Congestion Management Process

Des Moines Area Metropolitan Planning Organization

January 2016

DES MOINES AREA MPO
METROPOLITAN PLANNING ORGANIZATION

Table of Contents

Figures and Tables

1.0 Executive Summary

The Congestion Management Process (CMP) provides the Des Moines Area Metropolitan Planning Organization (MPO) and its members with a process that provides for the effective integrated management and operation of the multimodal transportation system. This strategy is based on a cooperatively developed and implemented metropolitan-wide strategy for new and existing transportation facilities. Currently, in the MPO area, congestion is not a major issue at the present time. The objective of this document is to stay ahead of any potential problems with the network so that the system continues to operate effectively.

The following steps represent the primary framework of the CMP:

- Selection of Objectives;
- Define the network;
- Develop performance measures;
- Collect data and monitor system performance;
- Analyze congestion issues;
- Identify appropriate strategies; and,
- Monitor improvements and revise process.

1.1 Selection of Objectives

Mobilizing Tomorrow set a number of objectives that relate to congestion management. These are long-term objects that are intended to allow the region to achieve desired outcomes for congestion management by horizon year 2050.

The CMP process identifies twelve primary objectives that will assist the MPO in maintaining an efficient and effective transportation network. These twelve objectives are directly linked to goals in the Mobilizing Tomorrow (2050 Metropolitan Transportation Plan). The CMP offers shorter term objectives that the MPO can measure more often to determine if current strategies are working and adjust accordingly while aligning with the objectives of Mobilizing Tomorrow.

1.2 Defining the Network

The CMP defined what components of the transportation system are the focus. The CMP focuses on the Federally Functionally Classified roadways in the Des Moines Are MPO planning area. The network consist of freeways, arterials, and collectors that included data from INRIX software program.

1.3 Performance Measures

Performance measures were established to identify and evaluate areas of recurring congestion. A two-level approach was developed to identify congestion, and make efficient use of limited resources.

The following recurring congestion performance measures were selected:

- Daily segment volume to capacity ratio;
- Percent of free flow speed;

- Travel Time Index; and,
- Planning Time Index.

1.4 Collect Data and Monitor System Performance

The MPO will primarily use data collected from INRIX to monitor and evaluate existing congestion level on a regional level. Other sources of data include the Iowa DOT's Traffic Management Center, travel time surveys, traffic counts, transit ridership numbers, and the MPO's travel demand model. These sources can be used periodically to supplement INRIX when monitoring system performance.

1.5 Analyze Congestion Issues

The CMP uses the identified performance measures to locate areas with congestion issues. The plan monitors current and long-term congestion issues. Present and anticipated congestion issues are analyzed on a segment-by-segment basis to determine the general source of the congestion for each segment.

1.6 Identify Appropriate Strategies

The CMP identified a variety of strategies to address congestion. These include transportation demand management, operational management, and capital intensive strategies. The plan sets a hierarchy of strategies to address congested segments based on least-cost planning principals. Each congested segment is identified in the plan, and includes potential strategies to address the issues at that location.

1.7 Monitor Improvements and Revise Process

Finally, the CMP outlines a process for monitoring the success of the implemented strategies. The CMP is a flexible document that is updated on a regular basis. This provides opportunities to revise the process to ensure the congestion issues are being address in an efficient and effective manner.

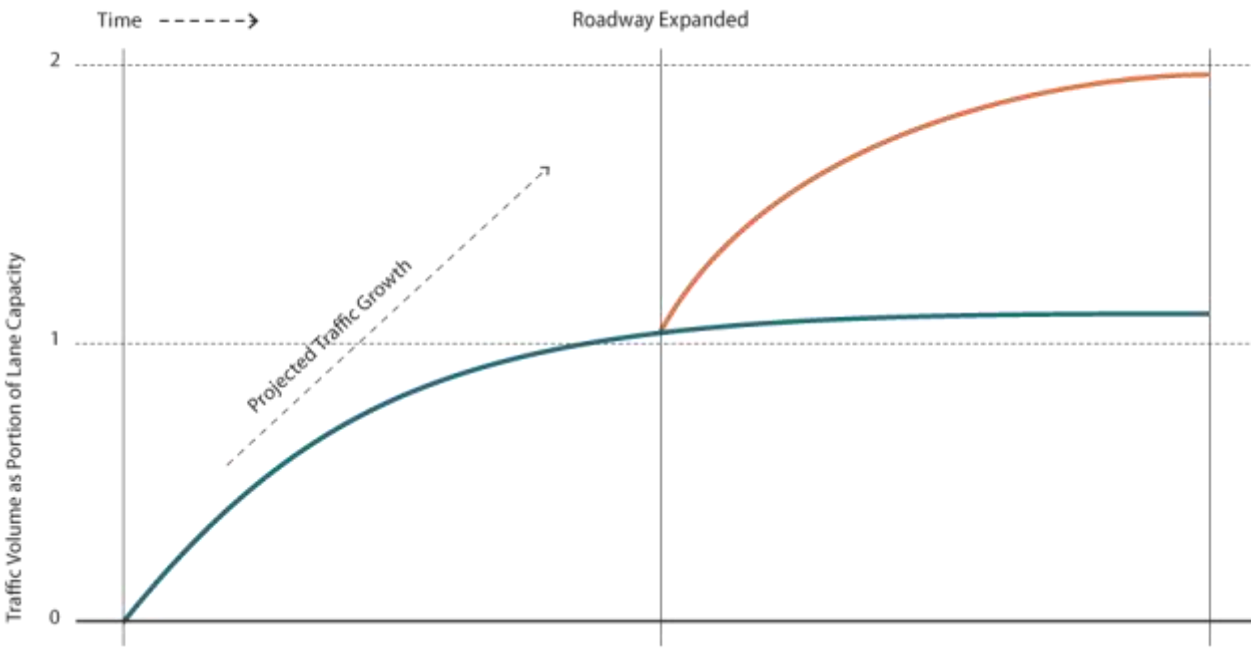
2.0 Background

2.1 Understanding Congestion

The Greater Des Moines population is expected to grow by approximately 250,000 people over the next thirty-five years to over 750,000. This growth will have an impact on the regions streets and highways, and will inevitably lead to increased levels of congestion. How we choose to address this challenge will have a significant impact on the financial, economic, and environmental sustainability of the region.

The most common method of addressing congestion over the past few decades has been to add capacity to the system. However, based on numerous studies[1][2][3], it is well known that adding capacity often leads to more drivers on the road and more congestion. This phenomenon is called induced traffic, and is demonstrated in the figure below:

Figure 1: Induced Traffic Demand



Source: NACTO Urban Street Design Guide

It is clear that expansion won't solve all congestion challenges. Therefore, it is important for the region to consider alternative strategies to address the traffic that will be generated due the projected growth we are anticipating over the coming decades.

[1] Handy, Susan, *Increasing Highway Capacity Unlikely to Relieve Traffic Congestion*, National Center for Sustainable Transportation, October 2015.

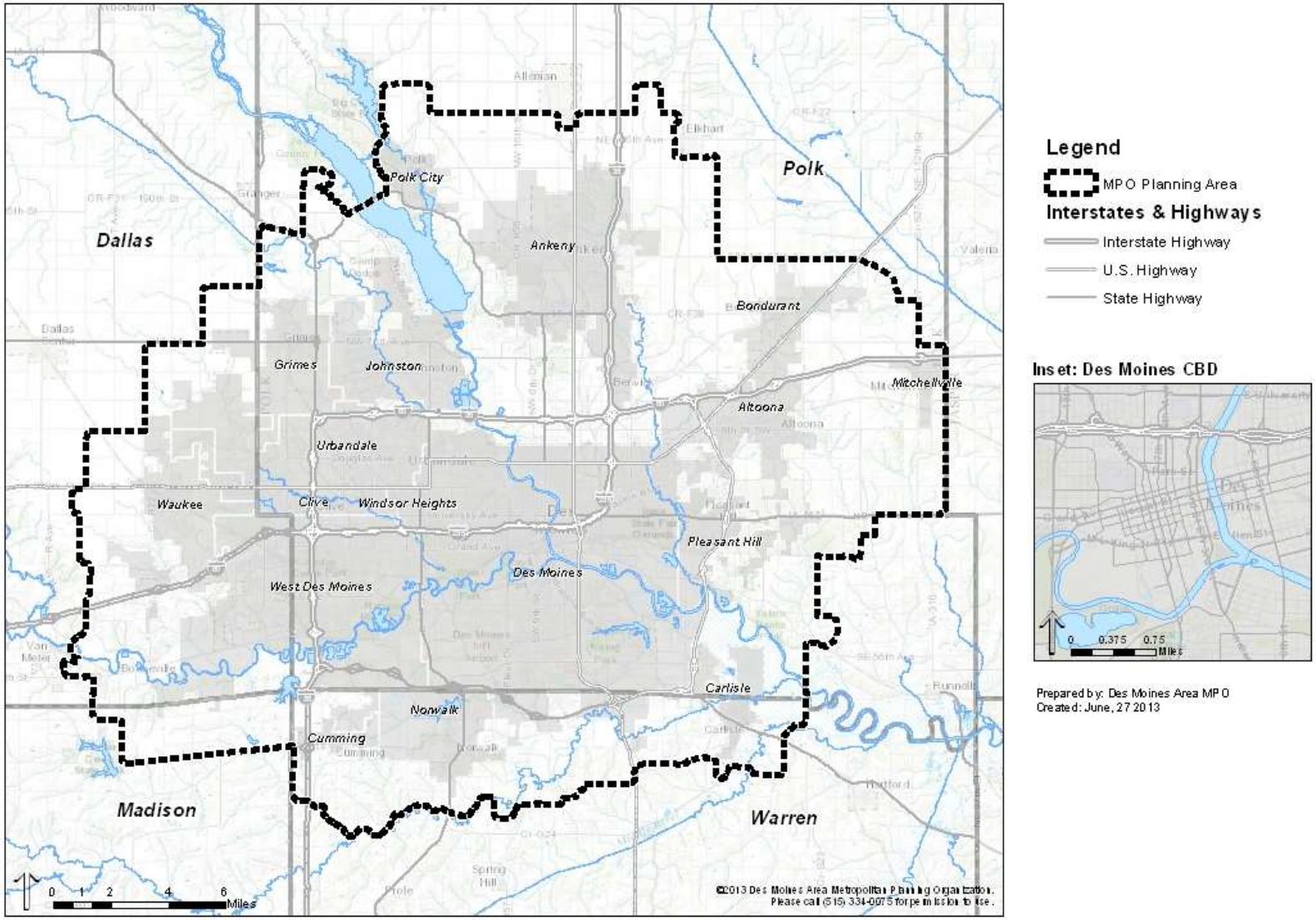
[2] Jaffe, Eric, *Why Rush-Hour Traffic Isn't the Best Way to Rank Urban Mobility*, The Atlantic – CITYLAB, August 31, 2015.

[3] Curry, Melanie, *Caltrans Admits Building Roads Induces More Driving, But Admitting a Program is Just the First Step*, StreetsBlog California, November 18, 2015.

