2050 LRTP Tech Memo Introduction

The Planning Process

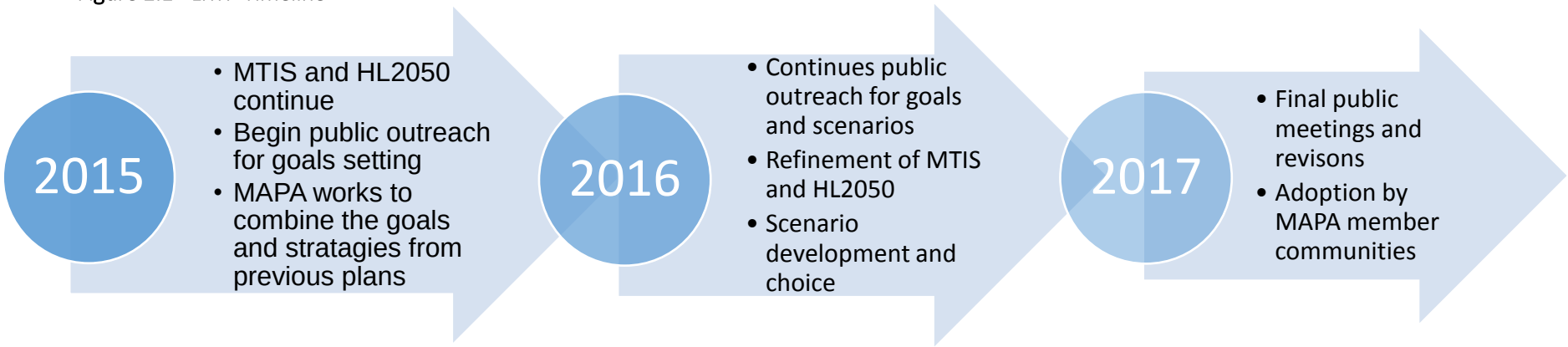
Long Range Transportation Plan Timeline

The 2050 long range transportation plan (LRTP) is based off of five plans and studies that MAPA has completed between 2009 and 2017. These are:

- HEARTLAND CONNECTIONS REGIONAL TRANSIT VISION (RTV) – 2013
- HEARTLAND 2050 VISION & ACTION PLAN – 2014 & 2015
- COORDINATED TRANSIT PLAN – 2014
- HEARTLAND CONNECTIONS BICYCLE AND PEDESTRIAN MASTER PLAN – 2015
- METROPOLITAN AREA TRANSPORTATION IMPROVEMENT STUDY (MTIS) – IN PROGRESS

In addition to these there is considerable development and refinement being done to these plans and studies to combine them into a cohesive vision for the Omaha-Council Bluffs region. Figure 2.1 shows the projected timeline for the 2050 LRTP development and coordination with H2050 and MTIS.

Figure 2.1 –LRTP Timeline



Public and Stakeholder Involvement

Public Involvement

Through the goal and scenario development process MAPA held meetings to ask for feedback and direction with stakeholders, interests groups, and the general public. The schedule for this is shown in the timeline below (Figure 2.2).

The public process used to develop this plan is detailed later in this chapter and was based off of the MAPA Public Participation Plan (PPP) which can be found in full on MAPA's website.

Time Line

MAPA's public involvement process for the 2050LRTP sought early and frequent input from citizens in the planning process with the goal of meaningful public input and engagement.

Figure 1.2 – Public Involvement Timeline

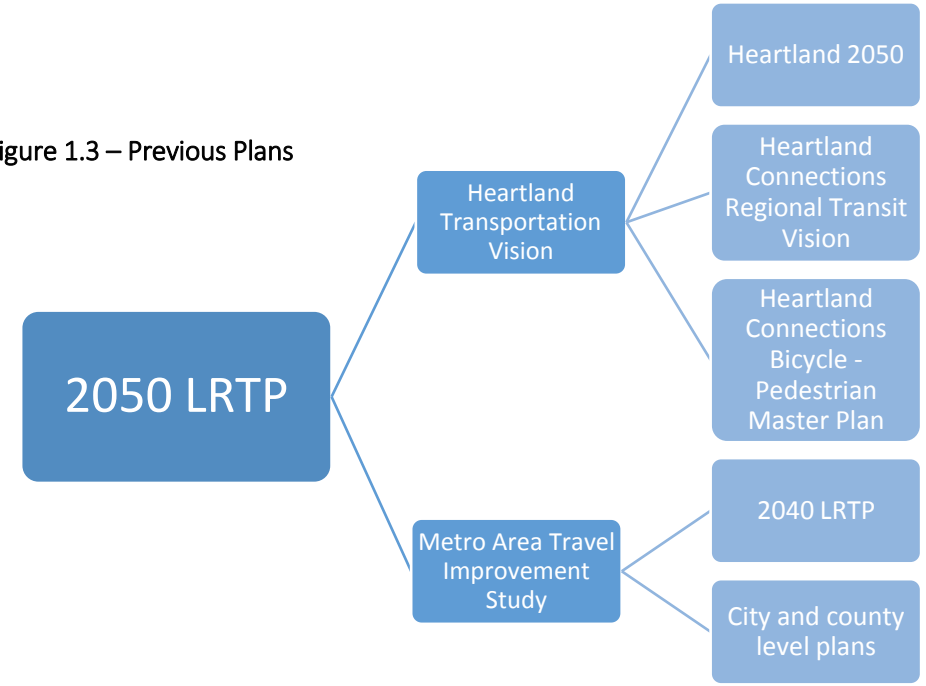
Goals and Strategies for the LRTP

MAPA staff used the goals developed through studies and plans that were completed between the 2010 and 2015. These studies, and how they fit into the 2050 LRTP, are shown in figure 2.3 to the right.

Through stakeholder involvement six goals from the previous plans were chosen and brought to the public for prioritization and comment. The goals are shown below in the order of importance in which stakeholders and the public ranked them.

Staff then conducted questionnaire and public meetings throughout the region to further refine and combine these goals for the long range transportation plan. The full surveys can be found online at: http://www.mapacog.org/transportation and http://heartland2050.org/download-our-vision/

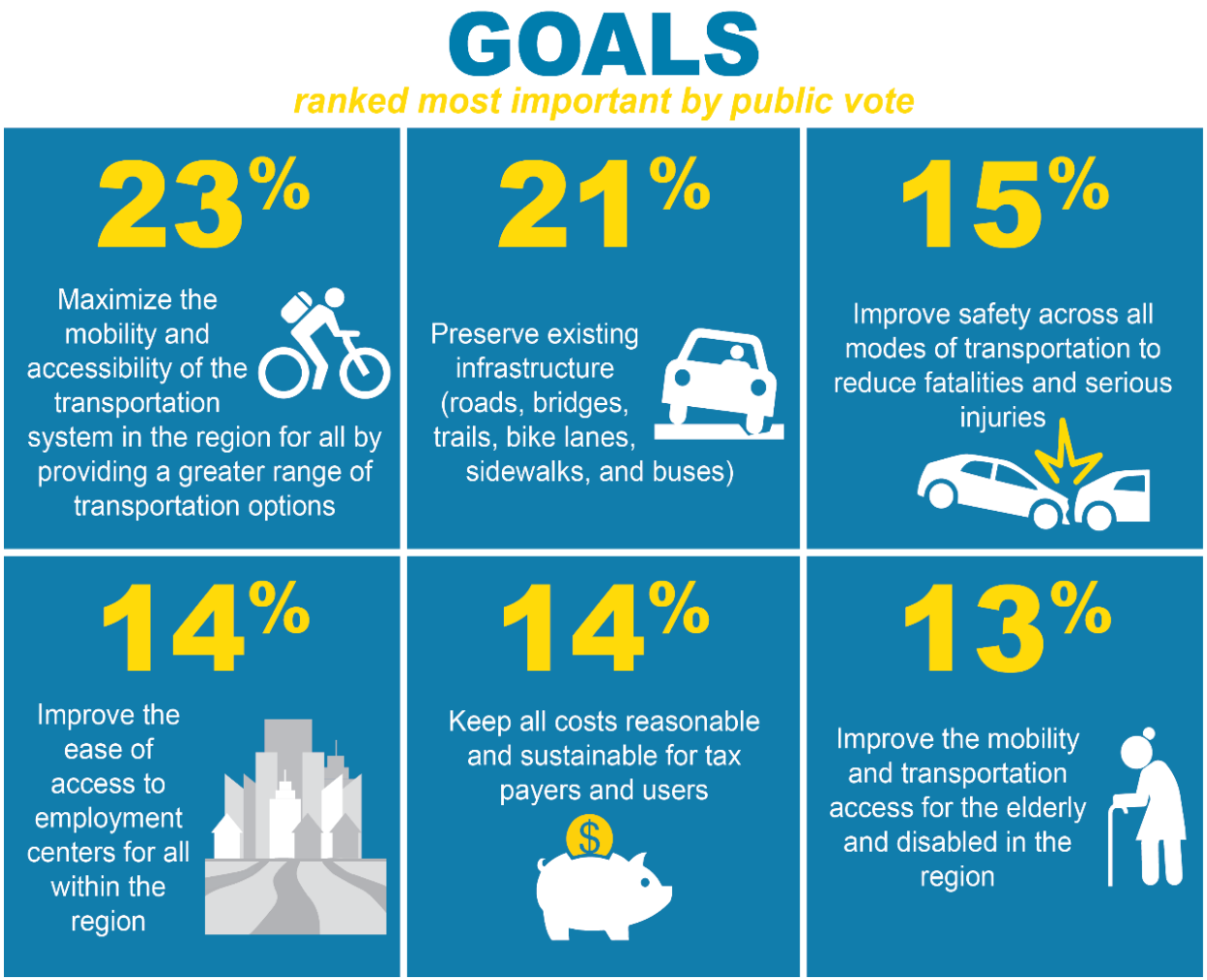
Figure 1.3 – Previous Plans



Goals

The goals that the public ranked most important are shown below, in figure 1.4. Through these goals MAPA is working on selecting and funding projects which will aid the region in achieving the vision set out in Heartland 2050.

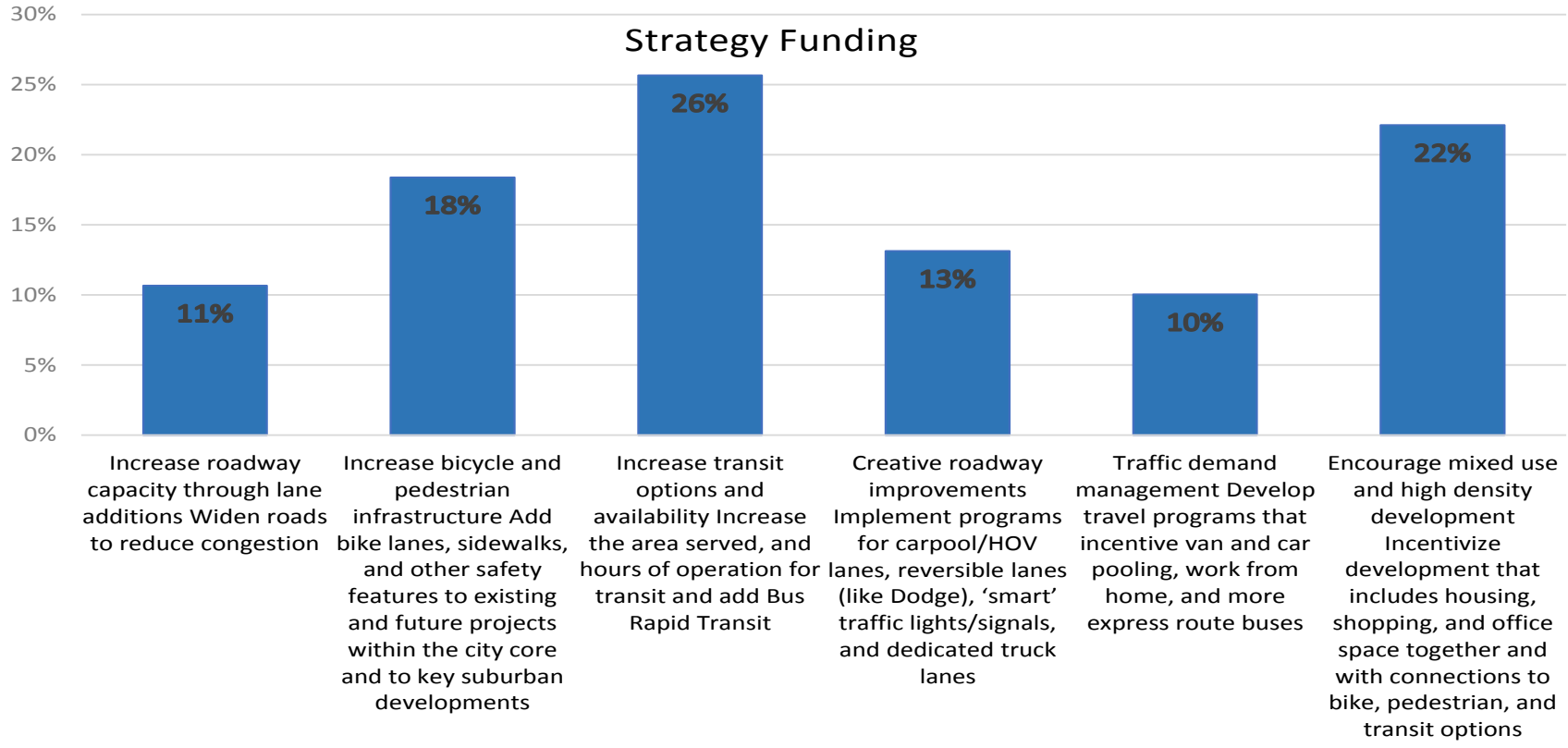
Figure 1.4 – LRTP Goals



Funding Strategies

The public and stakeholders voted to allocate transportation funding as shown below in figure 1.5.

Figure 1.5 – Strategy Funding Allocation



Preferred Alternative Development

Through a series of stakeholder and public meetings MAPA staff brought the draft focus of potential focuses for a scenario package to the public for feedback and to determine which is felt to be the most effective and feasible to implement.

The scenario packages focused on a variety of funding options which focused investment on specific types of transportation improvements. The scenarios are:

- High levels across all current modes
- Freeway focused investment
- Arterial focused investments
- Transit focus
- Low levels of investment across all modes
- Geographically dependent focuses

The focused scenarios are shown and discussed in chapter 2 of the technical memorandum.

Preferred Alternative

Based on the input received on the focused investment scenarios and the goals and strategies staff worked through MTIS to develop a seventh scenario which was reviewed by the public and will be used to develop the preferred scenario.

CHAPTER 10: COMMUNITY NEEDS AND FUTURE CONDITIONS

Introduction

While many issues exist today, changes in how our region grows, increases in traffic, and changes to development patterns will generate additional needs that communities in the Omaha-Council Bluffs region will need to address. This chapter is organized to provide an overview of identify needs for the various modes of transportation discussed earlier in this plan.

