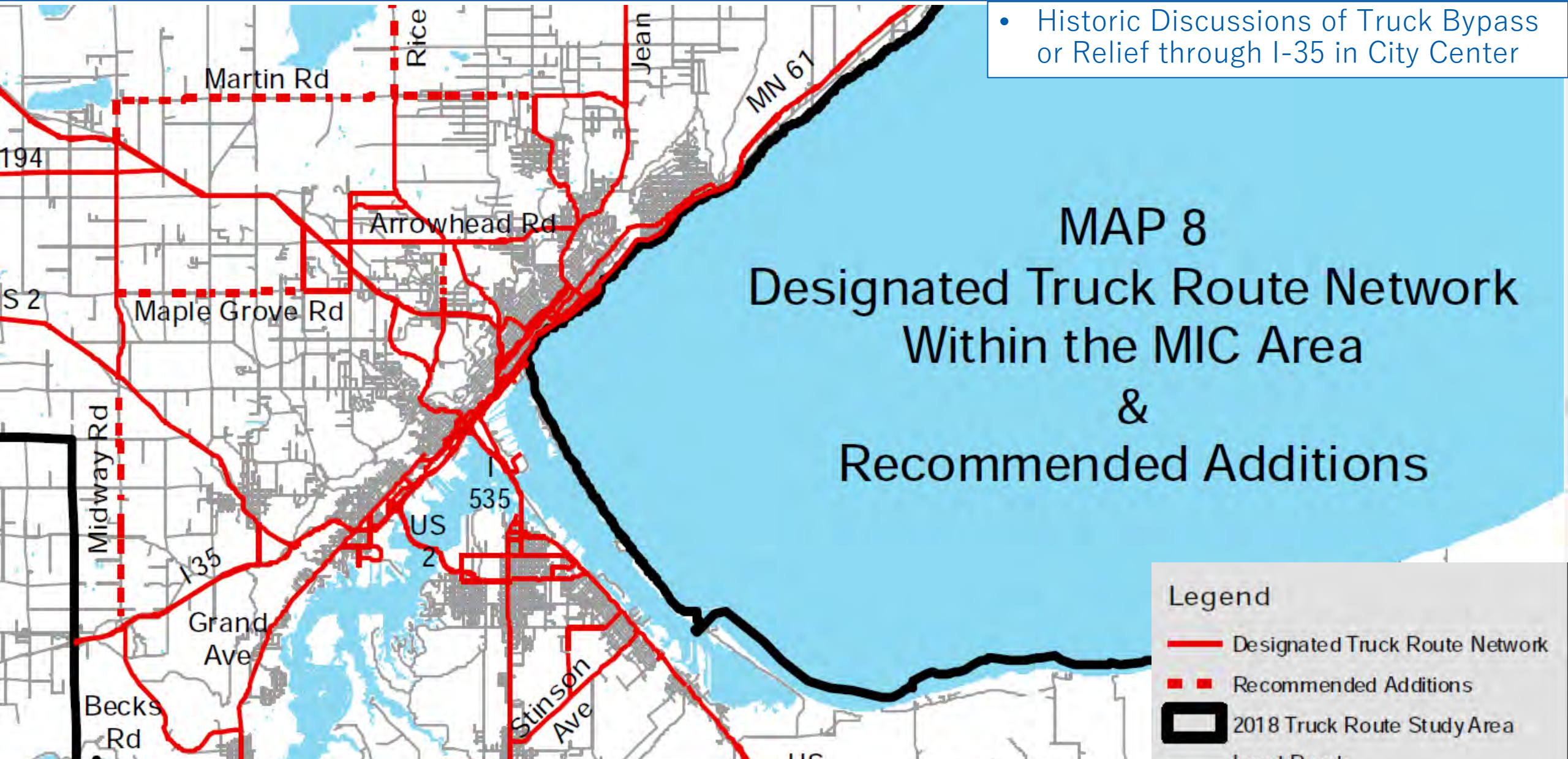
Regional Infrastructure Change

- New Interchange Between Midway Road and Boundary Avenue
- Existing Underpass at Ugstad Road