2.2 Des Moines Area Metropolitan Planning Organization

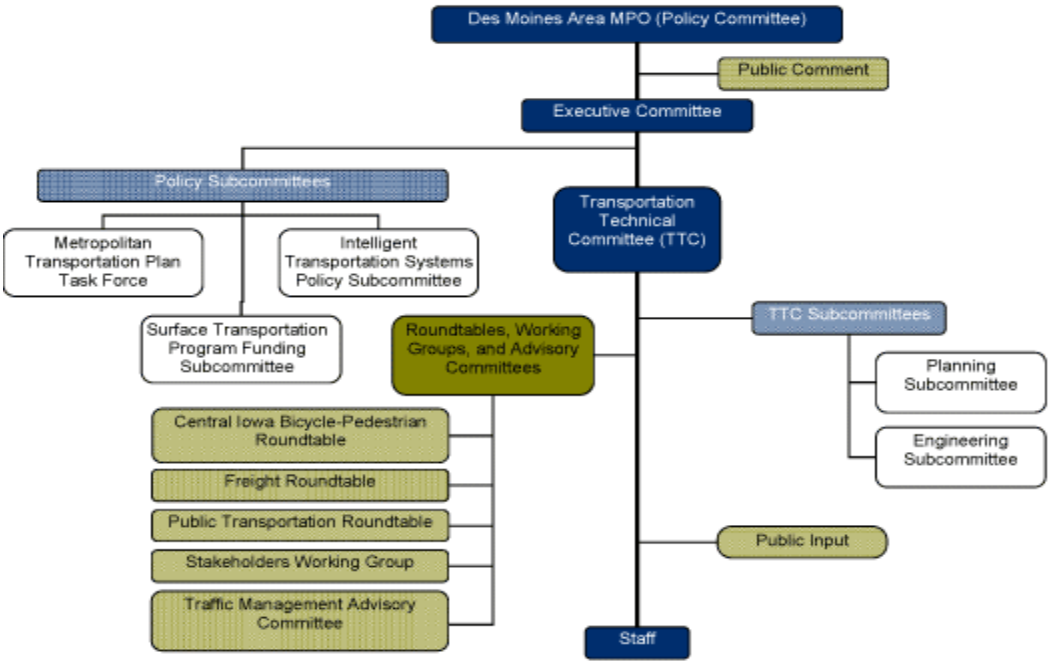
The MPO acts as the formal transportation body for the greater Des Moines metropolitan area (see Figure 1 below). The MPO exceeds the population threshold of 200,000 qualifying the area as a Transportation Management Area (TMA). The MPO is committed to implementing a comprehensive and coordinated continuing multimodal transportation planning process for the greater Des Moines metropolitan area.

Figure 2: Des Moines Area MPO Planning Area



The MPO provides a regional forum to ensure coordination between local, state, and federal agencies in regard to planning issues to prepare transportation plans and programs. The MPO develops both long and short-range multimodal transportation plans, selects and approves projects for federal funding based upon regional priorities, and develops methods to reduce traffic congestion. The MPO structure is comprised of three committees: the Executive Committee, the Transportation Technical Committee (TTC), and the MPO, which functions as the policy committee (Figure 2). The TTC is comprised primarily of technical staff members, including planners, engineers, and city administrators, representing member governments and participating agencies. The MPO includes elected officials, such as county supervisors, mayors, and city council members, and city managers. The MPO elects officers and at-large representatives to form the Executive Committee. MPO staff provides support to these three committees..

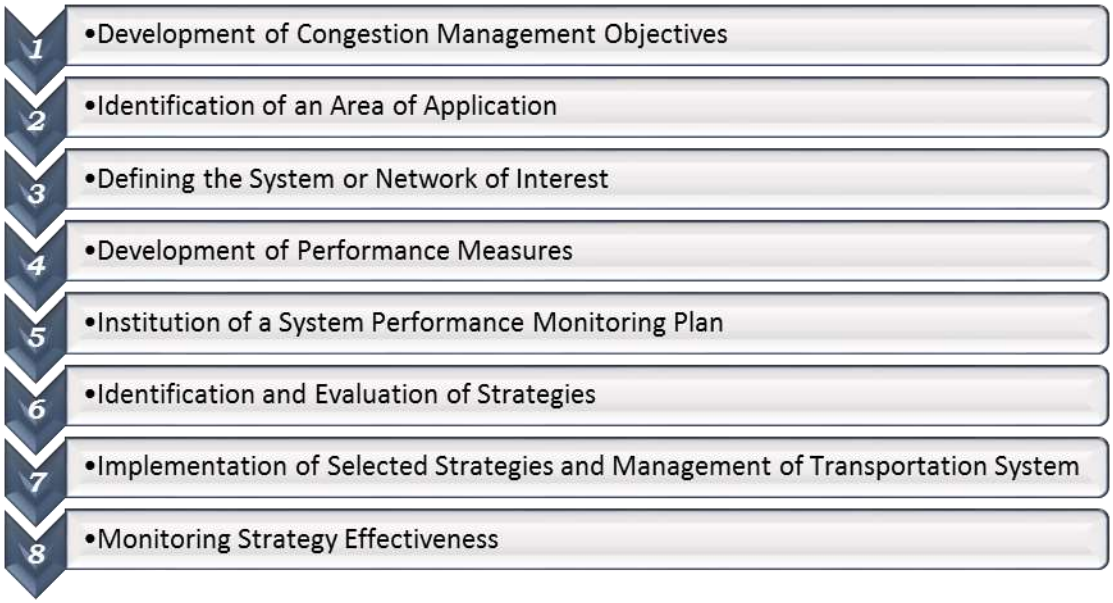
Figure 3: MPO Organizational Chart



2.3 Congestion Management Process

The Congestion Management Process (CMP) is a systematic approach, collaboratively developed and implemented throughout a metropolitan region that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies. The CMP is required to be developed and implemented as an integral part of the metropolitan planning process within a TMA. The CMP is a multi-step process that typically includes:

Figure 4: CMP Process



3.0 Congestion Management Objectives

3.1 Mobilizing Tomorrow Vision Statement and Goals

Mobilizing Tomorrow identifies a vision, goals, and objectives for the Metropolitan Planning Area (MPA). The vision, goals, and objectives establish the framework for achieving the desired transportation system.

Mobility is often closely tied to travel times and congestion, and is commonly defined as the ease in which a user is able to make a trip. Mobilizing Tomorrow identified a number of goals and objectives to maintain and/or improve the performance and/or mobility of the transportation system through efficient congestion management. In order to accomplish these goals and objectives the CMP provides additional analytical methods to monitor and evaluate system performance in dealing with congestion.

Mobilizing Tomorrow identified the following vision statement:

> Greater Des Moines will be a collaborative, vibrant, and dynamic region of lasting value, equity, and diversity

Mobilizing Tomorrow outlined four high-level goals that works as a system to direct Greater Des Moines toward a more vibrant and diverse transportation system. When realized, these goals will ensure the region continues to support a strong economy while protecting the environment. Fulfilling these goals also will enhance the great quality of life residents already enjoy in Greater Des Moines. The four goals are:

1. Enhance multimodal transportation options;
2. Manage and optimize transportation infrastructure and services;
3. Improve the region's environmental health; and,
4. Further the health, safety, and well-being of all residents in the region.

3.2 Mobilizing Tomorrow Performance Measures and Targets

The current conditions, measures, and targets associated with each goal were identified by the plan's steering committee and through public involvement. They will allow the region to understand the progress made in achieving our goals between now and 2050. These goals will not be achieved over night. Rather, they will be achieved by continual collaborative efforts in which all stakeholders take an active role. Mobilizing Tomorrow set the following performance measures and targets that relate to the congestion management process:

Table 1: Goal 1 Measures and Targets

Measure	Current	Target
Bicycle System On-Street		
Miles of On-Street Facilities	23	400
Mode Choice/Split (Peak Hour Trips to Downtown) [%]		
Single Occupancy Vehicles	77	55
Transit	7	20
Carpool	12	15
Walk/Bike/Work from Home/Other	4	10
Transit		
Total Ridership (Fiscal Year 2014)	4,400,000	8,800,000

Table 2: Goal 2 Measures and Targets

Measure	Current	Target
Level of Service – Peak Hour		
Non-Congested Roads [% of Roadway Miles]	98.2	>90

Table 3: Goal 3 Measures and Targets

Measure	Current	Target
Vehicle Miles Traveled		
Total [Average Weekday]	11,591,234	Decrease
Per Capita [Average Weekday]	24.14	Decrease

The MPO staff will monitor the performance measures and targets on an annual basis and provide reports on the progress being made to achieve the goals of the Long-Range Plan.

4.0 Defining the Network

4.1 The CMP Network

The Des Moines Area MPO's CMP system includes two entities. One entity is the MPA's Principal Arterial System as defined by the MPO's Federal Functional Classification System (FFCS). The FFCS establishes a classification hierarchy among streets and highways in the MPA. Interstate Highways and Principal Arterials are situated atop the hierarchy, and tend to carry the major portion of trips and serve the major centers of activity. The roadway network is depicted in **Figure 2**.

The CPM network consist of FFCS roadways that are included in the INRIX database, which is data that is collected through GPS enabled devices, including cell-phones. At present, the CMP network includes 974 centerline miles of roadways in the MPO region. It includes 375 different roadways divided into 557 separate segments ranging from 172 feet to 14 miles in length. **Figure 4** shows the CMP network which identifies the roadways currently included in the network.

Another entity is the area's transit system operated by the Des Moines Area Regional Transit Authority (DART). DART serves 19 area communities in and around Polk County with varying levels of service. Service includes local routes, express routes, shuttles and on-call service. DART plans to add Bus Rapid Transit (BRT) in the near future through the implementation of the *DART Forward 2035 Transit Services Plan*.