When possible, the needs identified in this Chapter are based on future conditions. Many of these conditions are identified based on the preferred Heartland 2050 land use scenario or output from MAPA's Travel Demand Model. Other future needs have been identified through the detailed engineering analysis conducted as part of the Metro Travel Improvement Study. Other needs are characterized by existing deficiencies in the transportation network that must be addressed by 2040.

Taken together, this needs comprise the transportation challenges that face the MAPA region over the next 25 years. The chapters that follow show various approaches to addressing these needs and illustrate the type of investment strategy necessary to meet the various needs across modes.

Overview of Pavement Conditions

As discussed in Chapter 5, Preservation of Strategic Corridors, pavement conditions in the MAPA Region are quite good overall. Figure 10-1 (right) shows the existing pavement condition data for the major roadways in the MAPA region.

At the state level, both NDOR and Iowa DOT have ongoing pavement management programs aimed at maintaining However, as needs are projected out into the future, it is critical to account for the roads in Fair condition today, as these segments are likely to be the pavement needs of the future.

Figure 10-2 summarizes the condition of pavements in the MAPA region as a percentage of the total mileage of roadways. In the MAPA region, approximately 19% of major roadways in the MAPA Region (105 miles) have pavements that are currently in Fair condition. Furthermore, approximately 6% of roadways are presently in poor condition. These roadways (identified in Figure 10-1) have constitute significant system preservation needs that must be addressed over the next 20 years.

Figure 10-1: Map of Road Surface Quality of Roadways in the MAPA Region

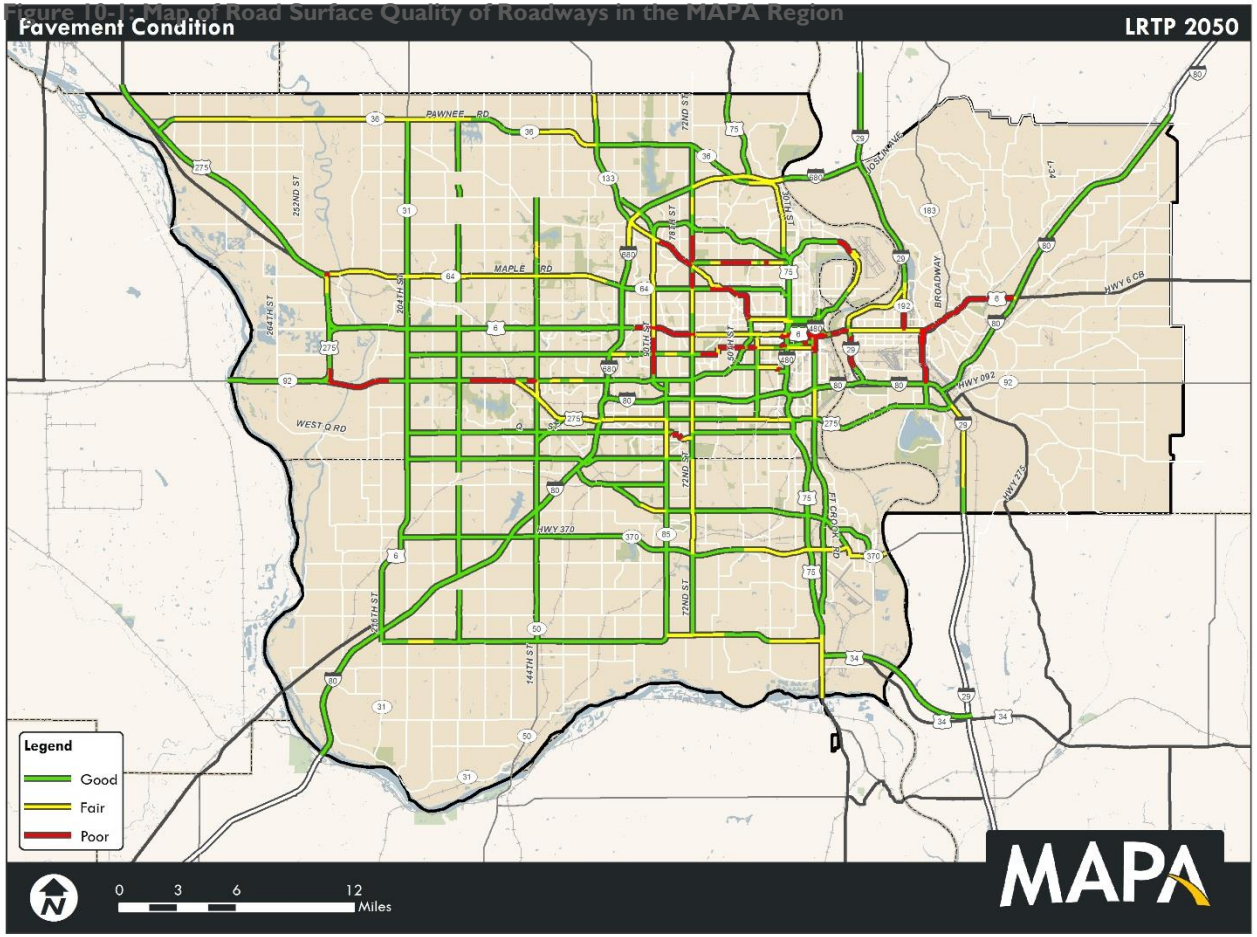
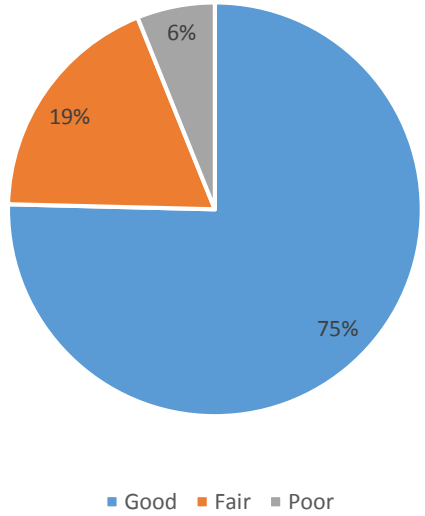


Figure 10-2: Breakdown of Road Surface Quality



Pavement Conditions – MTIS Identified Needs

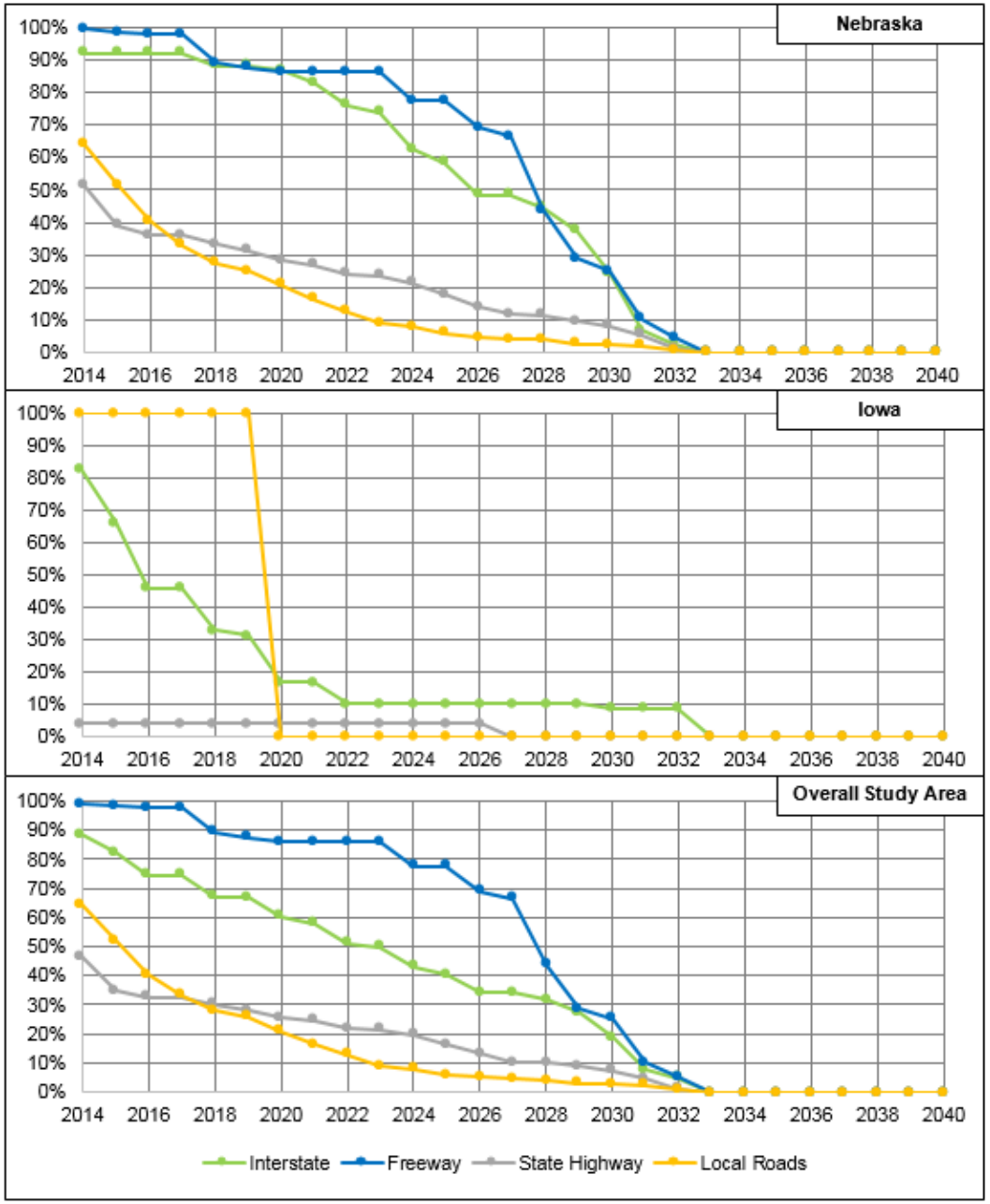
The Metro Travel Improvement Study (MTIS) conducted a detailed analysis of how pavements in the MAPA region will deteriorate over time on major roadways. Pavement deteriorates over time due to traffic loads, severe weather, and other factors. Without preventative maintenance or rehabilitation, pavement will eventually deteriorate to a point where it is no longer serviceable and requires reconstruction. Pavement deterioration models are used to predict how long the existing surface will last and what needs to be done to meet system preservation goals. The models help identify projects (such as preservation, rehabilitation, or reconstruction) and help identify when those projects should occur.

Pavement deterioration models developed by NDOR as part of the 2011 Pavement Optimization Program were applied for MTIS to forecast future pavement condition and determine the time at which pavement assets would become deficient assuming no further preservation or rehabilitation treatments are applied. Figure 10-3 shows how each functional classification's percentage of lane-miles in "good" or better condition is expected to change over time based on the deterioration models. Findings from this analysis include:

- Interstate and Freeway pavement segments in the Nebraska portion of the study area will not meet the 84% "good" or better performance target after 2021 and 2023, respectively. Nebraska State Highway and Local Roads will never meet the performance target unless pavement treatments are applied.

- By year 2033, no study area roadways are expected to have pavement in "good" or better condition unless pavement treatments are applied.

Figure 10-3: Deterioration of Pavements, MTIS Model Output



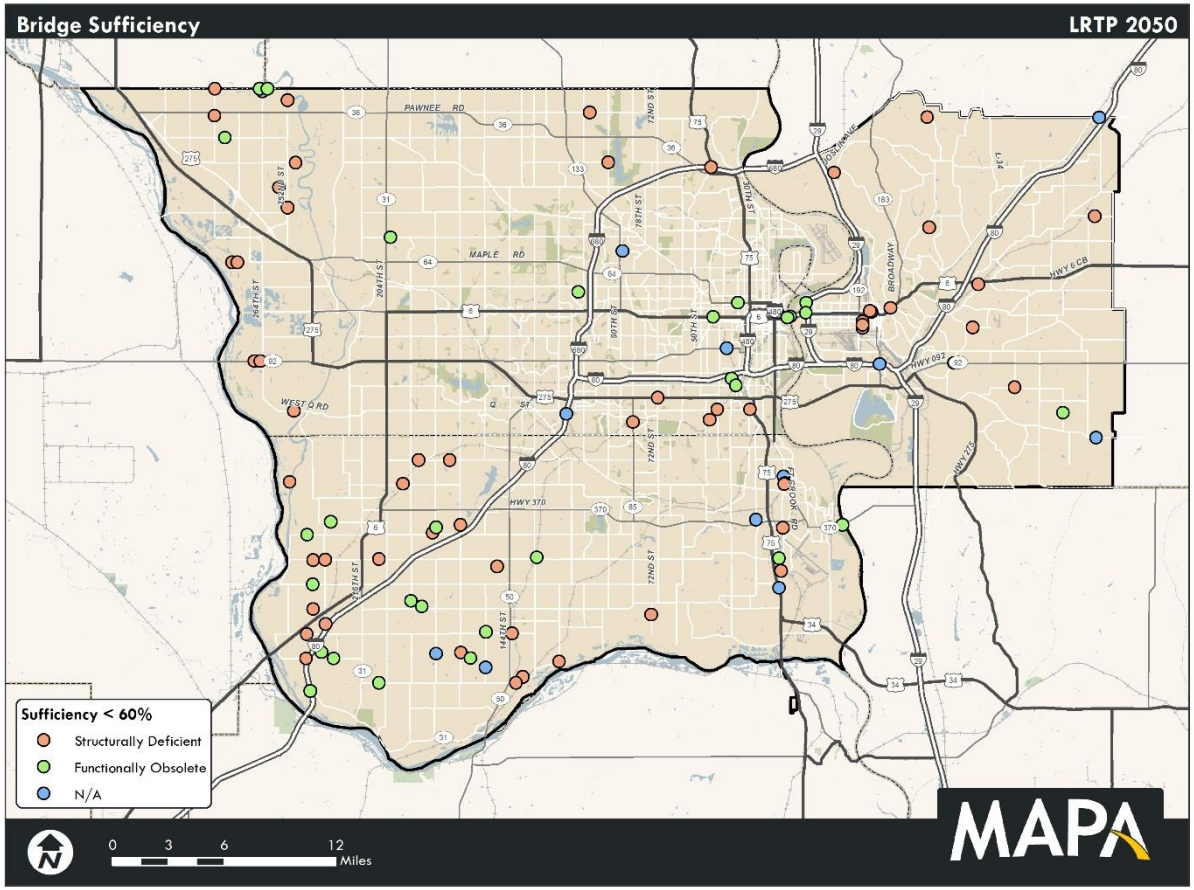
Overview of Bridge Needs in the MAPA Region

Bridges are critical links in the transportation network of a community. However, bridge structures are very expensive to replace after their condition has deteriorated to the point when they are no longer useful. Investments in improving the condition of bridges in the MAPA region is a critical System Preservation strategy identified as part of the goals and objectives of this Long Range Transportation Plan.