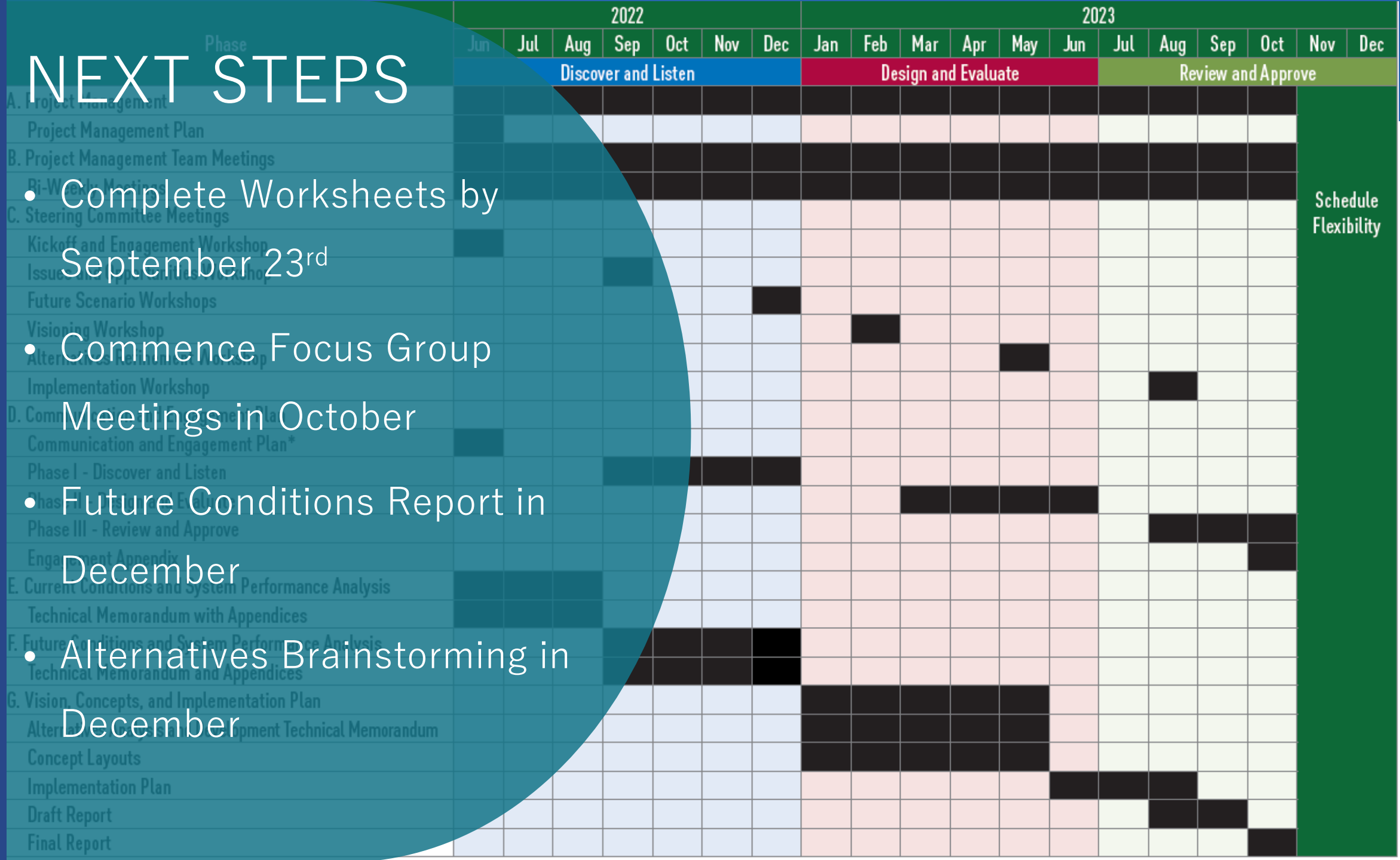
Regional Infrastructure Change

- Historic Discussions of Truck Bypass or Relief through I-35 in City Center



NEXT STEPS

- Complete Worksheets by September 23rd
- Commence Focus Group Meetings in October
- Future Conditions Report in December
- Alternatives Brainstorming in December



I-35 Connects