Figure 5: MPO Federal Functional Classification System Map

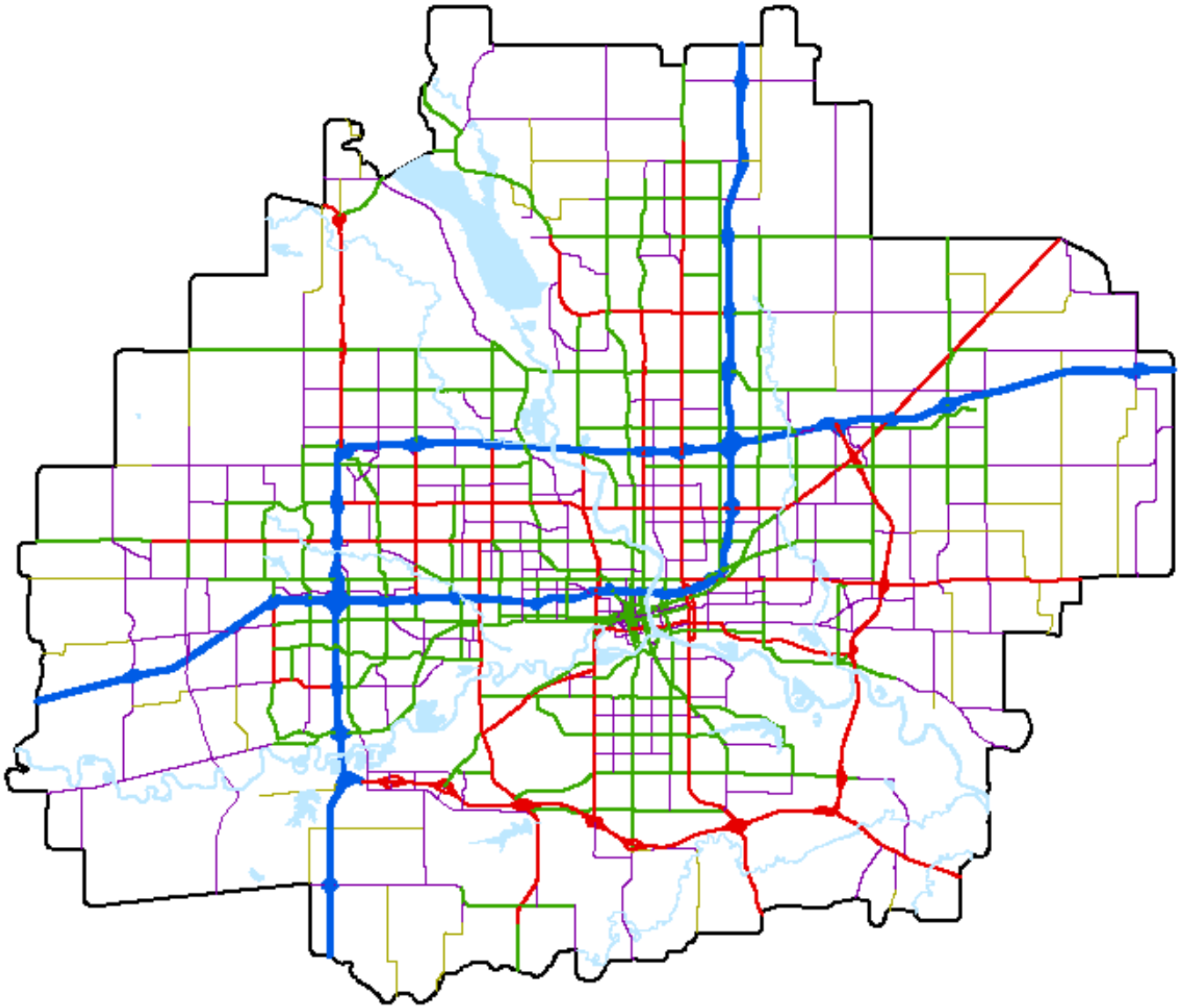


Figure 6: CMP Network with Available INRIX Data

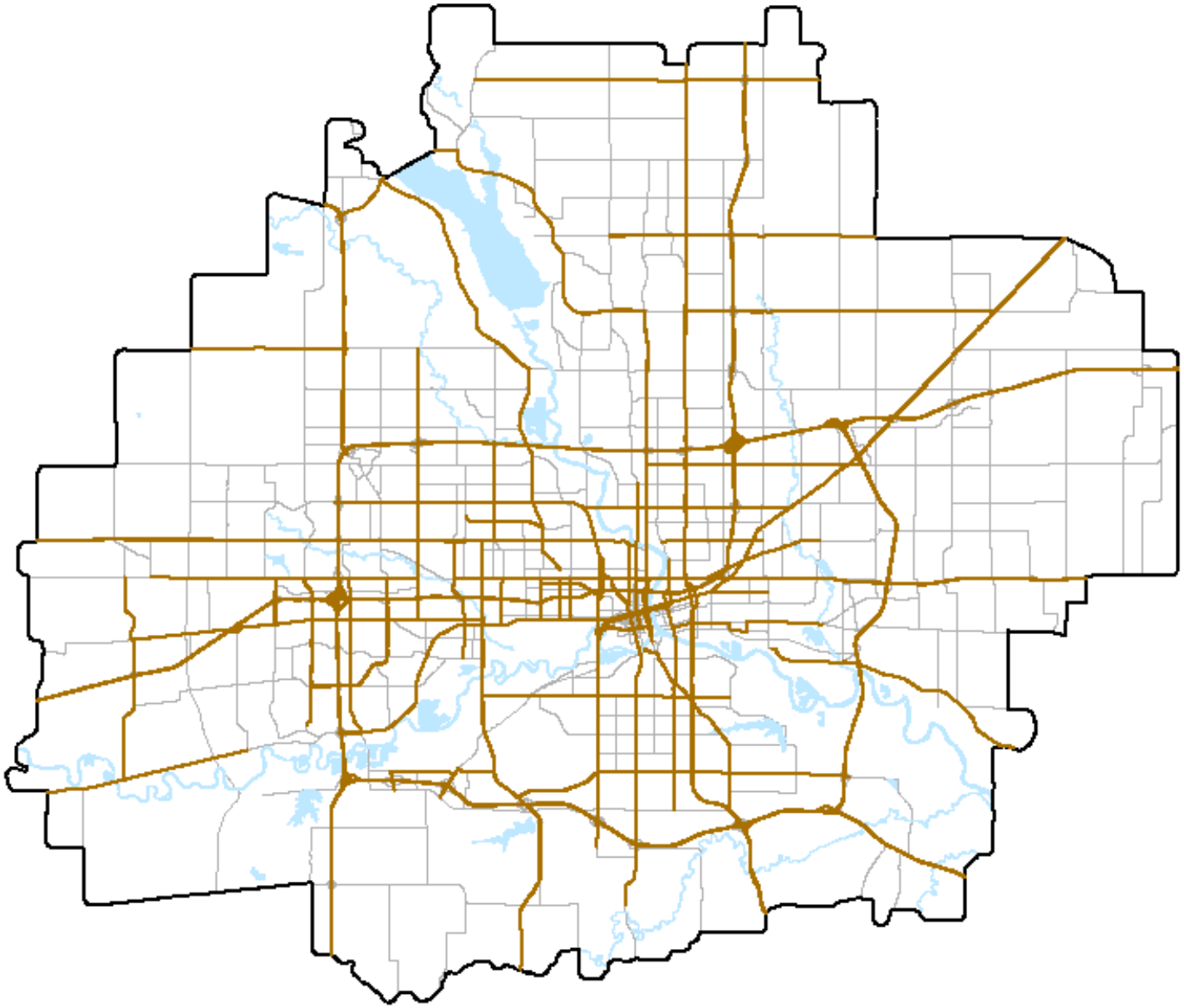
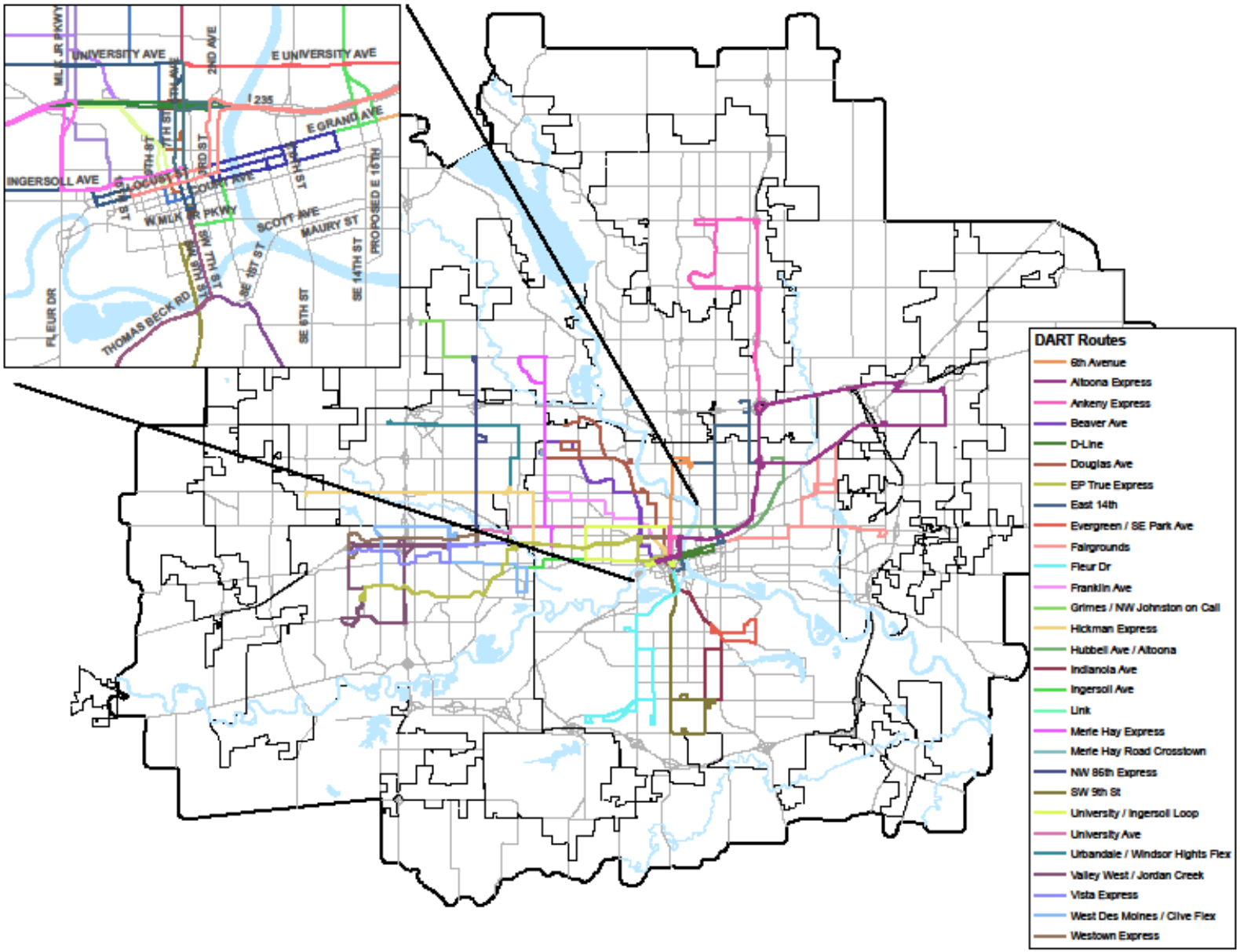


Figure 7: DART Route Map



5.0 Identification and Evaluation of Congestion

5.1 Defining Congestion

In order to focus transportation planning efforts, the CMP identifies where congestion occurs and what are its causes. Federal regulation 23 CFR 500.109 defines congestion as "the level at which transportation system performance is unacceptable due to excessive travel times and delays." According to the Federal Highway Administration (FHWA), roadway congestion is comprised of three key elements: severity, extent, and duration. The blending of these elements will determine the overall effect of congestion on roadway users. Three dimensions of congestion include the following:

- **Severity** - refers to the magnitude of the congestion problem at its peak. Severity has been traditionally measures through indicators such as volume/capacity (V/C) ratios or Level of Service (LOS) measures;

- **Extent** - describes the number of system users or components (e.g. vehicles, pedestrians, transit routes, lanes miles) affected by congestion; and,

- **Duration** - describes the length in time that users experience congested conditions.

Because these elements have a direct relationship, any increase in one will subsequently result in an increase in the others. Therefore, as roadway congestion continues to build (increased severity), more travel will occur under congested conditions (increased duration) affecting an increasing number of motorists and roadway facilities (increased extent). Congestion occurs due to a number of planned and unplanned events either in isolation or in tandem. Congestion can be generally classified as either recurring or non-recurring.

Recurring Congestion which include:

- Peak Period, Freight, Intersection, Freeway Corridor, Non-freeway corridor, School related, Central Business District, Bottleneck or hot spot, Railroad crossing, or parking related.

Non-Recurring Congestion which include:

- Incident related, Weather, Work zones, Fluctuations in normal traffic flow, or special event traffic

The congestion management process will focus on the routes that make up the CMP network. The CMP network is made up of those FFCS routes that have INRIX data available. Efforts to improve traffic conditions in the region will begin on the CMP network, and the level of congestion on the network will serve as a gauge for overall congestion in the area.

Performance measures allow the MPO to define, measure, and communicate levels of congestion based on both spatial and time oriented criteria. Many of the measures are segment-or site-specific, such as level of service, and intersection delay. Congested roadways were mapped in the Horizon Year (HY) 2050 Mobilizing Tomorrow Plan (MTP) using this type of data.

The MPO will use the following performance measures within a points based system to identified congestion:

- Travel Time Index
- Planning Time Index

5.2 Identifying Congestion

In order to efficiently use existing data collection programs when possible, the MPO will use real-time data and model outputs based on real-time data to identify areas of congestion.

Point-Based System
The performance measures used to identify congestion included Travel Time Index and Planning Time Index. The data for this analysis will be collected using INRIX data. INRIX collects information from mobile phones, connected cars, trucks, delivery vans, and other fleet vehicles equipped with GPS locator devices.

The analysis will be based on a point system to determine if a roadway is considered congested. Using the tables below, if a roadway or intersection has a combine **7 points or more**, then it is considered **congested**. If it receives 6 points or less, the roadway is considered not congested. The congested roadways or intersections that score 7 points or higher are listed in **Figure 10** and shown in **Figure 11**.