To aid in identifying current and future bridge needs, Figure 10-4 shows the locations of all bridges with a sufficiency rating below 60%. This rating is an overall assessment of the structural health of the bridge and is a key indicator of needs related to preservation, rehabilitation or replacement. While bridges identified on this map may be in reasonably good condition today, it is likely that they will have major needs over the planning period that must be addressed.

Additionally, Figure 10-4 identifies the bridges with ratings below 60% that are either Structurally Deficient or Functionally Obsolete. Structurally deficient bridges are characterized by deteriorated conditions of significant bridge elements and reduced load carrying capacity. Functional obsolescence is a function of the geometrics of the bridge not meeting current design standards. Neither type of deficiency indicates that the bridge is unsafe. While neither of these categories indicates the bridge faces an imminent collapse, they are useful tools to prioritize bridge needs at a regional level.

Figure 10-4: Bridge Needs in the MAPA Region



Bridge Needs for MTIS Corridors

Historical inspection data were used to develop bridge deterioration models in order to predict the time at which each bridge is expected to become structurally deficient. Bridge deterioration models were used to identify conditions out to 2040 based on no additional investment in preservation, rehabilitation or replacement. Without preservation, the bridges in Nebraska are expected to reach structural deficiency in 45 years, while the bridges in Iowa are expected to reach structural deficiency in 21 years.

By 2040, study area bridges are expected to deteriorate from the current level of 4.03% structurally deficient deck area to 30% structurally deficient deck area without further investment in bridge preservation and rehabilitation (see Figure 10-5). During the same time, the percentage of bridge deck area in "good" condition is expected to decrease from 75% to 44%.

More than 80% of bridges in the Iowa portion of the study area are expected to become structurally deficient by 2040 (see Figure 10-6). The percentage of structurally deficient bridges in Iowa is expected to remain at approximately 1% through 2020, but will suddenly increase to 40% in 2025, and increase to almost 80% in 2040. This sudden increase is expected as roughly half of the bridges in the Iowa portion of the study area that are currently in fair condition are expected to deteriorate to "poor" condition in the next few years. Structurally deficient bridges in the Nebraska portion of the study area are expected to increase at a much slower rate as more than 84% of the bridges are currently in "good" condition.

Figure 10-5: Forecasted Condition of MTIS Bridges

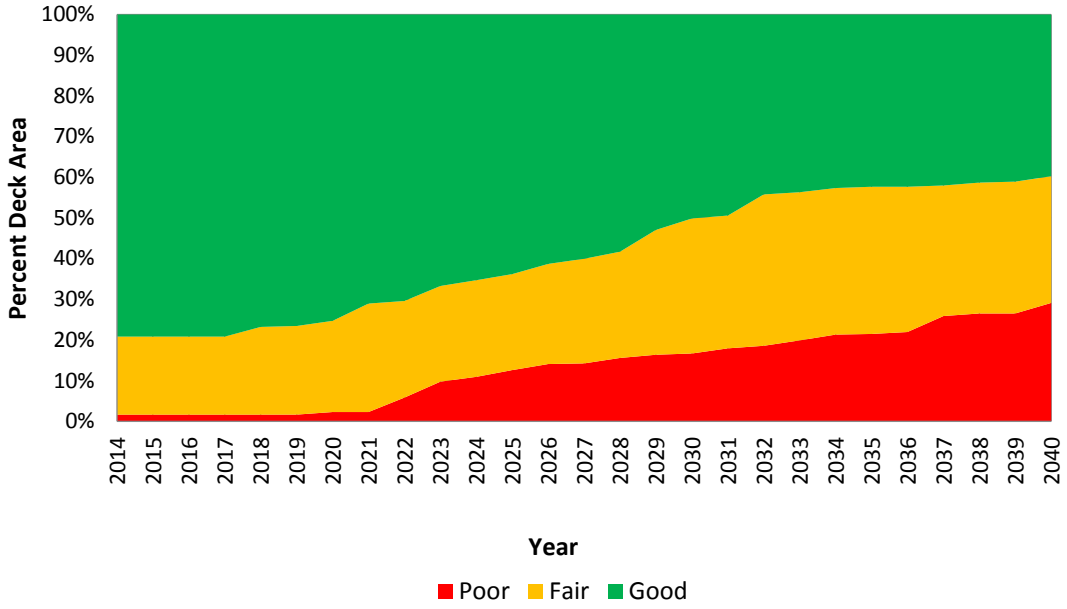
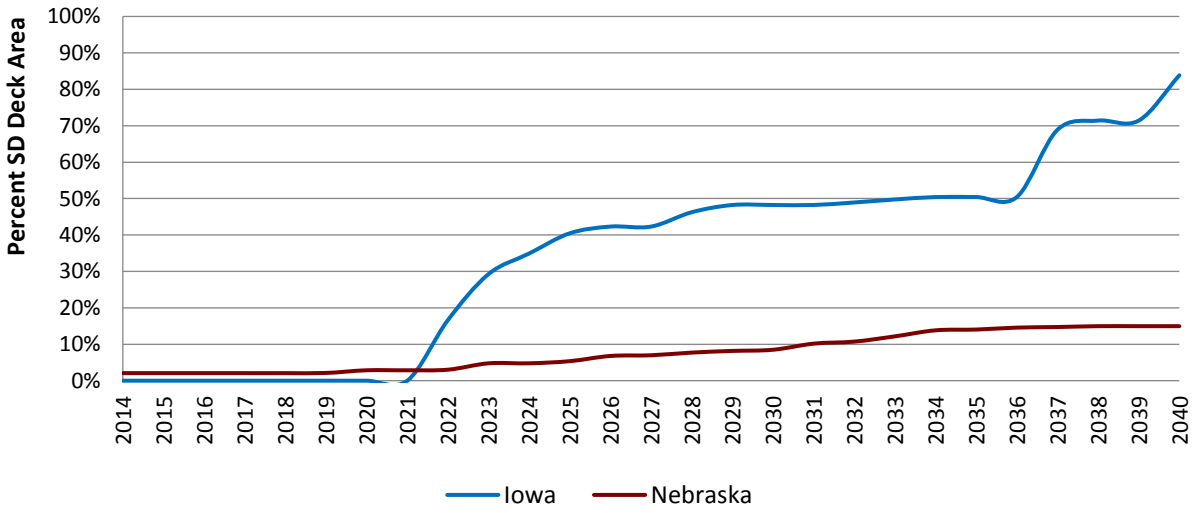


Figure 10-6: Forecasted Structural Deficiencies for MTIS Bridges

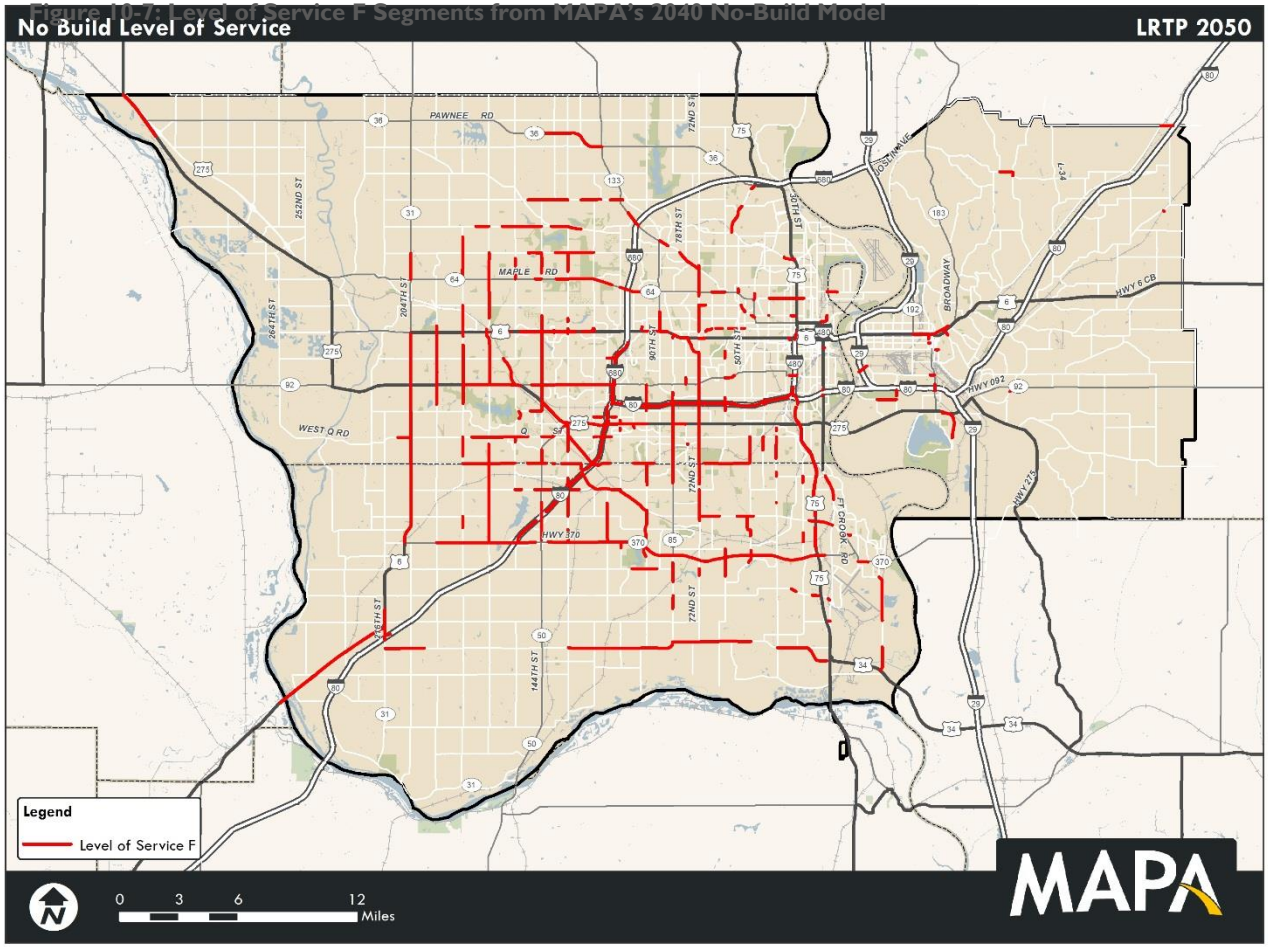


Traffic-Related Needs of the MAPA Region

The MAPA Travel Demand Model is a useful tool for identifying future traffic-related needs on the region's roadways. The MAPA Model uses forecasts about the location of housing and employment in the future to assess how traffic is likely to grow over the next 25 years. Figure 10-7 (below) illustrates roadway segments in the MAPA region that have been identified as "Level of Service F" by the MAPA model.

This designation means that the anticipated daily traffic on these roadways exceeds the capacity of the current system. As such, increasing the capacity of these roadways or shifting the demand from these corridors to other transportation modes or other roadways will be necessary to ensure that these corridors function well for road users in the MAPA region in the future.

Figure 10-7: Level of Service F Segments from MAPA's 2040 No-Build Model



MTIS Identified Traffic Operations Needs

The MTIS team utilized a variety of measures to quantify future traffic needs on major roadways in the MAPA region. Figure 10-8 illustrates the results of these analyses for the MAPA region. The Highway Capacity Manual (HCM) was used to identify the level of service (LOS) of intersections. Similar to LOS for roadways, Intersection Level of Service evaluates the capacity of intersections and the characteristics that can cause delay for roadway users.

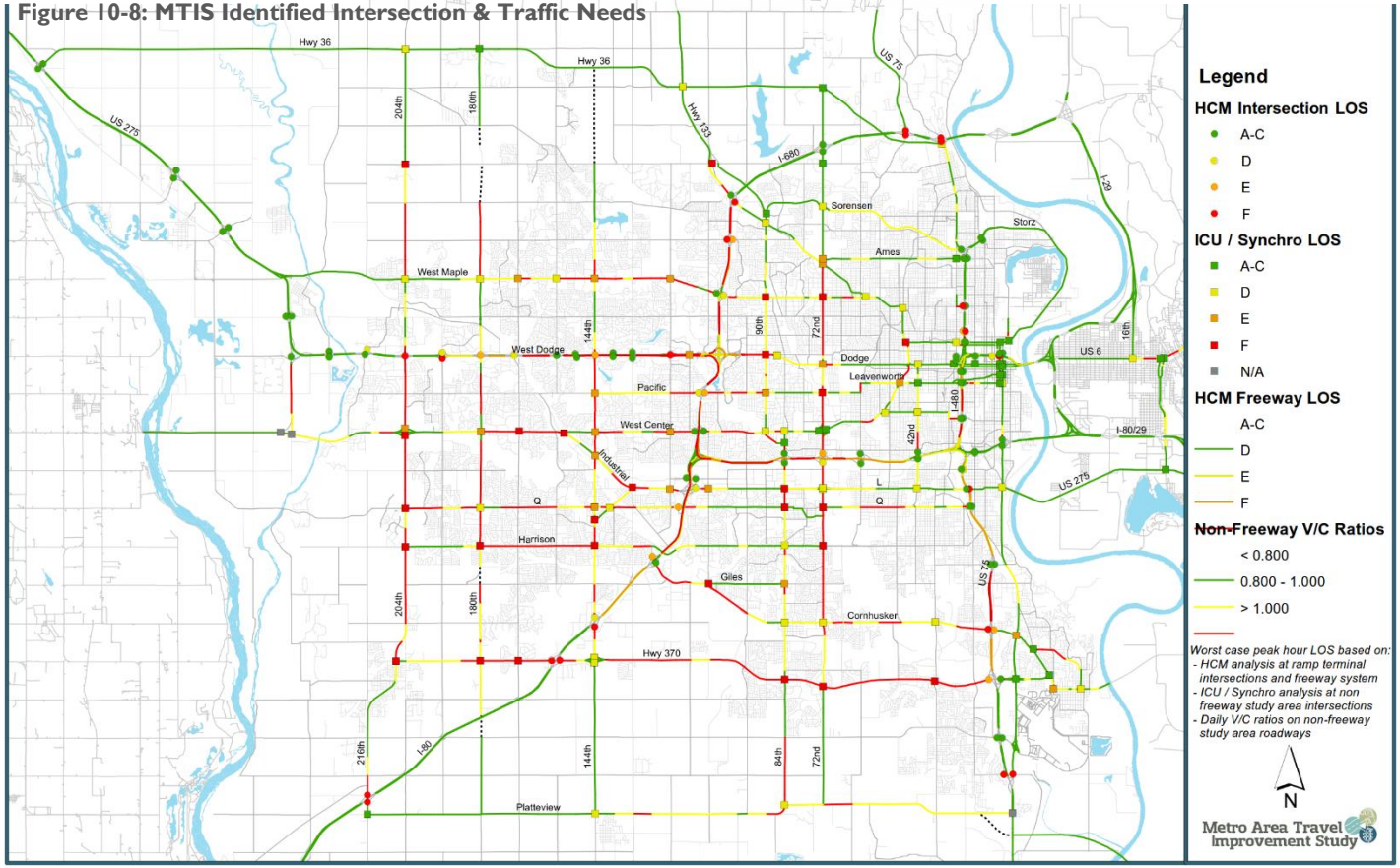
The Intersection Capacity Utilization (ICU) measure estimates the percentage of roadway users that are being served by the current signal timing and intersection design. Intersections that to not serve traffic well receive poorer grades on the scale.