Figure 8: Travel Time Index Points

Travel Time Index	Points
0 – 1.30	0
1.301 – 1.50	2
1.501 – 2.00	4
2.001 – 3.00	6
>3.000	8

Figure 9: Planning Time Index Points

Planning Time Index	Points
0 – 1.30	0
1.301 – 1.50	1
1.501 – 2.00	2
2.001 – 3.00	3
>3.000	4

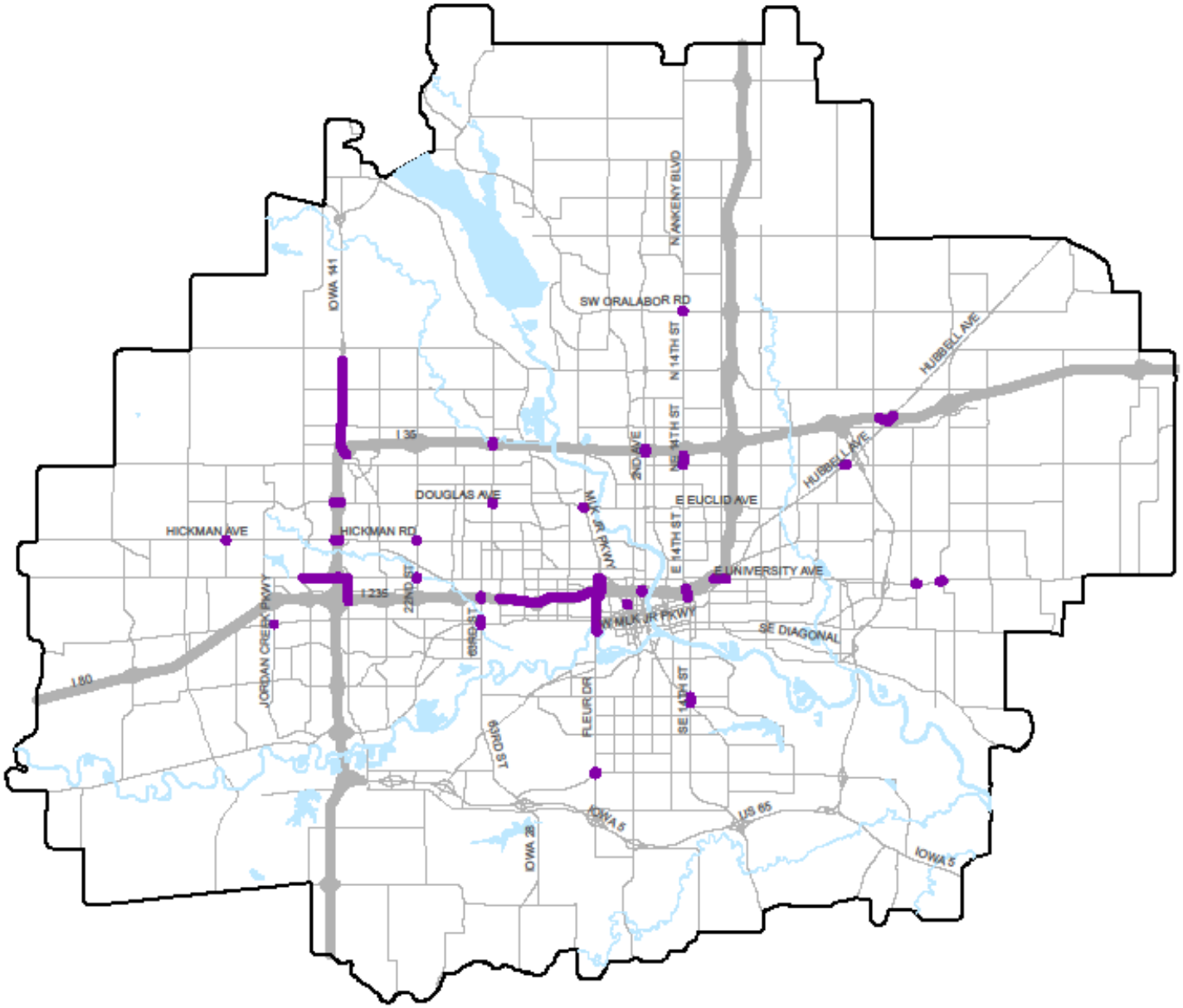
Source: Travel Time Study 2013, Mid-America Regional Council Transportation Department

Figure 10: Currently Congested Roadways and Intersections that Scored 7 Points or Higher (Based on 2014 Roadway Data)

TMC CODE	NAME	MILES	Peak Hour TT	Peak Hour PT	TT Points	PT Points	Total Points
118P11740	IA-160/ORALABOR RD	0.0100	2.137	5.830	6	4	**10.0**
118P10802	NE 70TH ST	0.0736	2.104	9.330	6	4	**10.0**
118N11740	IA-160/ORALABOR RD	0.0248	1.933	4.330	4	4	**8.0**
118-04653	35TH ST	0.0118	1.878	3.210	4	4	**8.0**
118N17144	US-69/S ANKENY BLVD	0.0100	1.856	3.180	4	4	**8.0**
118P16891	156TH ST	0.0075	1.739	3.470	4	4	**8.0**
118N04652	42ND ST	0.4994	1.709	3.210	4	4	**8.0**
118N17041	I-235/SCHOOL ST/DAY ST	0.0719	1.695	3.250	4	4	**8.0**
118P10803	NE 64TH ST	0.0500	1.690	3.600	4	4	**8.0**
118N16923	8TH ST/9TH ST	0.0724	1.656	3.110	4	4	**8.0**
118N11729	INDIANOLA AVE (DES MOINES) (NO	0.0352	1.638	5.500	4	4	**8.0**
118P07567	US-6/DOUGLAS AVE	0.0297	1.624	3.620	4	4	**8.0**
118P16892	I-35	0.1283	1.611	3.110	4	4	**8.0**
118P16921	US-6/HUBBELL AVE	0.0602	1.592	3.180	4	4	**8.0**
118P11729	INDIANOLA AVE (DES MOINES) (NO	0.0435	1.578	4.000	4	4	**8.0**
118+11730	E PARK AVE	0.1371	1.563	3.090	4	4	**8.0**
118N16891	156TH ST	0.0075	1.559	3.060	4	4	**8.0**
118N04654	31ST ST	0.5421	1.539	3.050	4	4	**8.0**
118+04619	UNIVERSITY AVE/EXIT 124	0.0146	1.533	3.940	4	4	**8.0**
118-04654	31ST ST	0.3646	1.505	3.050	4	4	**8.0**
118-17039	INGERSOLL AVE	0.5971	1.877	2.920	4	3	**7.0**
118P17038	FLEUR DR	0.0485	1.873	2.110	4	3	**7.0**
118P10811	I-80/US-6/NE HUBBELL AVE/EXIT	0.4164	1.836	2.770	4	3	**7.0**
118+17040	COTTAGE GROVE AVE	0.5763	1.808	2.530	4	3	**7.0**
118+11737	I-80/I-35	0.2518	1.788	2.920	4	3	**7.0**
118+17039	INGERSOLL AVE	0.3484	1.753	2.600	4	3	**7.0**
118+16941	I-35	0.7709	1.726	2.620	4	3	**7.0**
118N16825	FLEUR DR	0.0544	1.724	2.690	4	3	**7.0**
118P16825	FLEUR DR	0.0302	1.708	2.570	4	3	**7.0**
118-04651	56TH ST	0.5002	1.694	2.950	4	3	**7.0**
118-11732	E GRAND AVE	0.1517	1.692	2.620	4	3	**7.0**
118P16971	ASHWORTH RD	0.0045	1.675	2.500	4	3	**7.0**
118P17061	I-35	0.1182	1.655	2.500	4	3	**7.0**
118N17042	UNIVERSITY AVE	0.0301	1.647	2.910	4	3	**7.0**
118N16892	I-35	0.1257	1.641	3.000	4	3	**7.0**
118N16917	US-69/NE 14TH ST	0.0072	1.636	2.180	4	3	**7.0**
118P16941	I-35	0.2254	1.634	2.500	4	3	**7.0**
118P16897	MARTIN LUTHER KING JR PKWY	0.0397	1.633	2.330	4	3	**7.0**

TMC CODE	NAME	MILES	Peak Hour TT	Peak Hour PT	TT Points	PT Points	Total Points
118N07565	I-235	0.0656	1.614	2.380	4	3	**7.0**
118P16999	I-235	0.0850	1.611	2.540	4	3	**7.0**
118N11733	I-235	0.0747	1.607	2.540	4	3	**7.0**
118P07520	I-80/I-35	0.2519	1.593	2.710	4	3	**7.0**
118+17041	I-235/SCHOOL ST/DAY ST	0.1098	1.591	2.190	4	3	**7.0**
118-13444	GRAND AVE	0.1296	1.587	2.670	4	3	**7.0**
118N17072	I-235/SCHOOL ST	0.0698	1.577	2.190	4	3	**7.0**
118-17040	COTTAGE GROVE AVE	0.0676	1.575	2.420	4	3	**7.0**
118N17097	UNIVERSITY AVE	0.0251	1.571	2.900	4	3	**7.0**
118-10808	HUBBELL AVE	0.3198	1.562	2.690	4	3	**7.0**
118+17000	UNIVERSITY AVE	0.5210	1.556	2.420	4	3	**7.0**
118-04652	42ND ST	0.3382	1.556	3.000	4	3	**7.0**
118N16944	I-35	0.1897	1.551	2.540	4	3	**7.0**
118-17041	I-235/SCHOOL ST/DAY ST	0.2764	1.543	2.130	4	3	**7.0**
118N16941	I-35	0.2254	1.538	2.750	4	3	**7.0**
118N04651	56TH ST	0.2358	1.531	2.520	4	3	**7.0**
118P17099	US-6	0.0075	1.524	2.820	4	3	**7.0**
118P07568	I-80/I-35	0.0985	1.521	2.700	4	3	**7.0**
118N17010	UNIVERSITY AVE	0.0251	1.518	2.800	4	3	**7.0**
118+17042	UNIVERSITY AVE	0.2738	1.504	2.130	4	3	**7.0**
118+07519	IA-44/1ST ST	2.2640	1.504	2.080	4	3	**7.0**
118N16833	ARMY POST RD	0.0595	1.503	2.530	4	3	**7.0**

Figure 11: Congested Roadways and Intersections that Scored 7 Points or Higher



6.0 Identification and Evaluation of Strategies

6.1 Types of Strategies

Data collected in the monitoring phase of the congestion management process will be evaluated. The evaluation process for this data will utilize the strategies described in this section on a case by case basis. The strategies to address congestion include demand management, operational management, and capital intensive strategies. These strategies will be considered when determining improvements to address these congested roadways and intersections.

6.2 Hierarchy of Congestion Strategies

When choosing congestion management strategies, the region should follow a least cost planning methodology. Least cost planning is defined as, "*…a process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost-effective mix of options.*"[4] In a time were limited resources impact the decision making process, it is pertinent to address congestion in a cost effective manner. Therefore, the following hierarchy of congestion strategies should be considered:

Demand Management Strategies (least expensive);
Operational Management Strategies (moderately expensive); and,
Capital Intensive Strategies (most expensive).

When congestion is identified the first step should be to determine what demand management strategies might be implemented to address the issue. If an appropriate demand management strategy is identified, it should be implemented and evaluated prior to considering an operational management or capital intensive strategy. Capital intensives strategies to relieve congestion should only be considered as a last resort.

6.3 Demand Management Strategies

Car/Vanpooling Ridesharing programs reduce the number of single-occupancy vehicles on the road. This can be achieved through carpooling programs where the participants use their own vehicles. Vanpools are typically organized by employers, non-profit organizations, or transit agencies. Ridesharing programs are typical lly self-supporting, and is especially effective in area with poor access to public transit service.

Flexible Work Hours
This strategy allows employees to have flexibility in their work schedules. If a normal work schedule is 8:00 a.m. to 4:30 p.m., an employer would allow employees to work from 7:30 a.m. to 4:00 p.m. and others to work from 9:00 a.m. to 5:30 p.m. This shifts the number of employees leaving work at peak-hour, spreads traffic out over longer time period, and helps to reduce peak-hour congestion.

[4] 2009 Jobs and Transportation Act, Oregon Legislature (House Bill 2001).

Telecommuting
Telecommuting allows people to work remotely from home or other locations. Companies can offer this option to employee's that don't physically need to be at the office to perform their duties, and therefore removes vehicles from the road.