Finally, the Highway Capacity Manual Level of Service is a measure designed to reflect the unique characteristics of freeways and how they operate.

Results of these analyses are summarized below:

- 35% of non-freeway study roadways approaching capacity or over capacity (V/C > 0.9)
- 59 of the 112 studied intersections are over capacity (LOS 'F') during their AM or PM peak hours. LOS 'F' intersections during the AM and PM peak periods we coded in Synchro 8 software.

Figure 10-8: MTIS Identified Intersection & Traffic Needs



Regional Corridor Needs

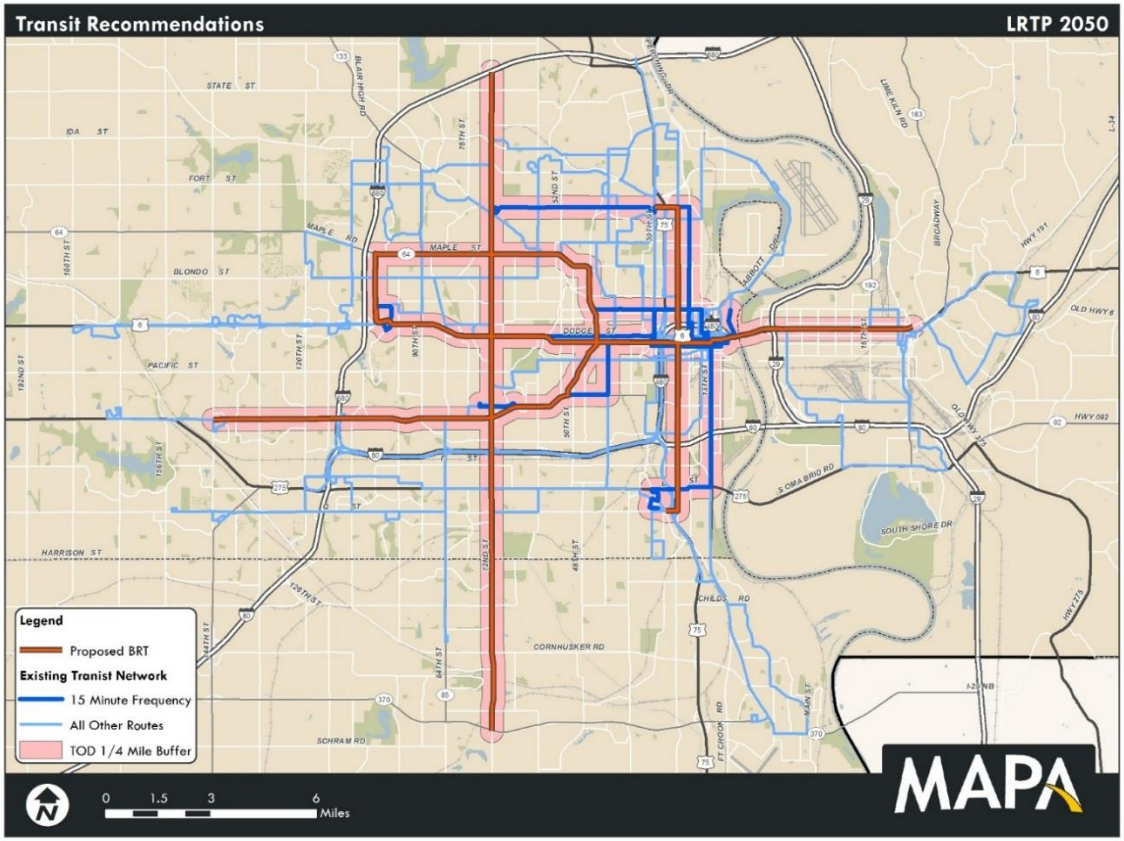
In 2013 MAPA and Metro Transit completed the Heartland Connections Regional Transit Vision. This technical study identified service improvements that could be made to Metro's existing service and potential rapid transit corridors throughout the MAPA region. The basis for many of these recommendations was an Origin-Destination analysis based on an onboard survey of riders on Metro's transit system. The results of this survey and the analysis of types of trips desired by Metro transits riders are illustrated in Figure 10-10 (next page).

Figure 10-9 (right) illustrates the proposed Bus Rapid Transit Corridors proposed as part of the Regional Transit Vision. One key recommendation of this study was to link together frequent transit service with developments that promote walkability, higher densities and mixed-uses that provide key services to transit users. These types of development policies are often grouped together and called Transit Oriented Development (TOD).

Addressing the relatively low-densities in many parts of the MAPA region will be critical to support the success of fast, frequent transit service throughout the region. Transit Oriented Development is a key strategy to achieve these goals.

Figure 10-9 highlights "Frequent Transit Corridors" that are identified as part of the Regional Transit Vision. These corridors are either regular fixed route service with frequencies 15 minutes or fewer, or identified rapid transit projects. These corridors are prime opportunities for Transit Oriented Development within walking distance of transit stations. As many transit stops haven't been identified for these corridors at present, a ¼ mile buffer is included on the map to show the potential for TOD that would support the transit service.

Figure 10-9: Regional Transit Vision Corridors & TOD Opportunities



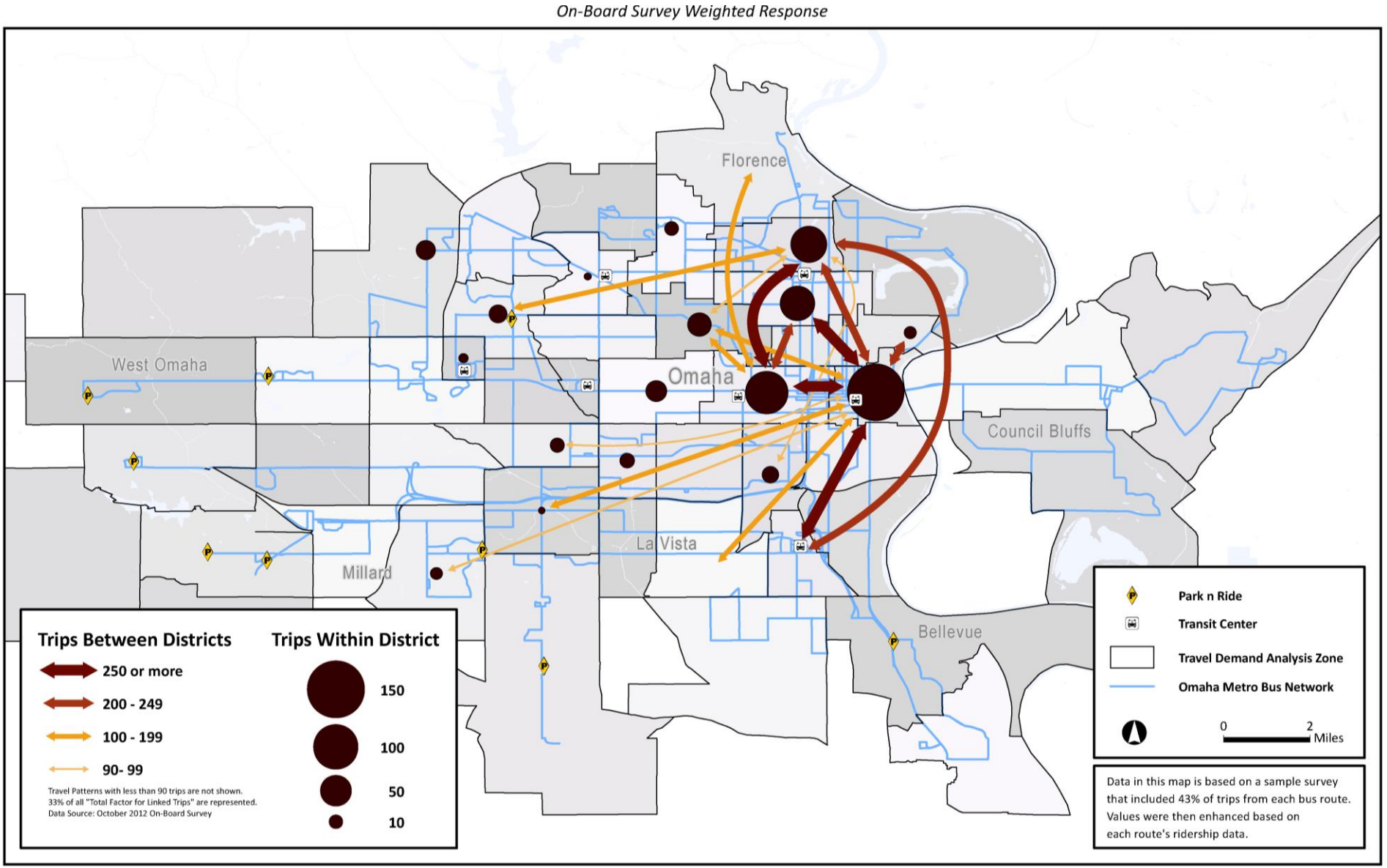


Figure 10-10: Regional Transit Vision Corridors & TOD Opportunities

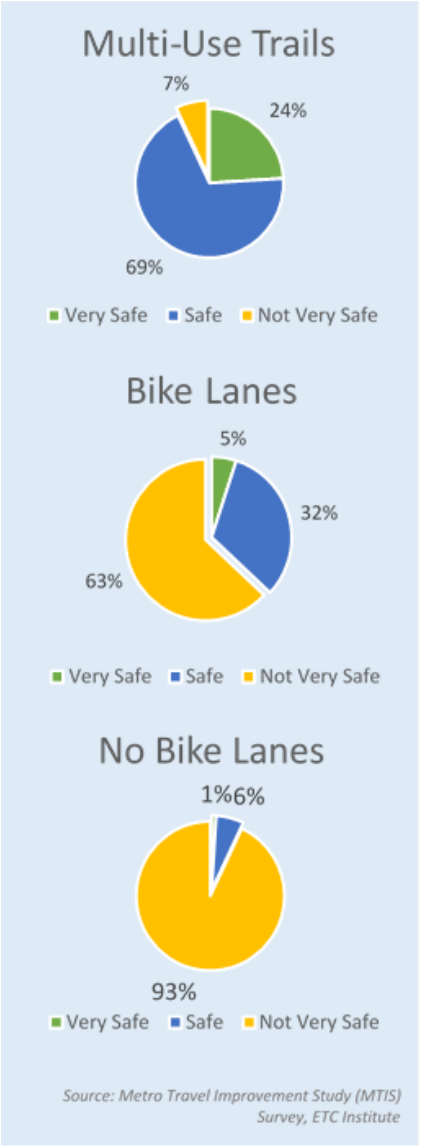
non-vehicle modes of transportation. However, when planning for these facilities, we must ensure that they are designed for the "Interested, but Concerned" rider that is not well-served by traditional bike infrastructure.

The Heartland Connections Regional Bicycle & Pedestrian Plan analyzed and quantified the potential for these kinds of connections to activity centers. The result of this analysis were summarized in a heat map that showed areas with a high potential for connectivity by bike infrastructure. This heat map is included in Figure 10-13 (page 10-12). This map combines the following elements to estimate the potential demand for bike infrastructure throughout the MAPA region based on the proximity to the following features:

- Population Density
- Employment Density
- K-12 Schools
- Colleges & Universities
- Transit Centers & Park & Ride Locations
- Major Employers
- Communities Facilities (Libraries, Hospitals, Government Offices)
- Parks & Existing Trails and Sidepaths

A map of the recommendations identified in the Regional Bicycle & Pedestrian Plan to address these needs is shown in Figure 10-13 (page 10-12).