Parking Management
Parking supply and price are effective measure to reduce automobile travel and congestion. The right supply and pricing can lower traffic congestion, ensure that some on-street parking is available at peak-hours, and incentivize some drivers to shift to other modes of transportation.

Land Use Policies
Integrating transportation and land use decision is the best long-term strategy for dealing with congestion. When working to integrate land use and transportation more effectively, communities should focus infill development that is compact, mixed-use, and built using human scale principles. Land use polices should focus on providing a highly connected system of streets that are design to accommodate a variety of user. A high level of emphasis should be place on creating an attractive public realm, and priority should be place on designing pedestrian-oriented places. What this achieves is a built environment that creates a higher level of accessibility by places residents in closer proximity to the activities people frequent. This proximity coupled with the high quality public realm, incentivizes people to use alternative modes of transportation includes walking, biking, and public transit. This removes vehicles from the streets helping to alleviate congestion.

6.4 Operational Management Strategies

Traffic Operational Improvements
Traffic Operational Improvements, which include improvements in traffic signalization, channelization, and highway geometrics, have been used extensively by MPO member governments, especially at intersections. Such projects can provide significant congestion-related benefits with only small investments in time, money, and labor.

Access Management
Access management principles, which typically involve standards for driveway spacing and median openings, have customarily been incorporated into the design for construction of new streets and highways and improvements to existing streets. In 2004, the Center for Transportation Research and Education (CTRE) at Iowa State University completed the Development of the *Des Moines Access Management Plan*, which provided recommendations for possible improvements and best access management practices. The results of this study were shared with MPO member governments and agencies. Iowa DOT and MPO member governments created an access management agreement along U.S. Highway 6 (Hickman Road) to limit access along the corridor. Similar access management agreements have been reviewed for other corridors in the MPA.

Incident Management
Incident management includes various activities that help mitigate non-recurring congestion, such as rapid detection and response to accidents and stalled vehicles, provision of congestion-related information to drivers, management of construction and maintenance activities, and management of traffic for special events. In conjunction with the widening of I-235, the Iowa DOT implemented a freeway incident management system that includes a traffic management center (TMC), variable message signs, a Highway Advisory Radio station, a Highway Helper program, and video and communications equipment.

The MPO's Transportation Management Advisory Committee (TMAC), a multi-disciplinary inter-agency group, provides coordination for the deployment and operation of the region's incident management plans and programs.

Intelligent Transportation System

ITS programs provide user services such as travel planning, traveler information, emergency management, and advanced vehicle control. Many of the activities associated with ITS also may fall into the Incident Management and Traffic Operational Improvements categories of the MTP. A Regional ITS Architecture was developed and the necessary infrastructure was put into place, prior to the reconstruction and widening of I-235. Currently, the Iowa DOT maintains an interactive traveler information website, where users can find updated information about traffic conditions on major travel corridors in the region. The TMAC provides coordination for the deployment and operation of the MPA's ITS programs. In 2006, the MPO programmed STP funds to assist in funding the Iowa DOT's TMC.

Signal Timing and Interconnectedness

Traffic signal operations strategies can be placed into two broad categories: Isolated or Coordinated. Isolated signal timing is generally designed to minimize delay at the intersections that are not in close proximity to other traffic signals. Coordinated operations strategies promote the smooth flow of traffic between along an arterial to minimize stops, avoid congestion, fuel consumption and air quality impacts resulting from the acceleration and idling of vehicles. Operational strategies consistent with the objectives of coordination include Adaptive Signal Control Technology (ASCT) and Traffic Responsive. Currently several western suburbs in the Des Moines Metro are working together to implement coordinated signal timing activities to ensure the smooth flow of traffic across jurisdictional boundaries.

Ramp Metering

Ramp metering is an effective strategy to control the number of vehicles entering a highway from an on-ramp. This maintains a smoother flow of traffic onto the highway and helps to ease congestion. This strategy could be implement on I-235 to help smooth access during peak-hours.

Roundabouts

Congestion on urban streets is often caused by queuing at signalized or stop controlled intersections. Modern roundabouts provide a solution to congestion created at intersections. A modern roundabout's capacity is 30 percent greater than a signalized intersection and can reduce major injury and fatal accidents by as much as 90 percent.

Complete Streets

Ensuring that lane addition/widening projects consider integrating Complete Street practices in the design process can assist in congestion mitigation through providing additional opportunity for users to choose alternative modes of transportation.

Traffic Signal Priority

Transit vehicles can be equipped with traffic signal priority technology that limits the amount of time buses have to wait at signalized intersections. This improves the travel time of transit trips and helps to promote mode shift.

6.5 Capital Intensive Strategies

Lane Additions

Objective 3.2 of the Mobilizing Tomorrow Plan (MTP) states that prior to consideration of capital improvements to alleviate congestion the MPO will consider the utilization of ITS and other operation improvements. However; when alternative methods are not feasible, adding through travel lanes has continued to be a widespread practice in the MPA for alleviating congestion and encouraging economic development.

Transit Capital Improvements

Transit capital improvements in the MPA mainly consist of the replacement of older buses in the DART fleet and procurement of additional buses for expanded DART services. Few, if any, roadway projects have been constructed with the intent of minimizing the impact of vehicle congestion for buses. No rapid transit services currently operate in the MPA. However, DART currently is studying the feasibility of BRT as part of the DART Forward 2035 Plan and is constructing a multimodal transit hub in the Des Moines CBD. As noted in Chapter 5 of the 2035 Metropolitan Transportation Plan, the MPO did commission a commuter rail feasibility study in 1999, which concluded the service was technically feasible, but economically impractical at that time.

7.0 Performance Monitoring Plan

7.1 System Monitoring Data Sources

The MPO will monitor system performance through various means based on the following data sources:

INRIX

The MPO has access, through the Iowa DOT, to traffic data available through the company INRIX. INRIX offers real time and historic traffic flow data for most of the major roads in the MPO area. Data is collected through cell phones and cataloged for analysis. Information is available at the 1, 5, 15, and 30 minute and 1 hour time segments. Time periods can be selected manually for any time in a year, including up to a year although yearly data is available at the hour time segment. Types of information available include vehicle speed, percent of travel of free flow speed, travel time index, planning time index, and buffer index. INRIX uses a unique set of Traffic Message Channel (TMC) codes and segments exclusive to the company. In the event that the Iowa DOT stops using INRIX, the MPO will use whatever service provider is hired by the DOT to provide the same type of data.

Travel Time Survey

The MPO periodically performs a travel time survey to gauge the level of congestion, in terms of delay or reduction in free flow travel speeds, on the Principal Arterial System. The MPO performs the Travel Time Survey (TTS) by utilizing Global Positioning System (GPS) equipment to actively survey a designated corridor. The recorded GPS data is analyzed and summarized into an annual report. The annual report documents the findings and compares the survey's results to historic survey results to gauge changes in travel speeds. The TTS is conducted on an annual basis in the fall.

Vehicle Occupancy Survey

The MPO periodically performs a Vehicle Occupancy Survey (VOS) to assist in evaluating both the number of people per vehicle and the percentage of people utilizing various modes of transportation. This data is collected manually by Des Moines Area MPO staff at various pre-determined key areas throughout the area. The annual report documents the findings and compares the survey's results to historic survey results to evaluate changes in occupancy and mode. The VOS is conducted on an annual basis in the fall.

Traffic Management Center

The MPO summarizes and analyzes traffic data from the Iowa Department of Transportation's (DOT) Traffic Management Center (TMC) on a quarterly basis. The Iowa DOT's TMC monitors the Intelligent Transportation System (ITS) infrastructure. This ITS infrastructure is comprised of a series of cameras, sensors, and digital message signs. The data is processed and relayed to a website, www.iowa511.org. The TMC collects traffic data from the numerous sensors along the freeway system, and includes traffic speeds and volumes. The data is summarized into 15-minute intervals at each sensor location.

Travel Demand Modeling

The Travel Demand Model (TDM) is operated and maintained by the MPO on an ongoing basis. The TDM is utilized to provide data related to volume and capacity of the transportation network. The TDM undergoes periodic reviews to ensure that the data collected is the most accurate and up to date data available.

Traffic Counts

Each jurisdiction in the MPO boundary conducts traffic counts on an independent basis. There is a need

in the region to engage in a more coordinated effort with traffic counts and other related data, such as traffic signal timing that have significant impacts on the regional traffic patterns.

DART Ridership

DART ridership is compiled and reported to the MPO each spring. The MPO uses this data in the TDM as well as reporting the data to the various committee's each month to obtain feedback on potential improvements to the transit system.

7.2 Monitoring Data Sources

The following guidelines provide examples of the monitoring that can be performed for common types of improvement strategies.

Demand Management Strategies: It is fairly difficult to monitor the effects of many transportation demand management strategies. Unless strong area-wide measures are taken and enforced, the existing CMP performance measures may not be sensitive enough to measure the benefits of demand strategies. A procedure to assess the effectiveness of each strategy should therefore be determined individually. Examples include: the number of people participating in ridesharing, and spreading of traffic volume over non peak-periods (K-factors). The MPO will use the following monitoring strategies:

- Establish an inventory of companies and agencies that practice transportation demand management and track annually;
- Track the participation in Des Moines Area Regional Transportation Authority (DART) vanpool on an annual bases;
- Monitor DART ridership and track over time;
- Monitor parking management strategies and track over time; and,
- Monitor community land use plans and track changes over time.

Traffic Operational and System Capacity Strategies: Most capacity and traffic operational improvements will be measured and assessed through the CMP's standard data collection and evaluation process. Additionally, before and after analyses are being completed for retiming projects.

In the year following implementation of a recurring congestion roadway or intersection improvement, the improved roadway segment will be included in the annual data collection efforts. For most improvements, performance of the facility will be compared with data from previous years, and the resulting benefits will be identified in terms of the performance measures identified in section 5 of the CMP. The process for evaluating the benefits of ITS technologies, as related to the regional ITS architecture, should be developed on a case-by-case basis.

8.0 Implementation and Management

8.1 Evaluation of Effectiveness

Evaluation of strategy effectiveness is an essential, required element of the CMP. The primary goal of this action is to ensure that implemented strategies are effective at addressing congestion as intended, and to make changes based on the findings as necessary. Two general approaches are used for this type of analysis is:

(1) System-level performance evaluation - Regional analysis of historical trends to identity improvement or degradation in system performance, in relation to objectives; and,

(2) Strategy effectiveness evaluation- Project-level or program-level analysis of conditions before and after the implementation of a congestion mitigation effort.

Findings that show improvement in congested conditions due to specific implemented strategies can be used to encourage further implementation of these strategies, while negative findings may be useful for discouraging or downplaying the effectiveness of similar strategies in similar situations. The information learned from evaluation should be used to inform the TIP and MTP, as well as other steps within the CMP, notably the identification and assessment of strategies.

The periodic and on-going data gathering efforts required under the congestion management process provides a two-fold benefit including: the provision of up to date network performance data, while also confirming the efficacy or failure of implemented congestion management strategies in achieving system performance improvement. Thus, at its core the CMP incorporates a feedback loop which provides local decision makers with a valuable mechanism for measuring the success of previously implemented congestion management strategies.

8.2 Complete a Regional Analysis of ITS Infrastructure

The MPO should develop an update to the regions ITS Infrastructure inventory. This will allow the MPO to analysis the effectiveness of the existing ITS Infrastructure and identify areas where improvements are needed. This update should be complete prior to any additional funding being spent on capacity expansion as a way to address identified congestion.

8.3 CMP and the Surface Transportation Program

Congestion is one of the components used to score STP project applications. STP projects are scored on a 100-point scale, and eight of the total points are awarded based on congestion. STP projects are evaluated based on current and future levels of congestion. There are four points available for projects that are located on an area that is identified as being currently congested. These points will be awarded if the submitted project includes any part of a segment that meets or exceeds seven points. Points awarded for future congestion will be based on level of service until the MPO model is capable of using real-time data to project Travel Time Index and Planning Time Index for future years. When using LOS, any project that includes a segment with a LOS of E or F will receive points for future congestion.