Figure 10-11: Bike Safety Results from MTIS Survey



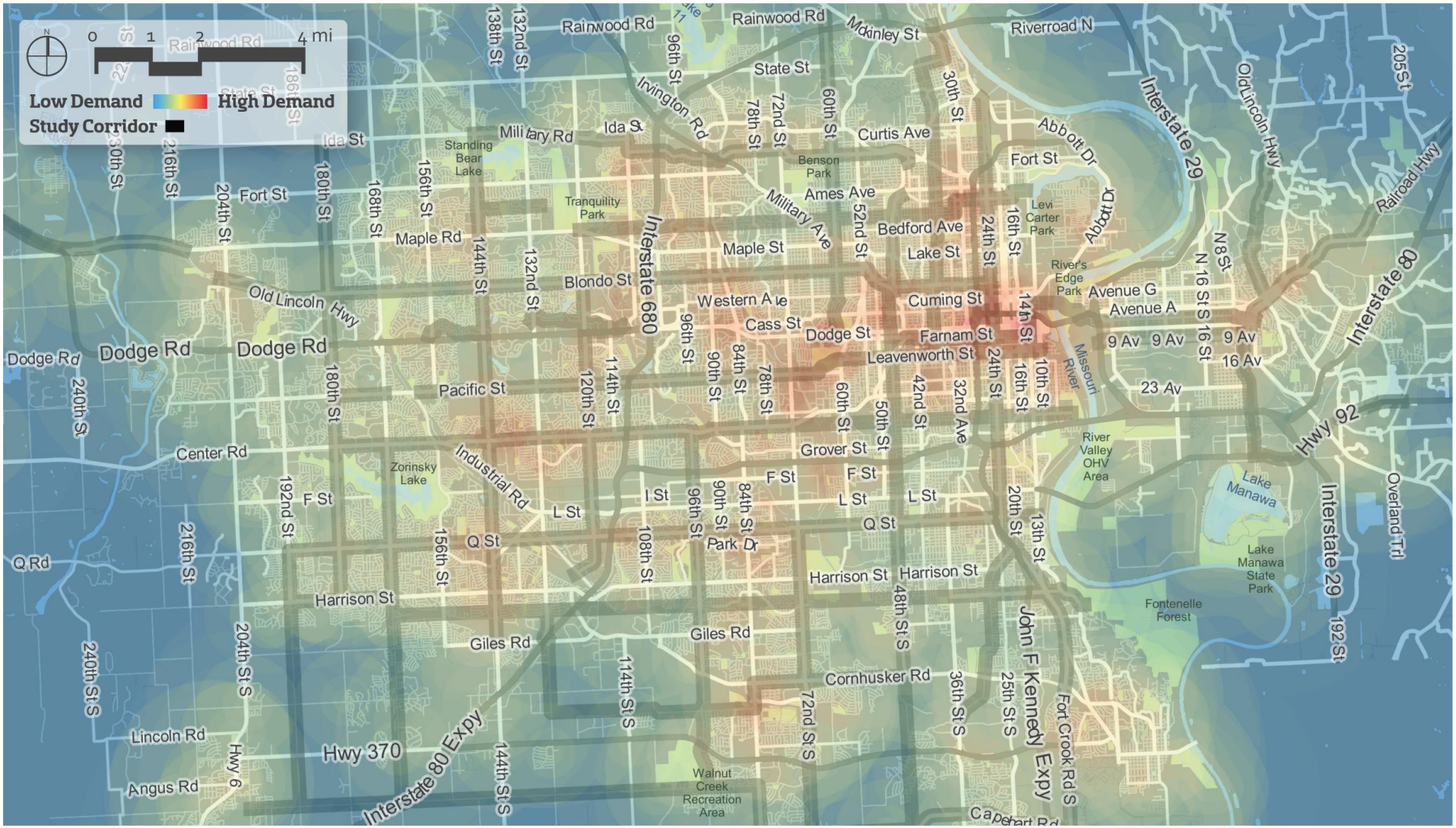


Figure 10-12: Regional Heat Map of Potential Bicycle Activity

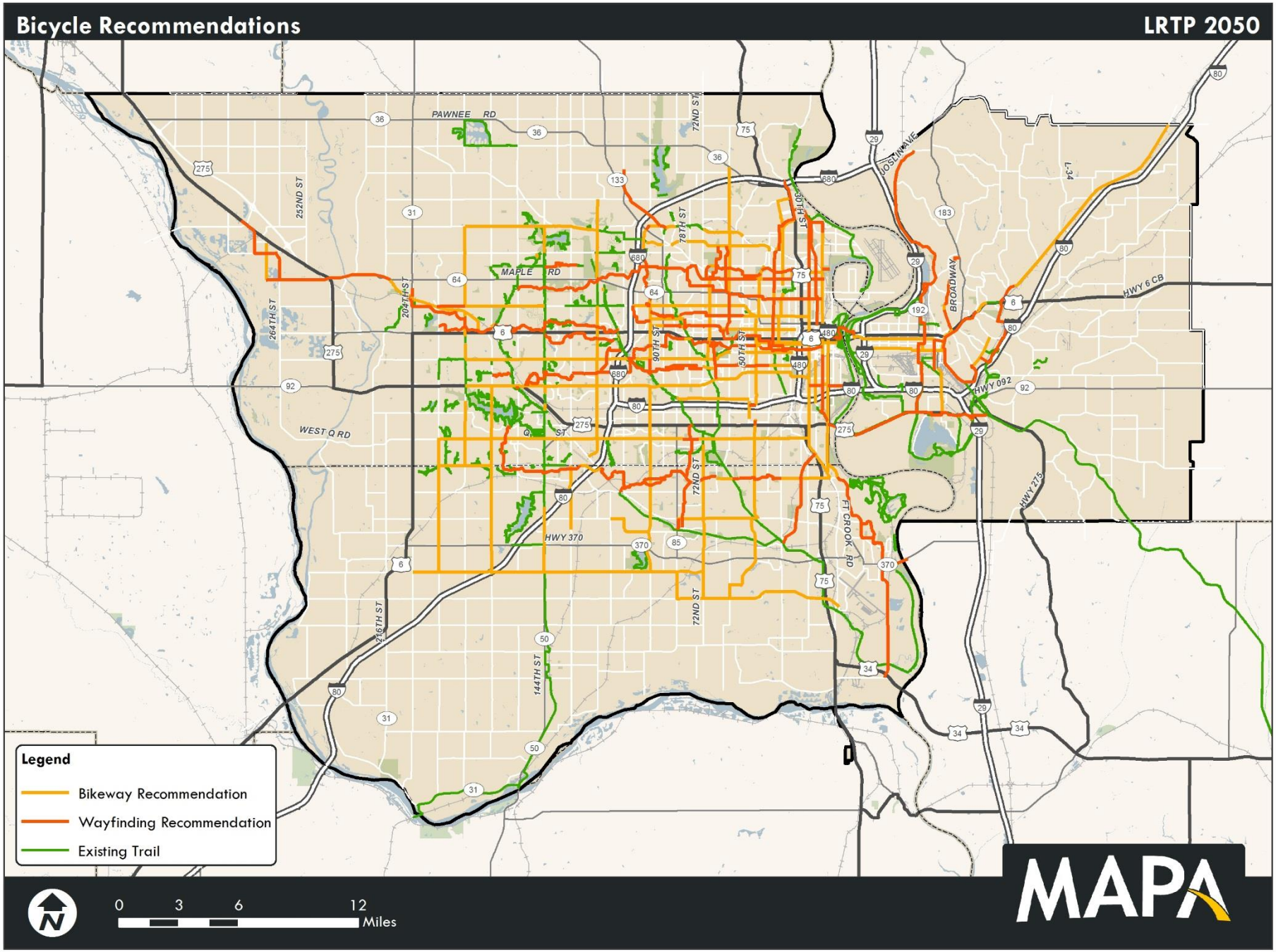


Figure 10-13: Bikeway Recommendations from MAPA's Regional Bicycle Pedestrian Plan

Regional Pedestrian Needs

In order to understand the location of sidewalks throughout the Omaha-Council Bluffs region, MAPA identified the location of sidewalks on functionally classified roadways (collectors or above). The results of this analysis are shown in Figure 10-14 (right) illustrates the existing sidewalks along major roadways and known gaps. These gaps are very important to consider with regard to the types of facilities and attractions that drive pedestrian activity. The Heartland Connection Bicycle-Pedestrian Plan utilized a heat map of pedestrian activity based on employment, population, retail opportunities, schools and other facilities that are key generators and attractors of pedestrian activity. This heat map is included in Figure 10-15 (next page)

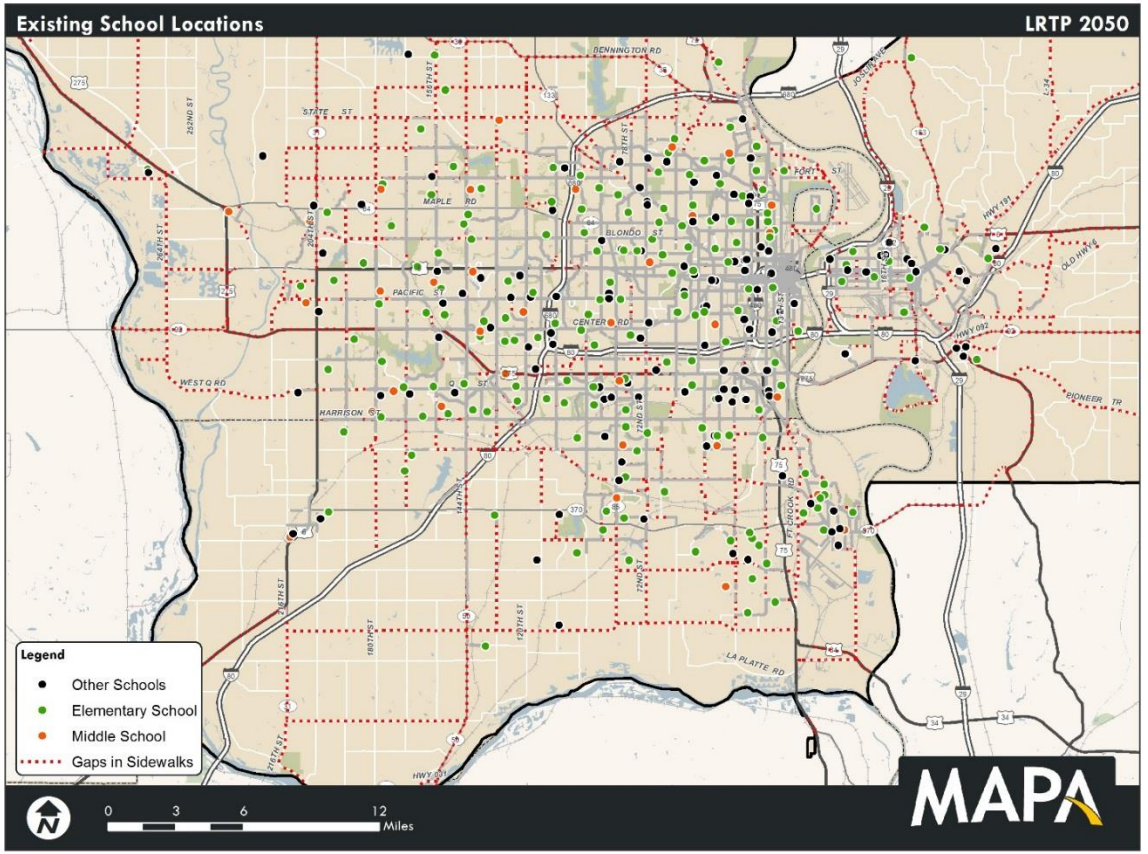
These gaps are important links that should be considered as part of future roadways projects, in order to complete the network of sidewalks along major routes in the MAPA region.

Additionally, these gaps in local sidewalk networks are particularly important to consider around the location of school facilities– particularly elementary and middle schools. An important component of promoting walkability in the MAPA region is ensuring that children have "Safe Routes to School" that make school-related trips more attractive.

Improving sidewalk networks around schools provides families with choices about making trips to school, and improves the safety of the transportation network for users of all ages.

Figure 10-13 shows the school locations in the MAPA TMA. Locations around elementary and middle schools will be priority locations for recommendations related to improving pedestrian infrastructure.

Figure 10-14: Regional Pedestrian Needs for the MAPA Region



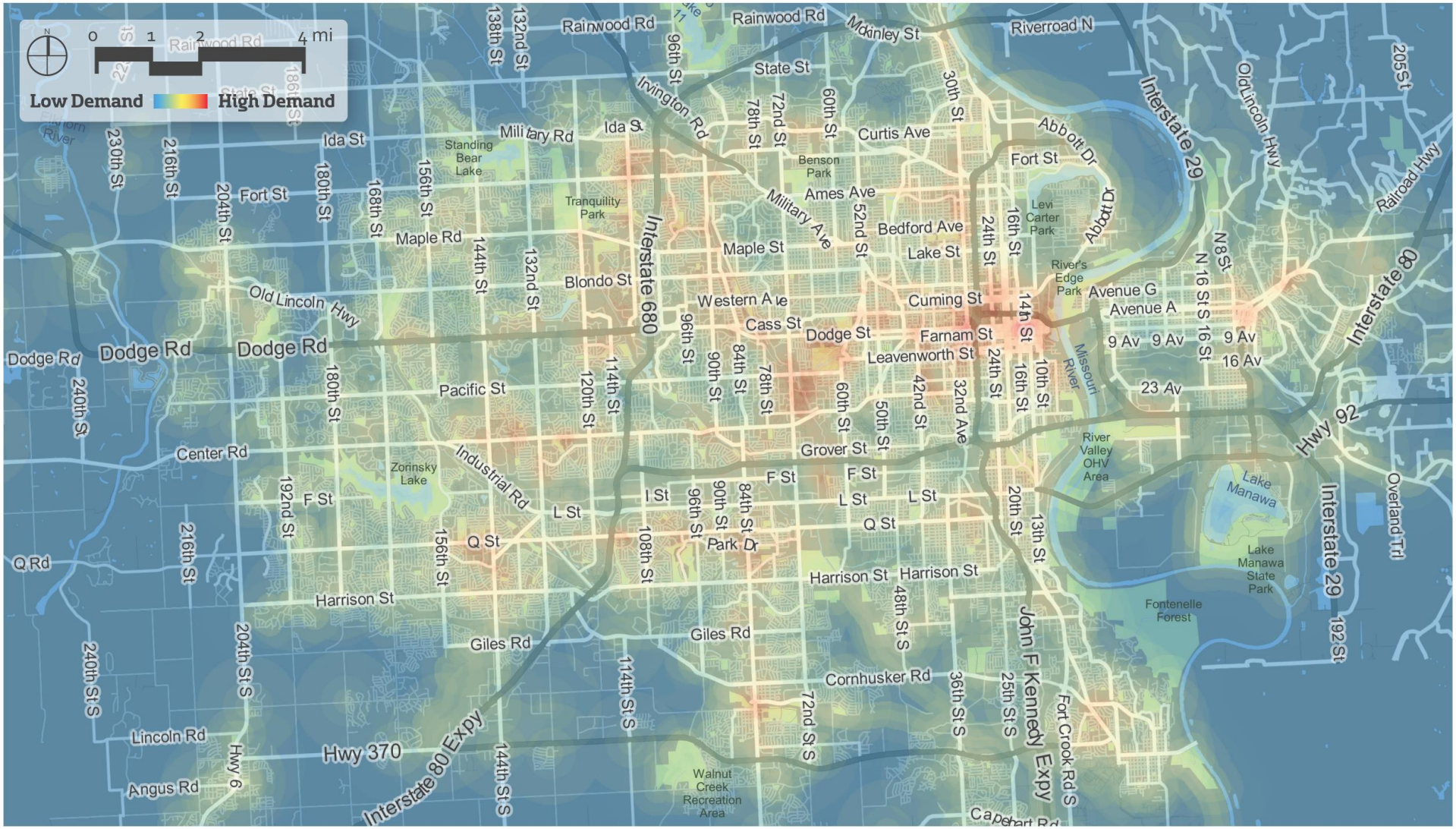


Figure 10-15: Regional Pedestrian Activity Heat Map

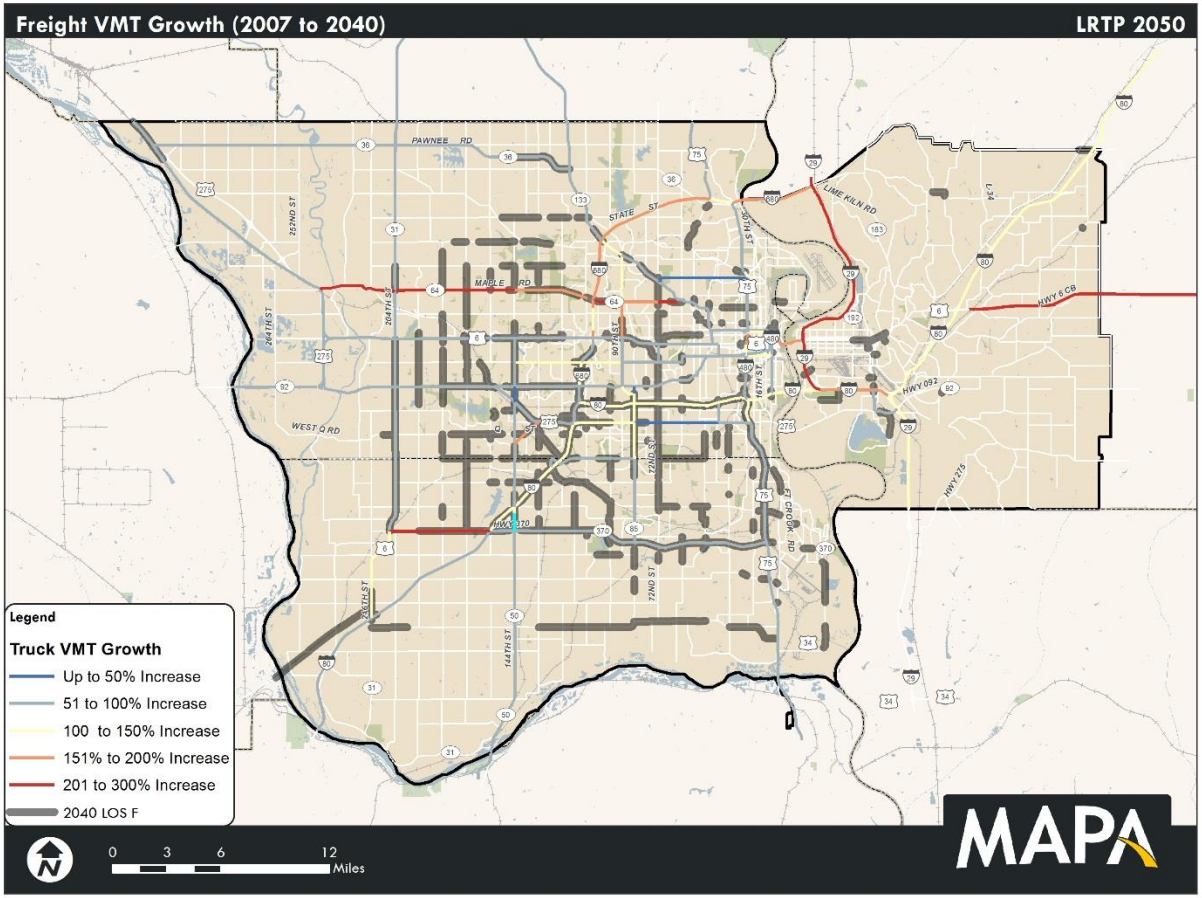
Regional Freight Needs

The FHWA utilizes Freight Analysis Framework (FAF) to project freight growth by mode for the entire US as well as for individual states. Additionally, the analysis shows the origin and final destination for freight traffic by state. As part of this analysis, FHWA provides generalized estimates of freight growth on the National Highway System (NHS).

The majority of freight reliability issues in the MAPA region are driven by recurring congestion on major roadways. As such, understanding changes in freight traffic in relationship to existing and forecasted congestion helps illustrate potential areas of freight needs.

Figure 10-16 (right) shows the estimated growth in truck vehicle miles travelled between 2007 and 2040. The map also shows areas within the MAPA model network where segments are projected to have Level of Service F. These segments are likely to be congested for all roadway users

Figure 10-16: Regional Freight Needs for the MAPA Region



2050 LRTP CHAPTER 11:
OPTIONS FOR THE FUTURE

Scenario Options

Through MTIS and previous studies and plans MAPA developed goals, performance measures, and potential investment scenarios for the LRTP. Six scenarios were developed based off of the types of infrastructure investment potentials identified in various area studies, each scenario focused on improving one mode of transportation. The individual scenarios are shown in beginning on page 11-3.

These scenarios tested different approaches to investing in the transportation system, and were all evaluated using MAPA's Travel Demand Model. All 6 of the modeled scenarios create a functional usable transportation system for the projected population and land use of the year 2050. The performance measures that were used to evaluate each scenario are shown in Figure 11.1. The scenario scores are shown in figure 11.2

Scenario 1 – High levels of overall investment

This scenario is what improvements over the coming decades would look like if we continued increased funding at the same levels per mode that we currently do. This method ensures that all modes get funding at the system continues to function as it currently does with very little change in the types and intensity of service over what is currently provided.

Scenario 2 – Freeway focused investment

Scenario 2 examines what transportation would be needed by the year 2050 if the regions funding were to be mainly spent on freeway capacity and improvement projects. A key feature of this scenario is a connection in the potential future "Beltway" connecting Platteview Road to US-6.

Scenario 3 – Arterial roadway focused investment

Scenario 2 models what projects would be needed to make a functional system that concentrated on expanding and improving major, non-freeway roads throughout the region.

Scenario 4 – Transit focused investment

This scenario shows the level of transit oriented investment that would need to be done over coming decades to keep up with the region's transportation demands. This level of transit investment tested a significant expansion of transit service over current and planned projects.

Scenario 5 – Limited levels of investment

This scenario shows the level of investment that would be needed for the region's transportation system to continue in coming years. There is little to no improvement in travel time or options for any users of the system.

Scenario 6 – Geographic Distribution of Investment

This scenario breaks out the urban, suburban, and rural areas of the MAPA region and focuses investment based on the types of transportation these areas that reinforces their current land use patterns

Performance Measures

The scenarios were evaluated using performance measures listed below to determine their effectiveness and efficiency at reaching the regions goals for how it would like to look in coming decades. These performance measures are listed below:

- Congestions reduction
- Mobility and Accessibility
- Stewardship and Environment
- Safety