8.4 CMP and the Iowa Clean Air Attainment Program (ICAAP)

Congestion also contributes to air pollution, a key component of the Iowa DOT ICAAP program, which seeks to help meet the national ambient air quality standards in Clean Air Act nonattainment areas for ozone, carbon monoxide, and particulate matter. ICAAP is a statewide competitive application based program and awards federal funds to projects with the highest potential for reducing transportation-related congestion and air pollution. Des Moines Metro communities periodically apply for such funding and moving forward communities will be able to use this document by targeting the most congested areas in the metro and as a resource when ICAAP applications are submitted.

8.5 Technological Advances

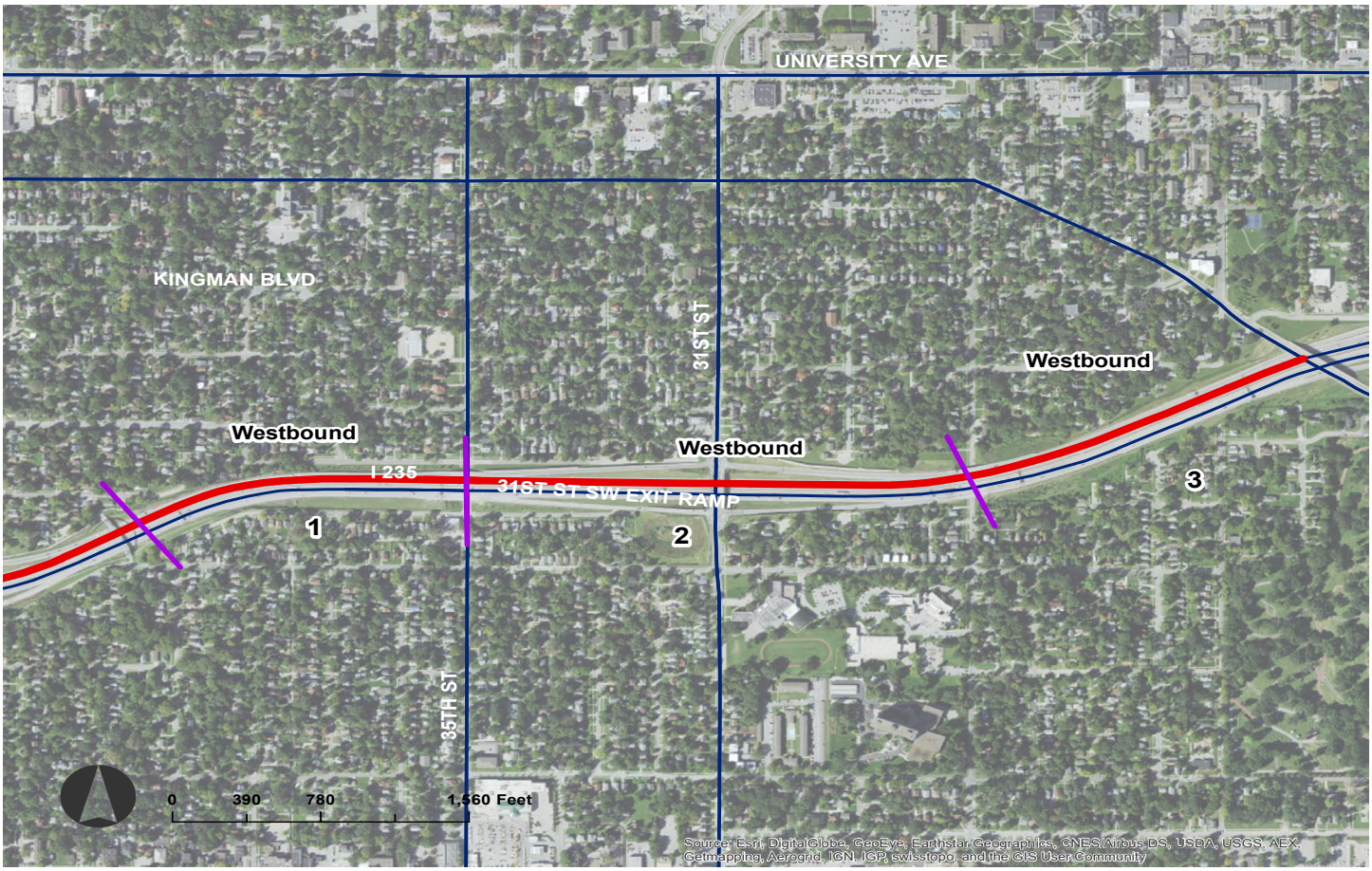
In the coming years, advances in transportation technology are likely to have a significant impact on congestion and how it is addressed. These technologies included things like autonomous cars and vehicle-to-vehicle communication that are predicted to greatly reduce the main causes of congestion. It is important to consider the impact of these technologies when considering what strategies to employ to address identified congestion. As part of the CMP process, the MPO will continue to monitor these changes in technology to ensure that the region is employing the most cost-effective strategies to address congestion.

Appendix A

Oralabor Road and Ankeny Boulevard Intersection (Ankeny)

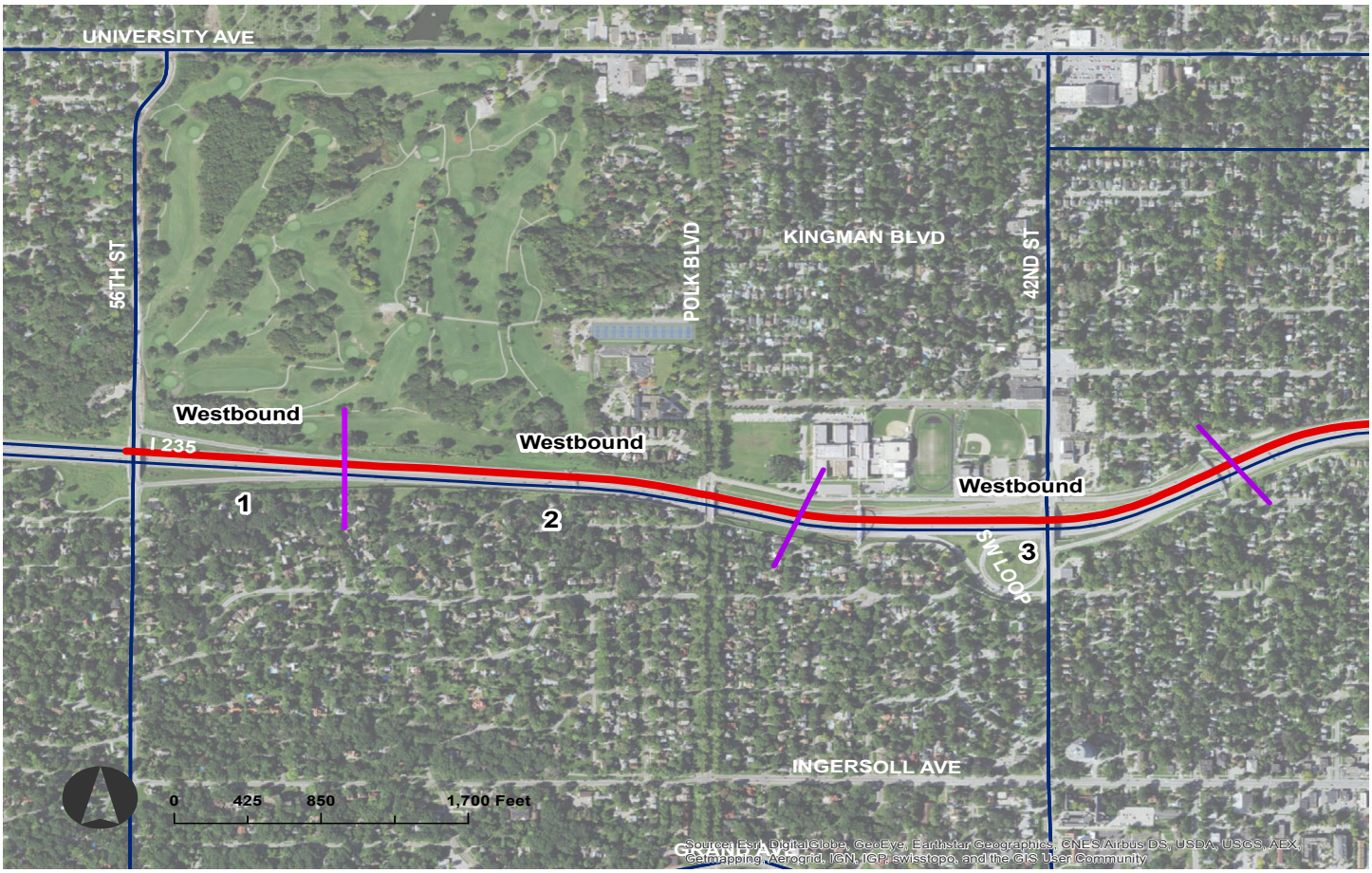
Summary of Conditions and Congestion	Congestion Measures
This intersection contains three road sections that are congested. The DMACC Ankeny Campus sits at the intersection and several block to the East is access to I-35. Other area land uses include single family residential to the south. Both roadways are considered Principal Arterials.	Peak LOS: C (Westbound) N/A (Northbound & Southbound) Peak TTI: 1.86 (Westbound) 2.14 (Northbound) 1.93 (Southbound) Peak PTI: 3.18 (Westbound) 5.83 (Northbound) 4.33 (Southbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Traffic Operational Improvements would improve vehicle delay time at this intersection. Updating traffic signal timing, in particular adaptive traffic signalization (although at greater cost), which has been used successfully in other communities in the metro, would improve traffic flow and reduce intersection delay.	Ankeny Boulevard is slated to receive road improvements, including widening from 4 to 5 lanes, in 2030.

I-235 - From 42nd Street Exit to Cottage Grove Avenue (IDOT)