Figure 11-2: High Levels of Balanced Investment, Roadway Improvements

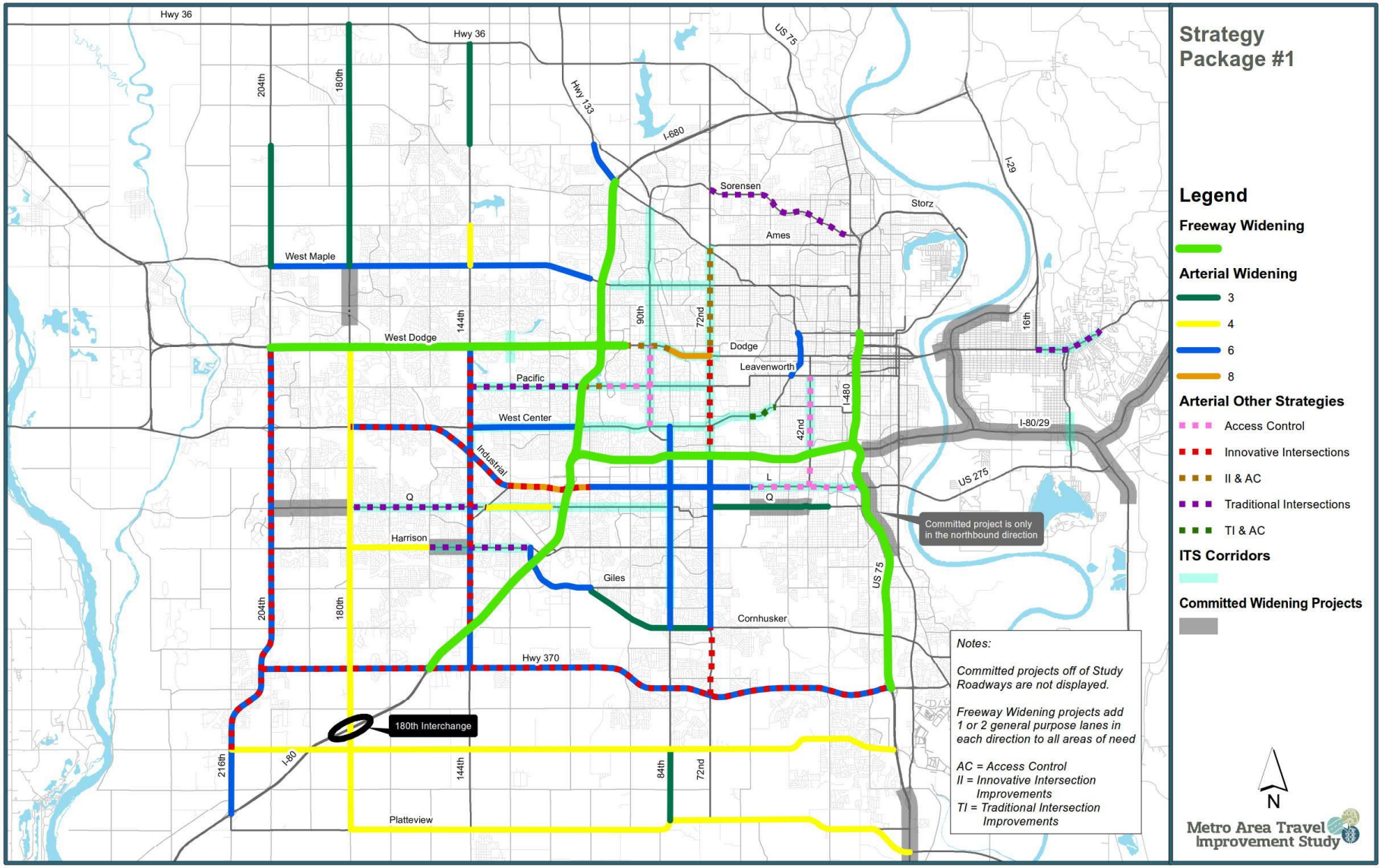


Figure 11-3: High Levels of Balanced Investment, Transit Improvements

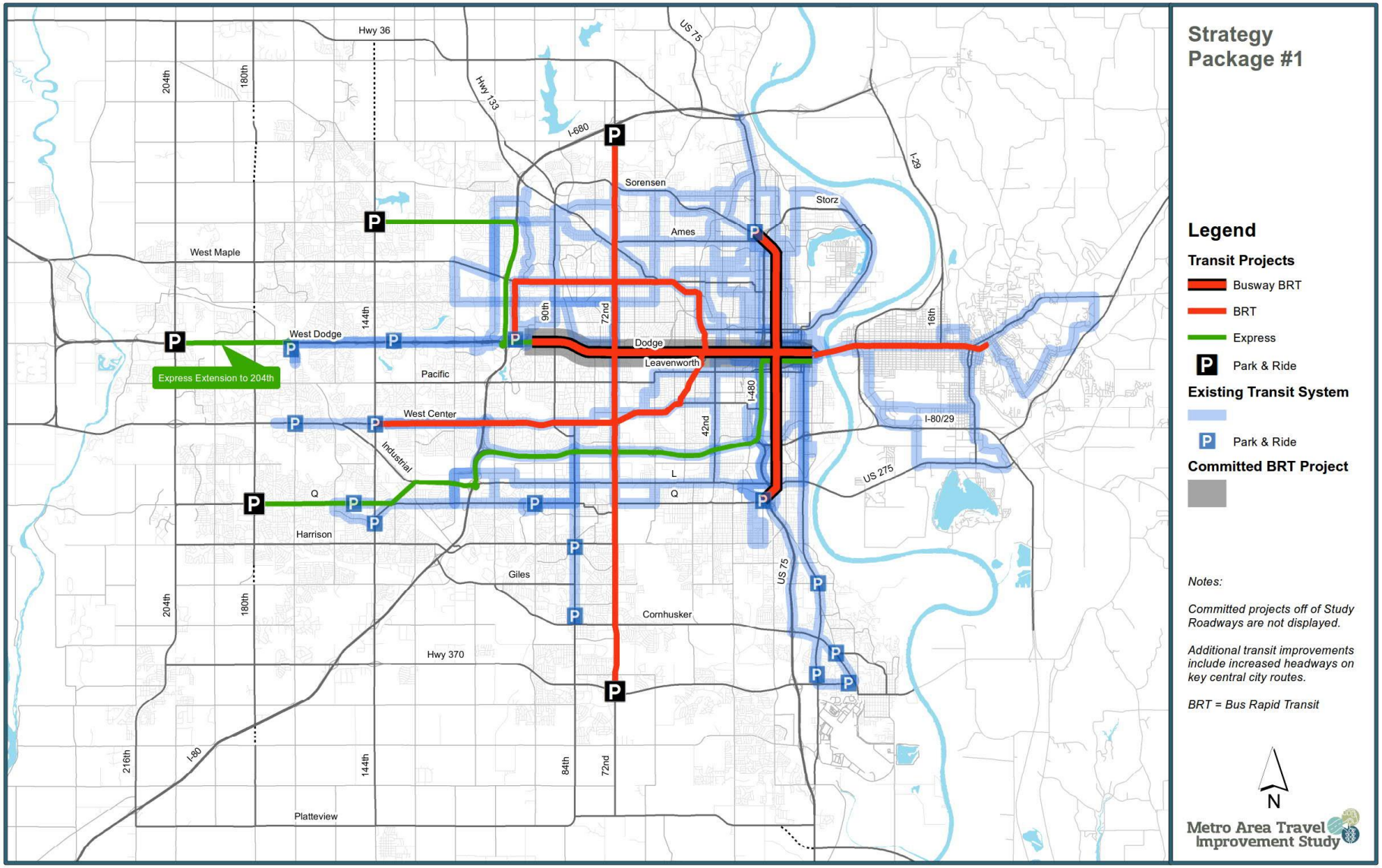


Figure 11-4: Freeway Focused Investment, Roadway Improvements

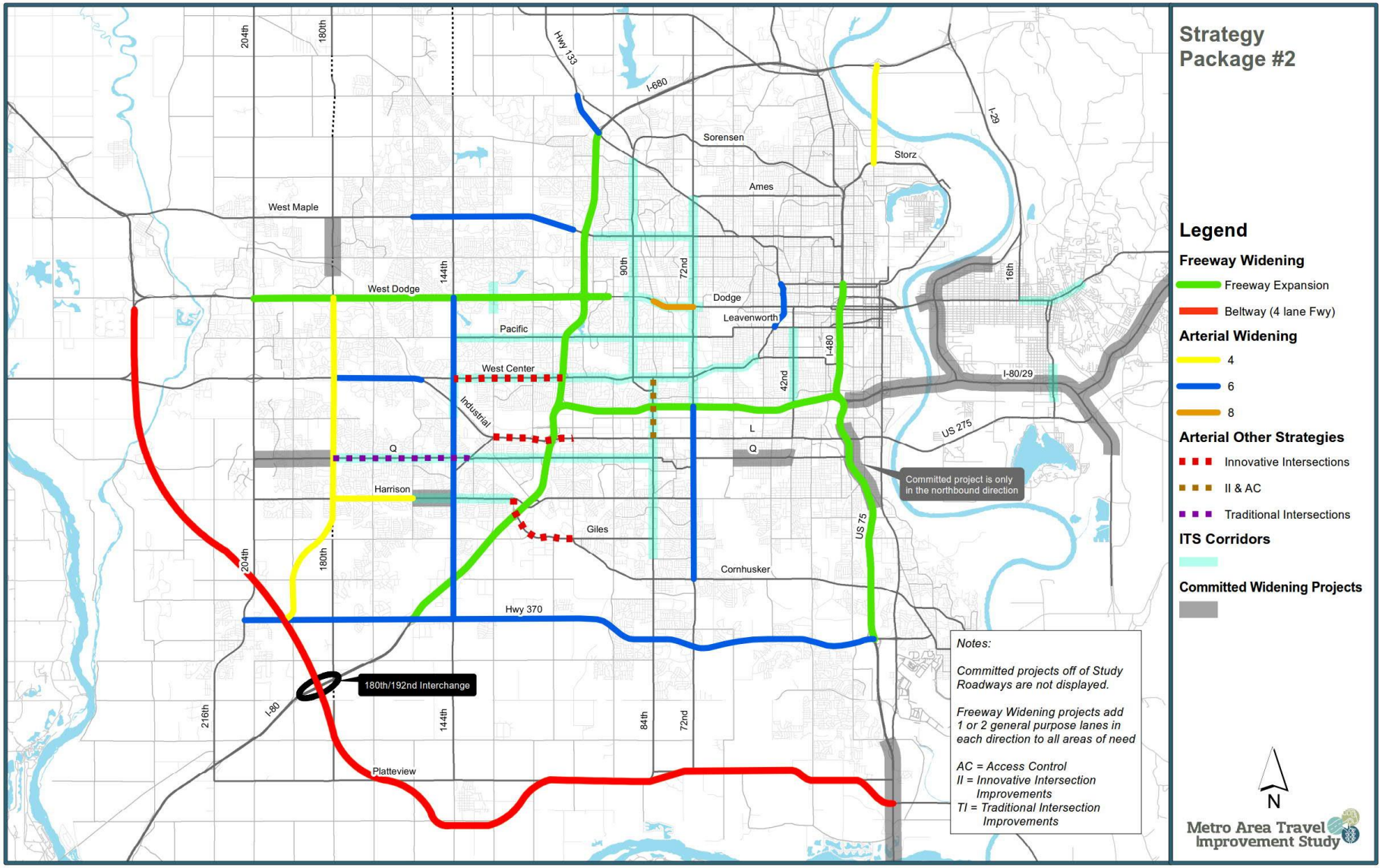


Figure 11-5: Freeway Focused Investment, Transit Improvements

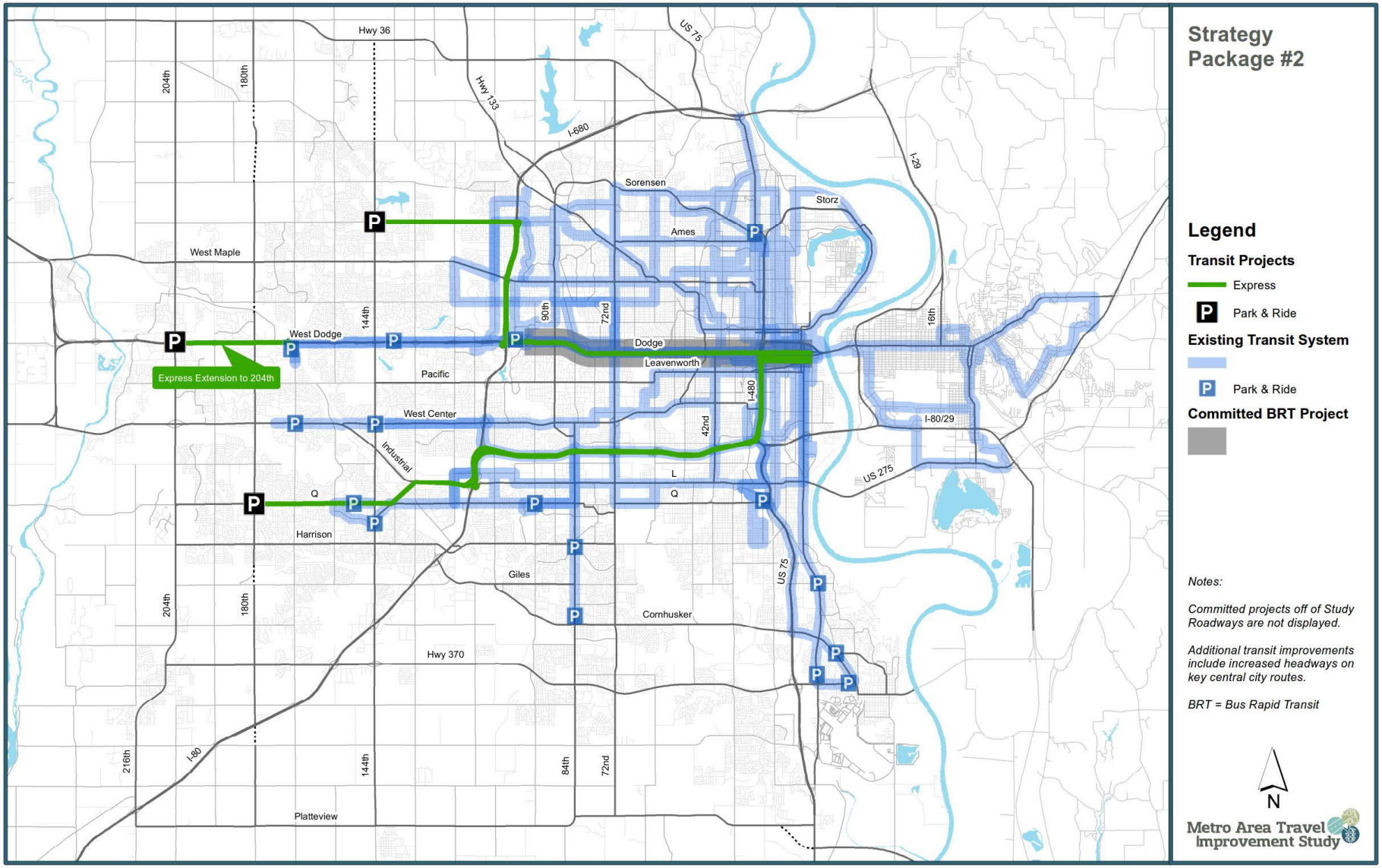


Figure 11-6: Arterial Focused Investment, Roadway Improvements

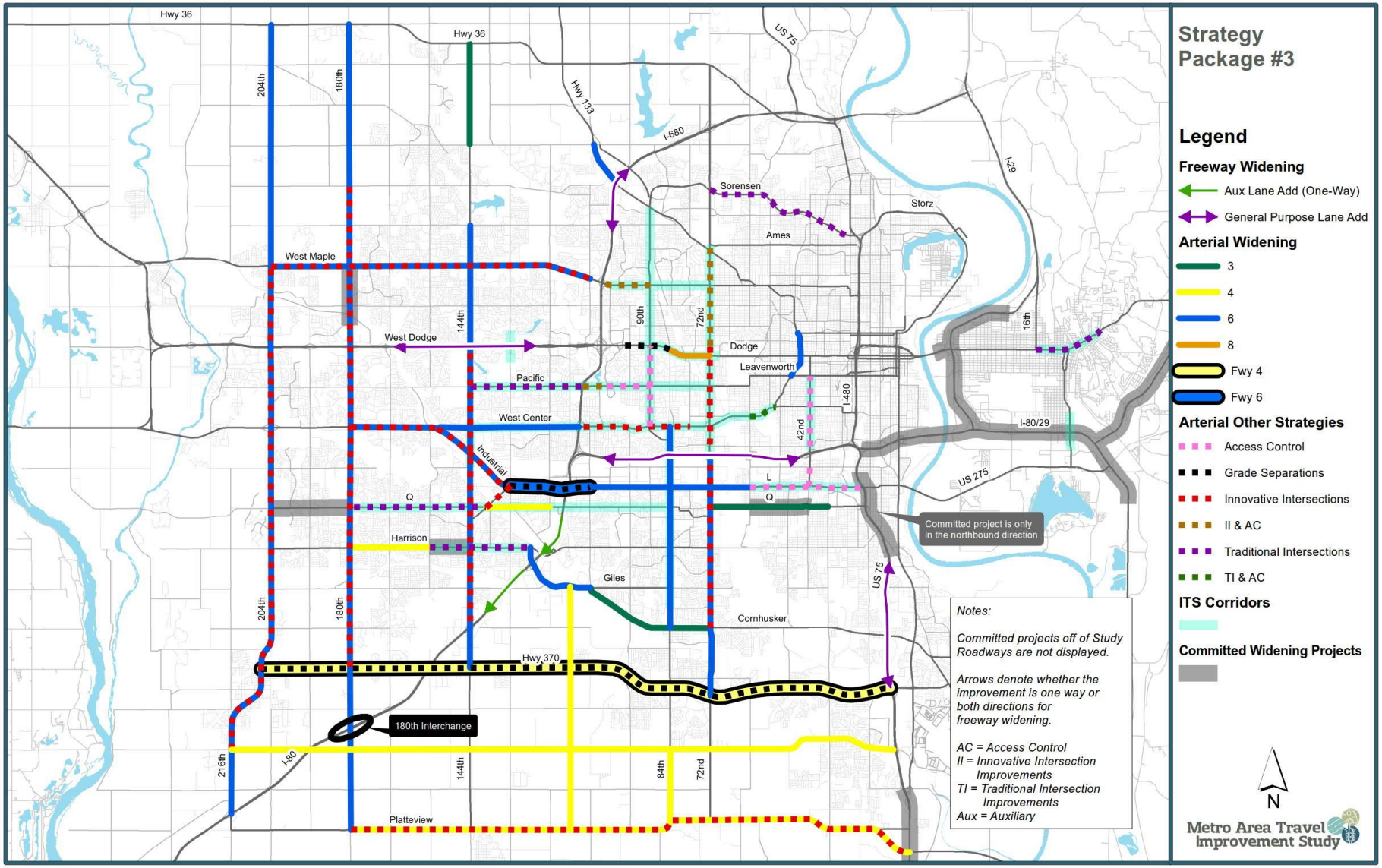


Figure 11-7: Transit Focused Investment, Roadway Improvements

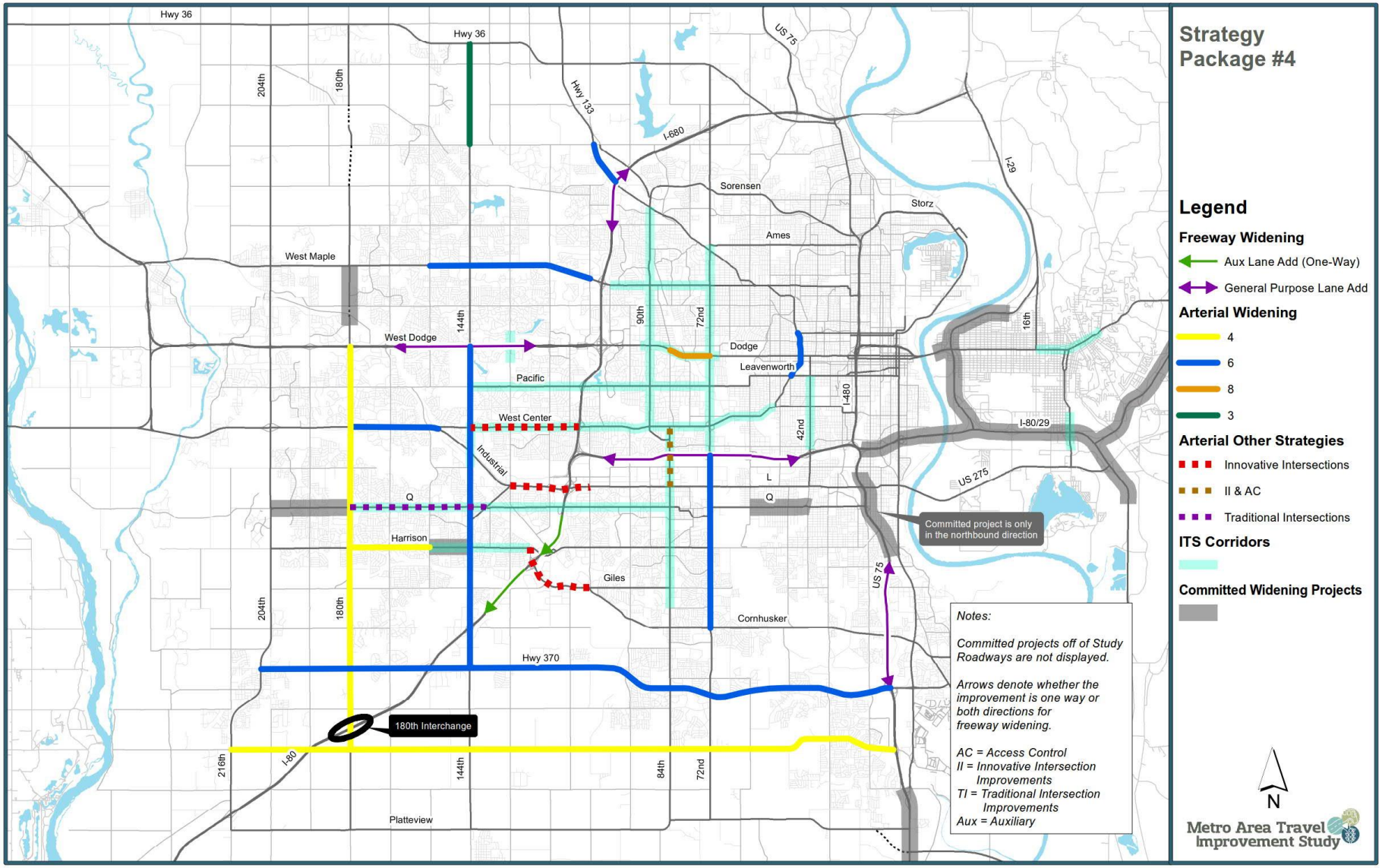


Figure 11-8: Transit Focused Investment, Transit Improvements

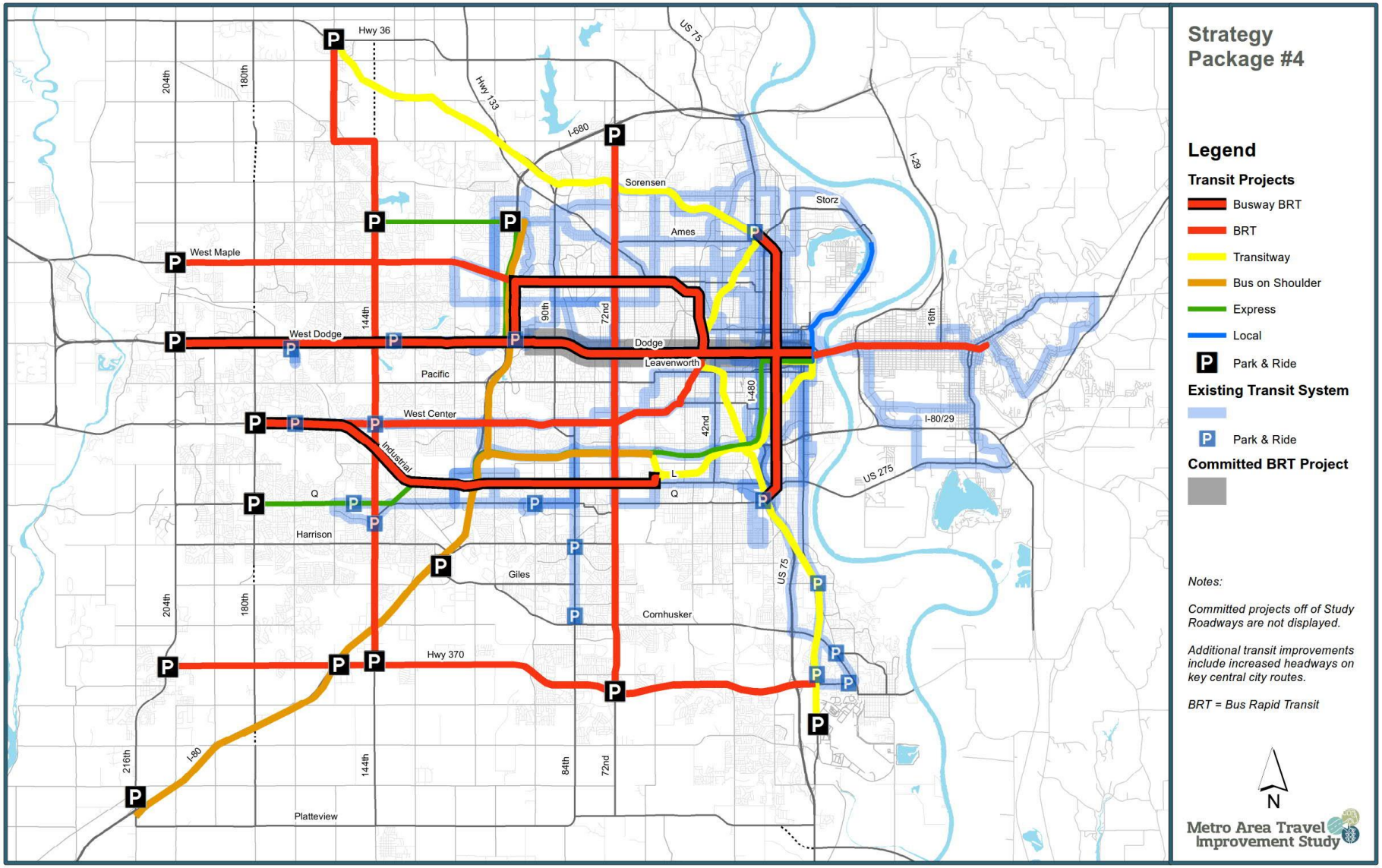


Figure 11-9: Limited Levels of Investment, Roadway Improvements

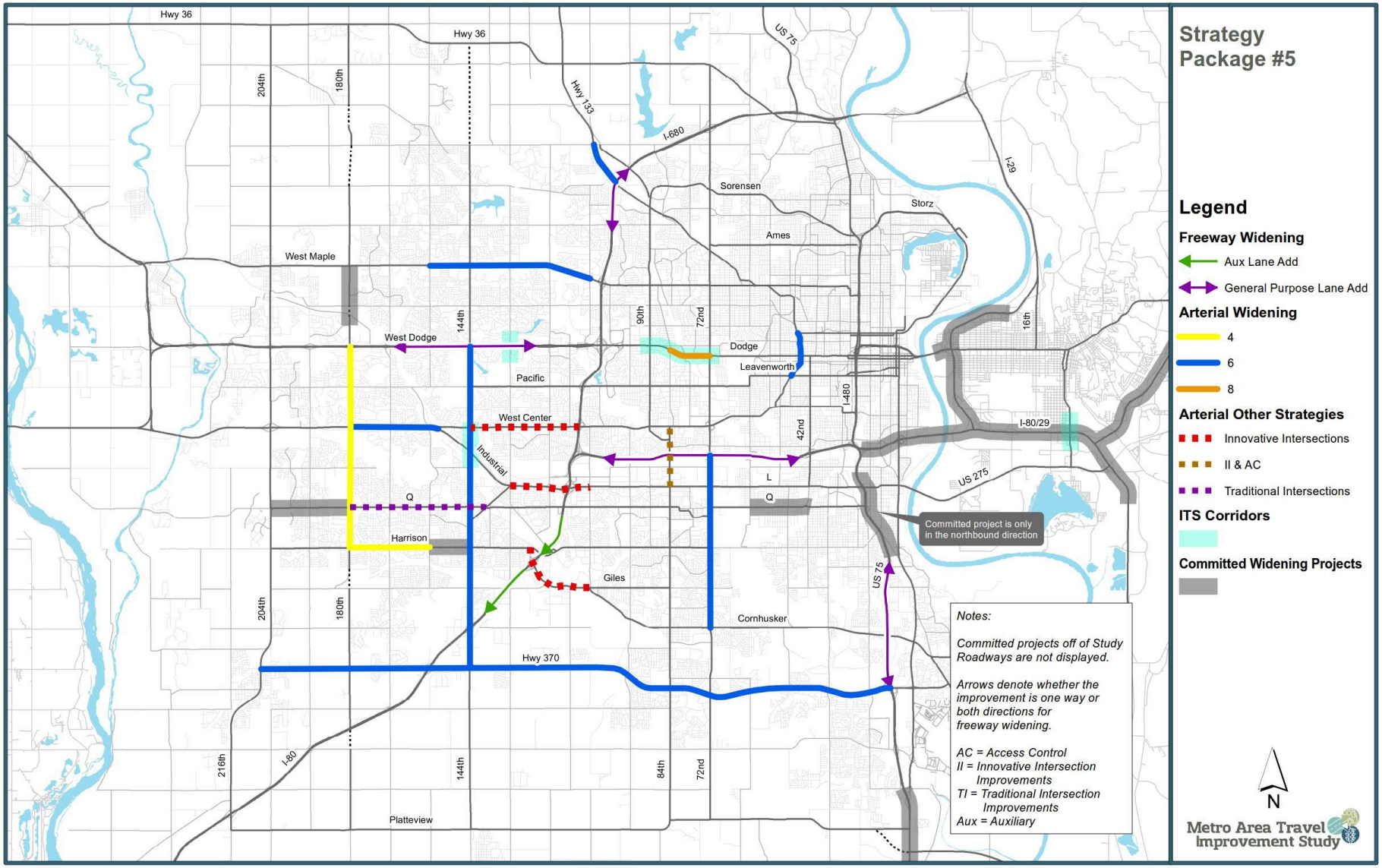


Figure 11-10: Geographic Distribution of Investment, Roadway Improvements

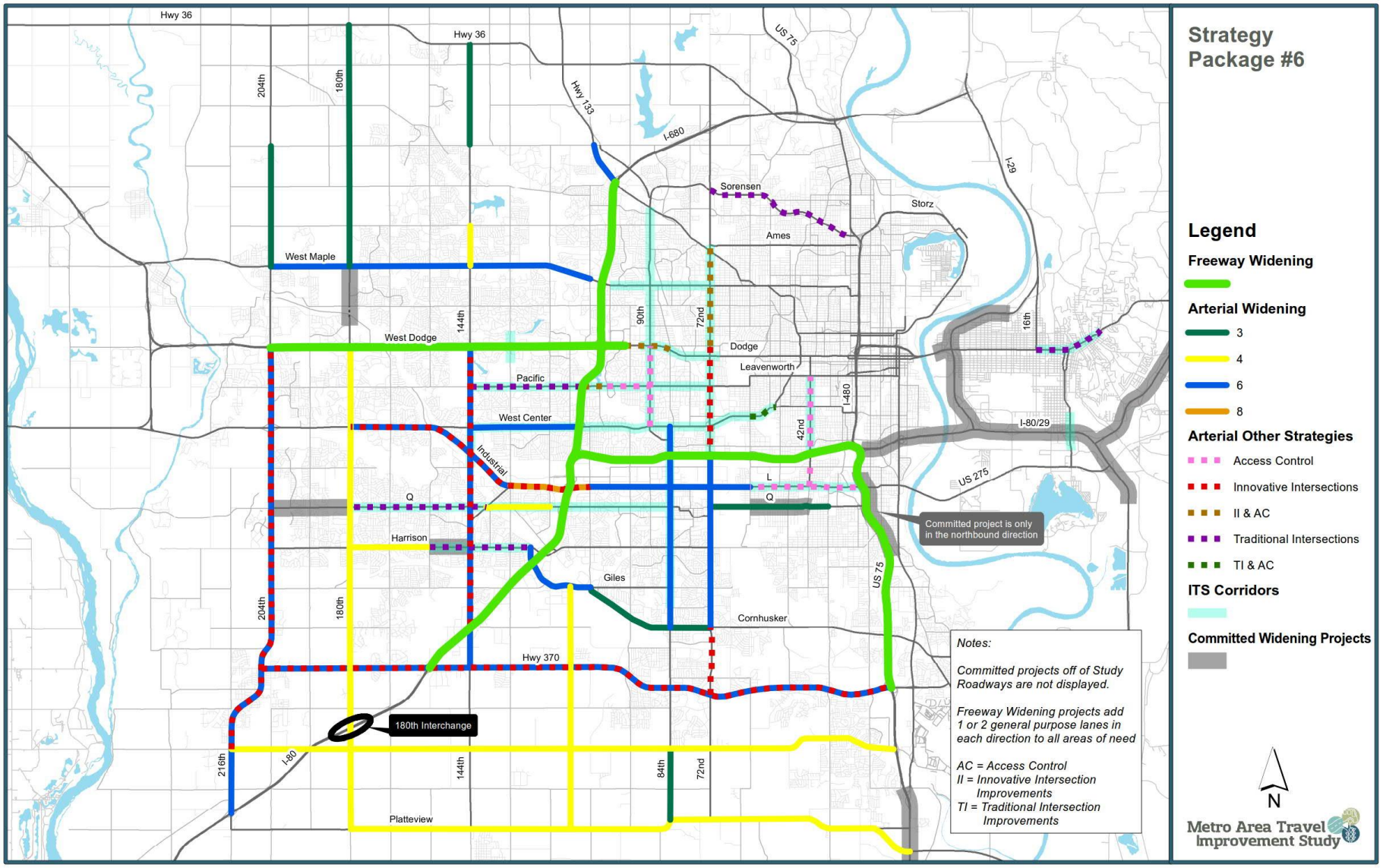
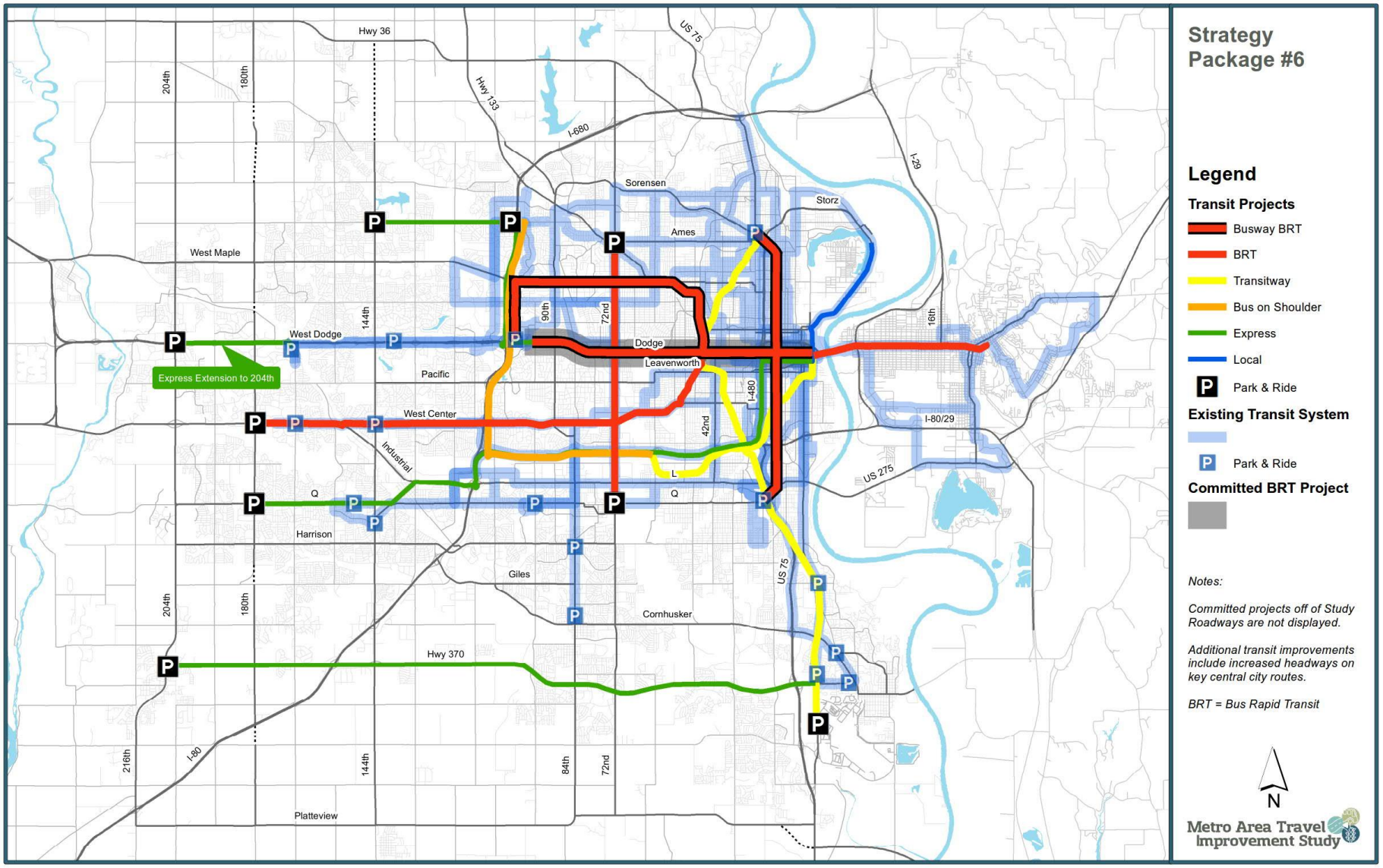


Figure 11-11: Geographic Distribution of Investment, Transit Improvements



Scenario Comparison Rankings

Each of the 6 focused scenarios were evaluated on the performance measures in Figure 11.1, these measures were tested using the Heartland 2050 land use assumptions. The performance measures are based off of the state and federal performance measures for transportation, the weighting of the measures is based on the public input received on values goals and strategies.

The rankings are shown below in figure 11.12

Figure 11-12: Performance Measure Results

	Total Scores						Weighted Scores					
	SP 1	SP 2	SP 3	SP 4	SP 5	SP 6	SP 1	SP 2	SP 3	SP 4	SP 5	SP 6
Congestion Reduction	78.7	63.0	66.7	57.0	45.3	72.6	72.7	57.0	62.2	52.5	45.3	66.6
Mobility & Accessibility	5.0	5.0	5.0	6.0	4.4	5.2	4.9	4.9	4.9	5.7	4.3	5.1
Stewardship & Environment	9.9	9.7	9.7	10.0	9.7	9.8	9.9	9.7	9.7	10.0	9.7	9.8
Safety	5.5	4.3	5.2	5.3	4.5	5.2	5.0	4.2	4.7	4.8	4.4	4.7
Score	99.1	82.1	86.6	78.3	63.8	92.8	92.5	75.8	81.5	73.0	63.7	86.2
Rank	1	4	3	5	6	2	1	4	3	5	6	2