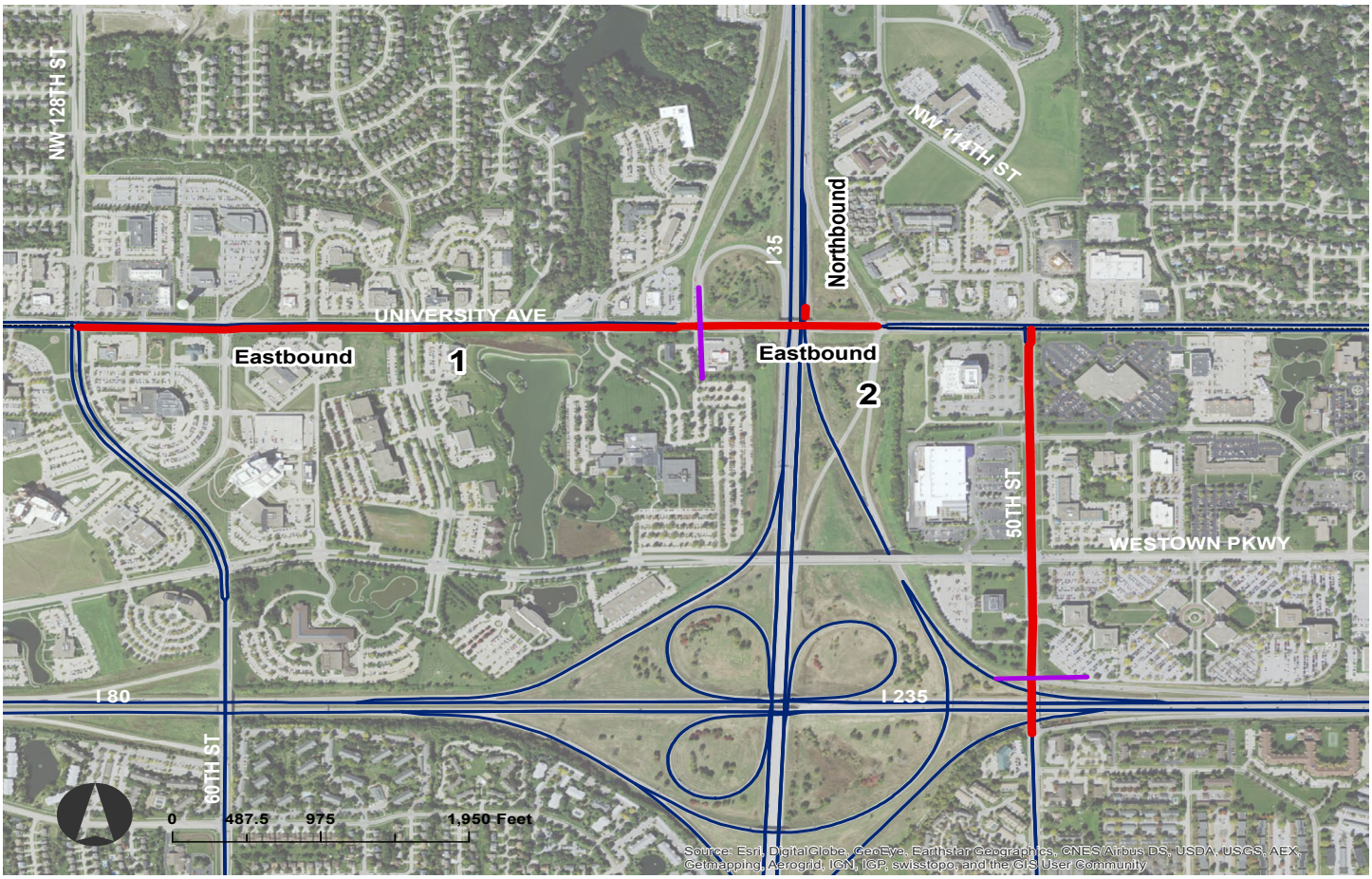
Summary of Conditions and Congestion	Congestion Measures
Westbound sections of I-235 from the 42nd Street exit to Cottage Grove Avenue are considered congested. These areas are located primarily near single family residential neighborhoods. In addition to residential properties, ancillary activities include Callanan Midde School. This roadway is considered an Interstate.	Peak LOS: (1) D (Westbound) (2) E (Westbound) (3) D and E (Westbound) Peak TTI: (1) 1.56 Average (Westbound) (2) 1.54Average (Westbound) (3) 1.51 Average (Westbound) Peak PTI: (1) 3.00 Average (Westbound) (2) 3.05 Average (Westbound) (3) 3.05 Average (Westbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Ramp metering would work well in reducing congestion on I-235. A study that was sponsored by the MPO found that I-235 west of Downtown would see a travel time delay improvement with ramp metering. Incident management improvements would also help mitigate non-recurring congestion, which accounts for more than half of all congestion.	The adjacent street of 42nd street has a planned project in 2040 to widen from 2 to 3 lanes. 31st street north of I-235 will also see a widening project from 2 to 3 lanes in 2030. However nothing is planned for I-235 in the LRTP or TIP for these sections.

I-235 - From 38th Street to 56th Street (IDOT)



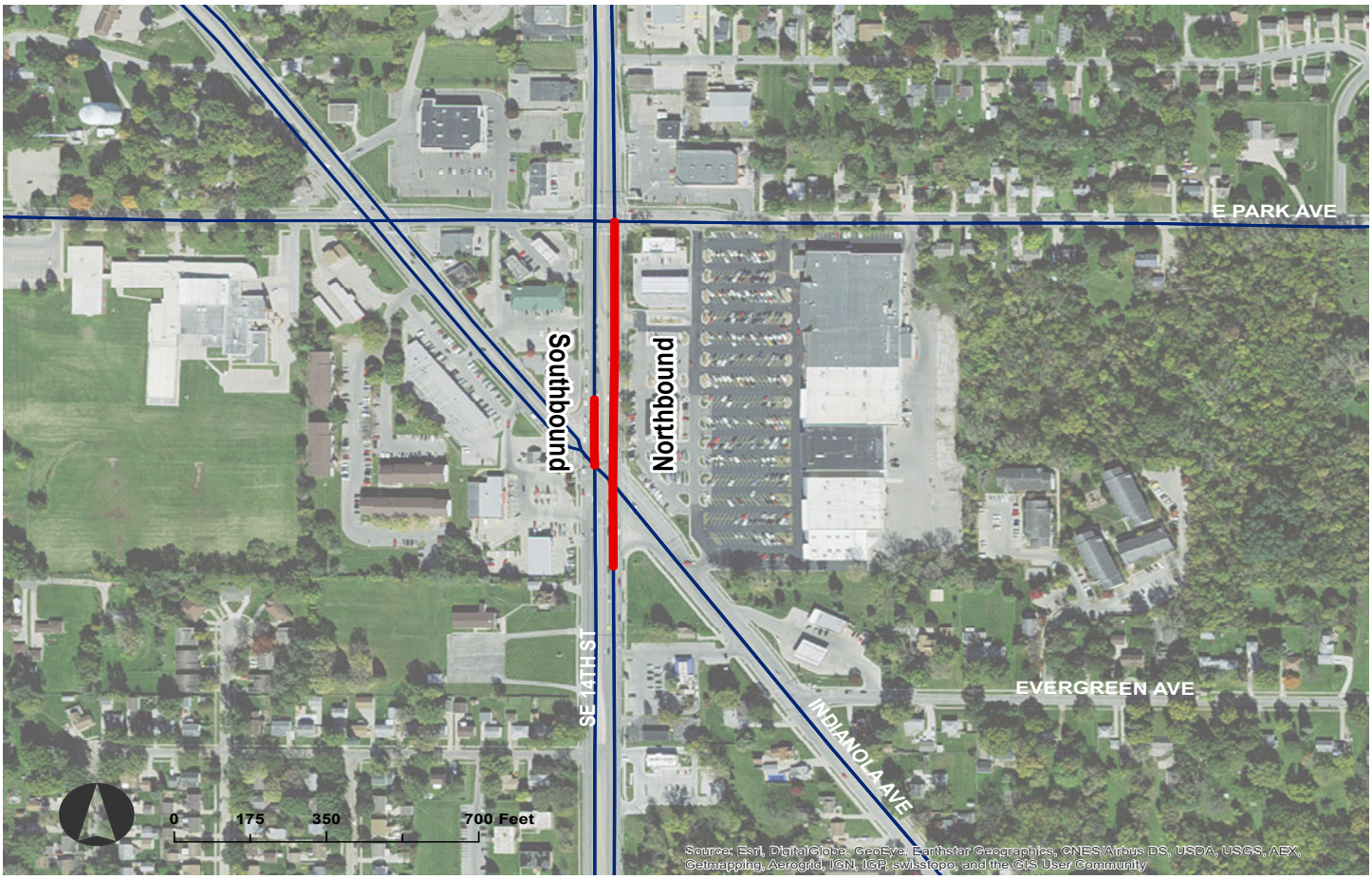
Summary of Conditions and Congestion	Congestion Measures
Westbound sections of I-235 from 38th Street to the 56th Street exit are considered congested. These areas are located primarily near single family residential neighborhoods. In addition to residential properties, ancillary activities include Roosevelt High School and Waveland Golf Course. This roadway is considered an Interstate.	Peak LOS: (1) E (Westbound) (2) D (Westbound) (3) C (Westbound) Peak TTI: (1) 1.53 Average (Westbound) (2) 1.69 Average (Westbound) (3) 1.71 Average (Westbound) Peak PTI: (1) 2.52 Average (Westbound) (2) 2.95 Average (Westbound) (3) 3.21 Average (Westbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Ramp metering would work well in reducing congestion on I-235. A study that was sponsored by the MPO found that I-235 west of Downtown would see a travel time delay improvement with ramp metering. Incident management improvements would also help mitigate non-recurring congestion, which accounts for more than half of all congestion.	The adjacent street of 42nd street has a planned project in 2040 to widen from 2 to 3 lanes. However nothing is planned for I-235 in the LRTP or TIP for these sections.

University Avenue - I-235 and 50th Street (West Des Moines and Clive)



Summary of Conditions and Congestion	Congestion Measures
All three locations of congestion is surrounded by commercial development, especially hotels and motels, eateries, and gas stations. The Northbound I-235 segment is only 0.015 miles long, so by virtue of how the road segments are laid out it shows that road is congested but it is probably not because of its very limited length. Both roads are considered Minor Arterials.	Peak LOS: (1) B (Eastbound) C (Northbound) (2) C (Eastbound) 1) B, 2) A (50th Street) Peak TTI: (1) 1.76Average (Eastbound) (2) 1.54 Average (Eastbound) 1.53 Average (Northbound) 1) 1.56, 2) 1.61 (50th Street) Peak PTI: (1) 2.62 Average (Eastbound) (2) 2.75 Average (Eastbound) 3.94 Average (Northbound) 1) 2.42, 2) 2.54 (50th Street)
Potential Solutions	**Planned Improvements in LRTP & TIP**
This segment of I-80/35 is right were traffic from the on-ramp merges onto the interstate. Ramp metering would regulate the traffic entering the interstate and help relieve congestion on this segment. University and 50th street has several stoplights that cause delay and continued integration of Intelligent Transportation Systems in adjacent communities can help mitigate some congestion. Some of these issues are caused by land use imbalances between where people live and work.	In 2030 there is a project that includes this road segment that would widen I-35/80 from six to eight lanes, including various road improvements. University will see a new overlay in 2020 and 2050 as well as a planned transit line in 2050. Nothing is identified in the LRTP or TIP for 50th Street.

US 69 - Between North of Indianola Avenue and Park Avenue (Des Moines)

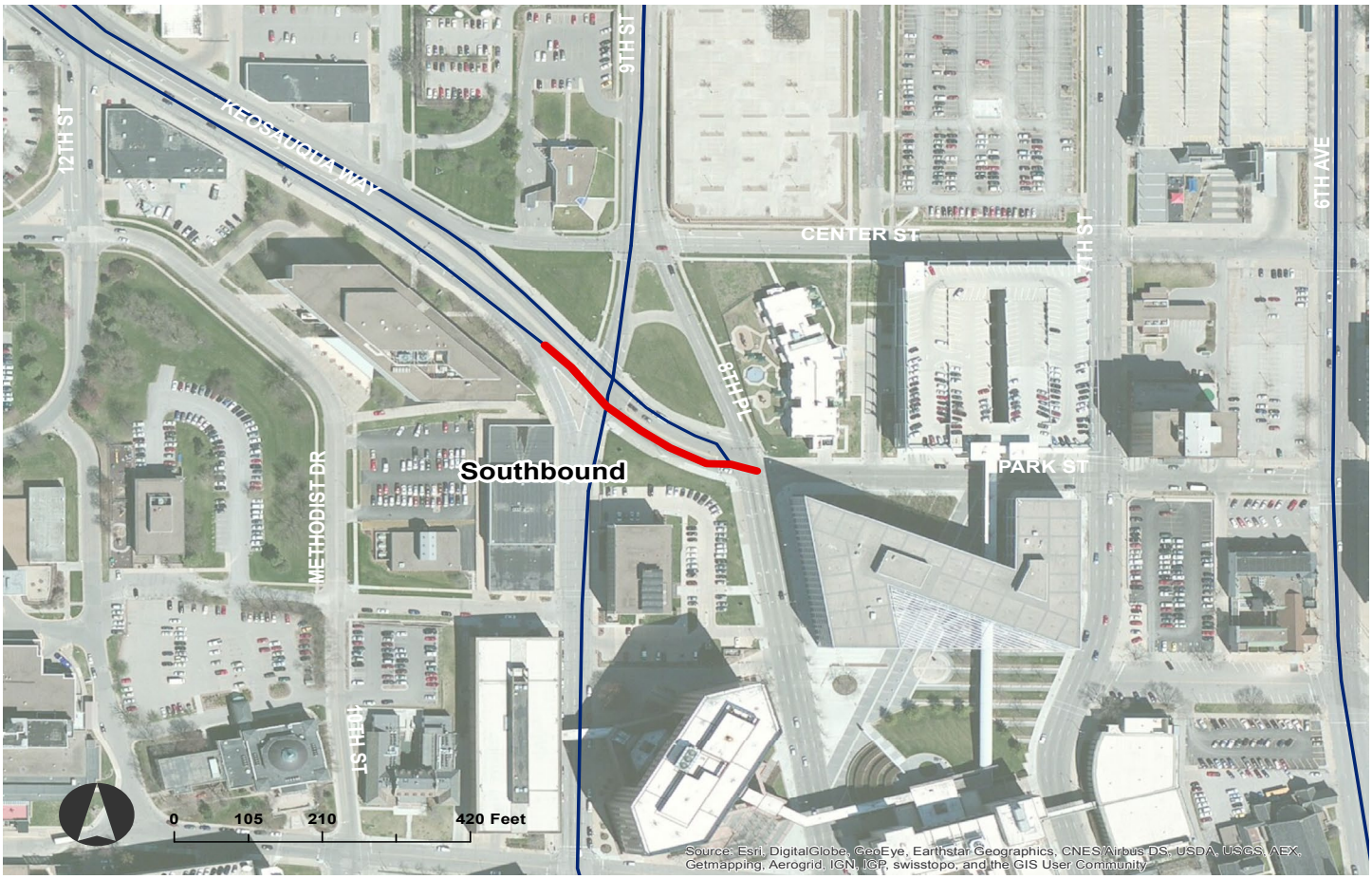


Summary of Conditions and Congestion	Congestion Measures
These road segments are surrounded by numerous commercial properties, including several strip malls. Other surrounding property usages include apartments, Weeks Middle School, and single family residential homes. This roadway is considered a Principal Arterial.	Peak LOS: B (Northbound & Southbound) Peak TTI: 1.563 (Northbound) 1.638 (Southbound) Peak PTI: 3.09 (Northbound) 5.50 (Southbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
These roadway segments are bounded by several major intersections on Indianola Avenue and Park Avenue. Updating signal timing, possibly including adaptive traffic signalization, would help ease congestion between these two intersections. Also, due to the numerous entrances for businesses, additional access management measures would help improve the ability for vehicles to enter commercial properties.	Indianola Avenue southeast, Park Avenue west, and US 69 north and south of this road segment will see widening from 4 to 6 lanes. These improvements are expected to take place in 2020, 2050, and 2040 respectively. However no improvements are planned for this road segment in particular.

Hickman and NW 156th Street (Clive)

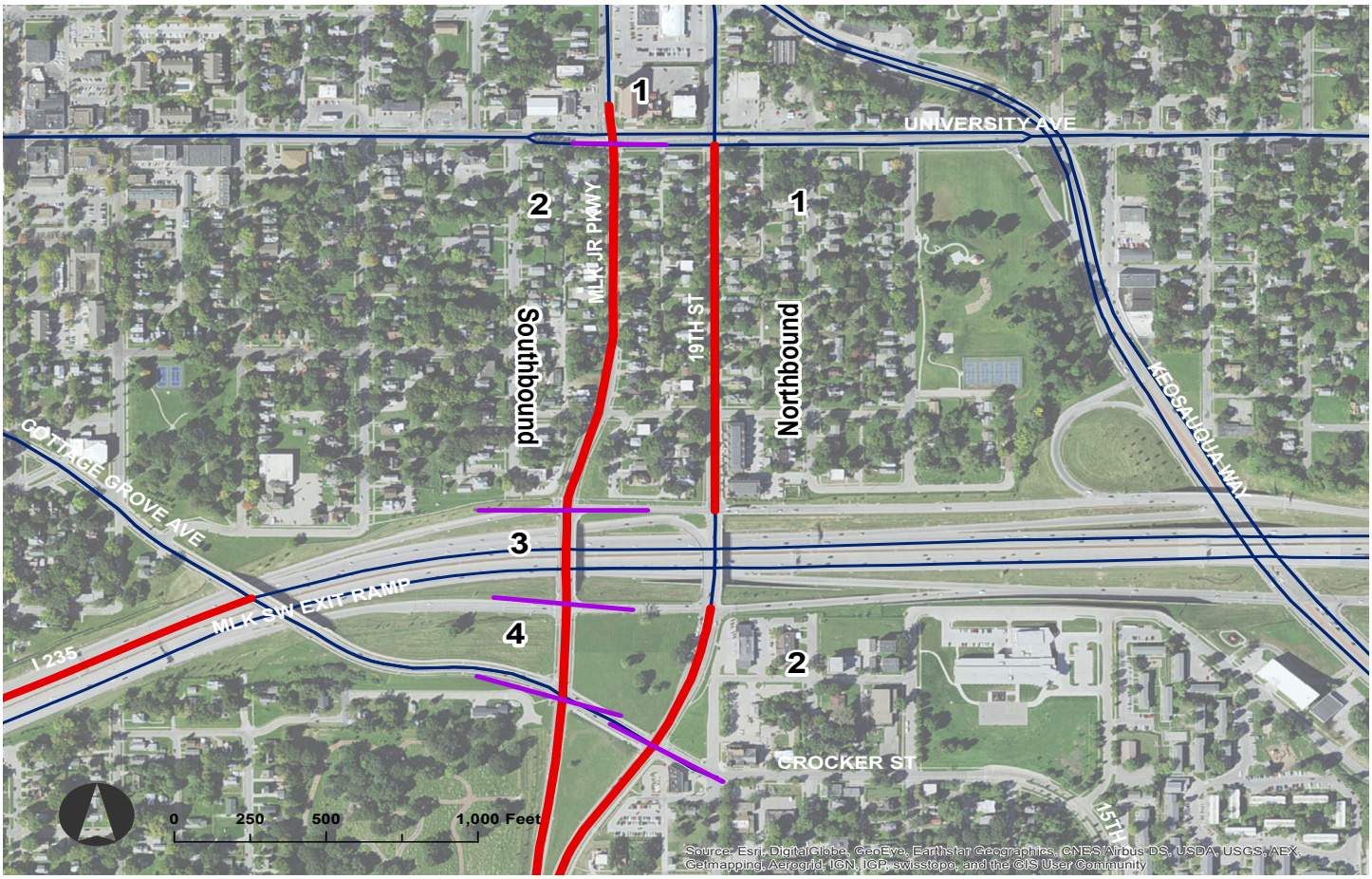
Summary of Conditions and Congestion	Congestion Measures
This intersection contains two road segments at the intersection of Hickman Avenue and NW 156th Street. Commercial businesses surround the intersection with farther out areas having mostly single family residential. A large grocery store and strip mall sits at the intersection. This roadway is considered a Principal Arterial.	Peak LOS: N/A (Westbound & Eastbound) Peak TTI: 1.56 (Westbound) 1.74 (Eastbound) Peak PTI: 3.06 (Westbound) 3.47 (Eastbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
The intersection would see an improvement in congestion from updating traffic signal timing. A higher cost option, but would also improve congestion, would be to institute adaptive traffic signalization. Other traffic operational improvements such as improving roadway geometrics would also help.	Both NW 156th Street and Hickman Road will see roadway improvements in 2040, 2030 (Hickman eastside), and 2040 (Hickman westside). NW 156th will be a maintenance project, and Hickman will be expanded from 4 to 6 lanes on both sides.

Keosaqua Way (Des Moines)



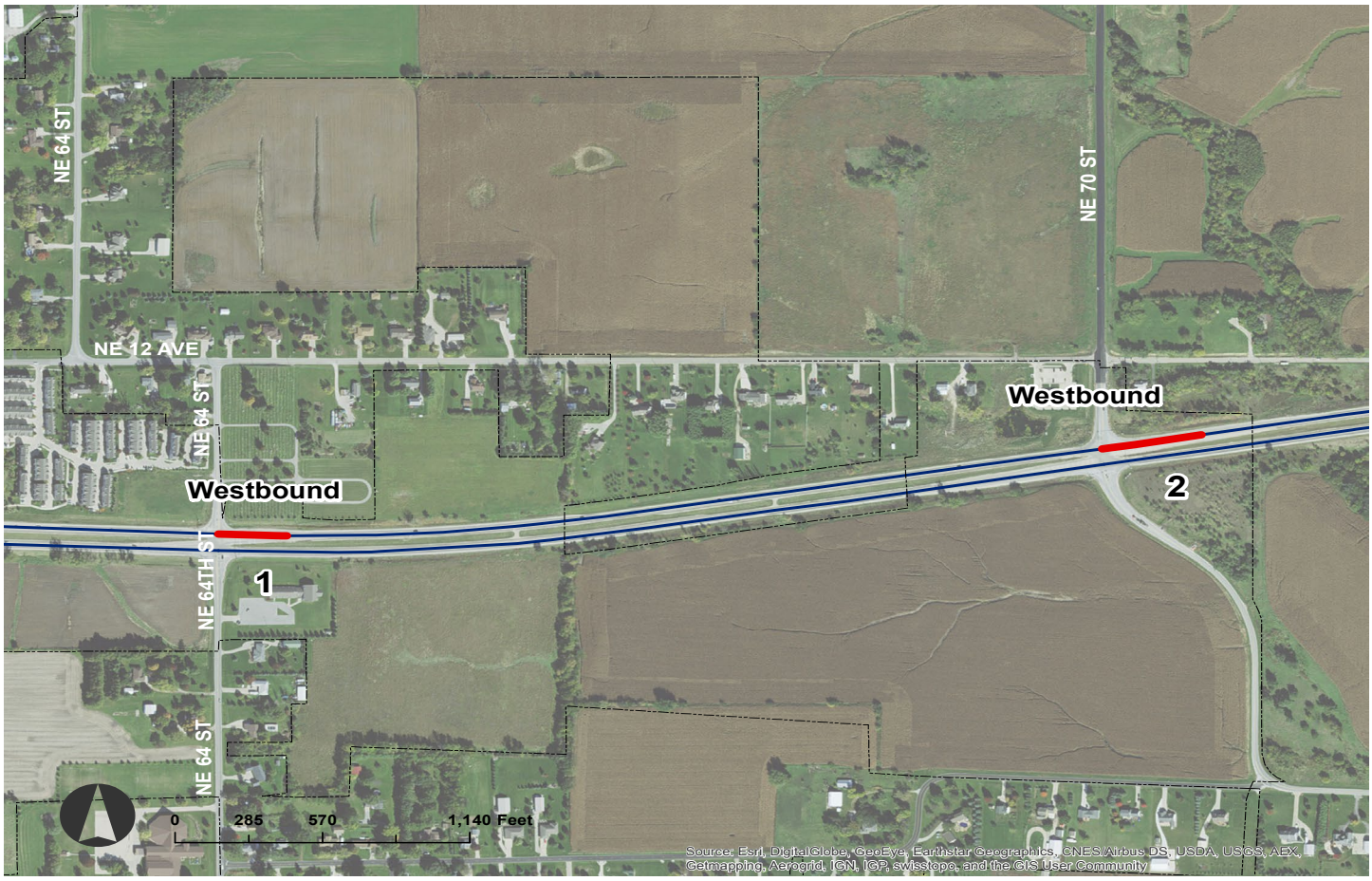
Summary of Conditions and Congestion	Congestion Measures
Located in downtown Des Moines this road is surrounded by commercial businesses, including a gas station, a credit union, and several very large office buildings. North of this road segment, Keo Way also has an interchange with I-235 that offers access to downtown. This roadway is considered a Minor Arterial.	Peak LOS: A (Southbound) Peak TTI: 1.66 (Southbound) Peak PTI: 3.11 (Southbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
This area of downtown contains several unique intersections that are contributing to congestion on this road segment. Revisiting intersection timing, and possibly implementing adaptive traffic signalization, would help lower travel times at these intersections.	The road segment will see a project improvement in 2030 consisting of streetscaping, with the potential to reduce the number of lanes from 6 to 4. MLK will also see a street improvement project for transit improvements.

Martin Luther King Jr. Way over I-235 (Des Moines)



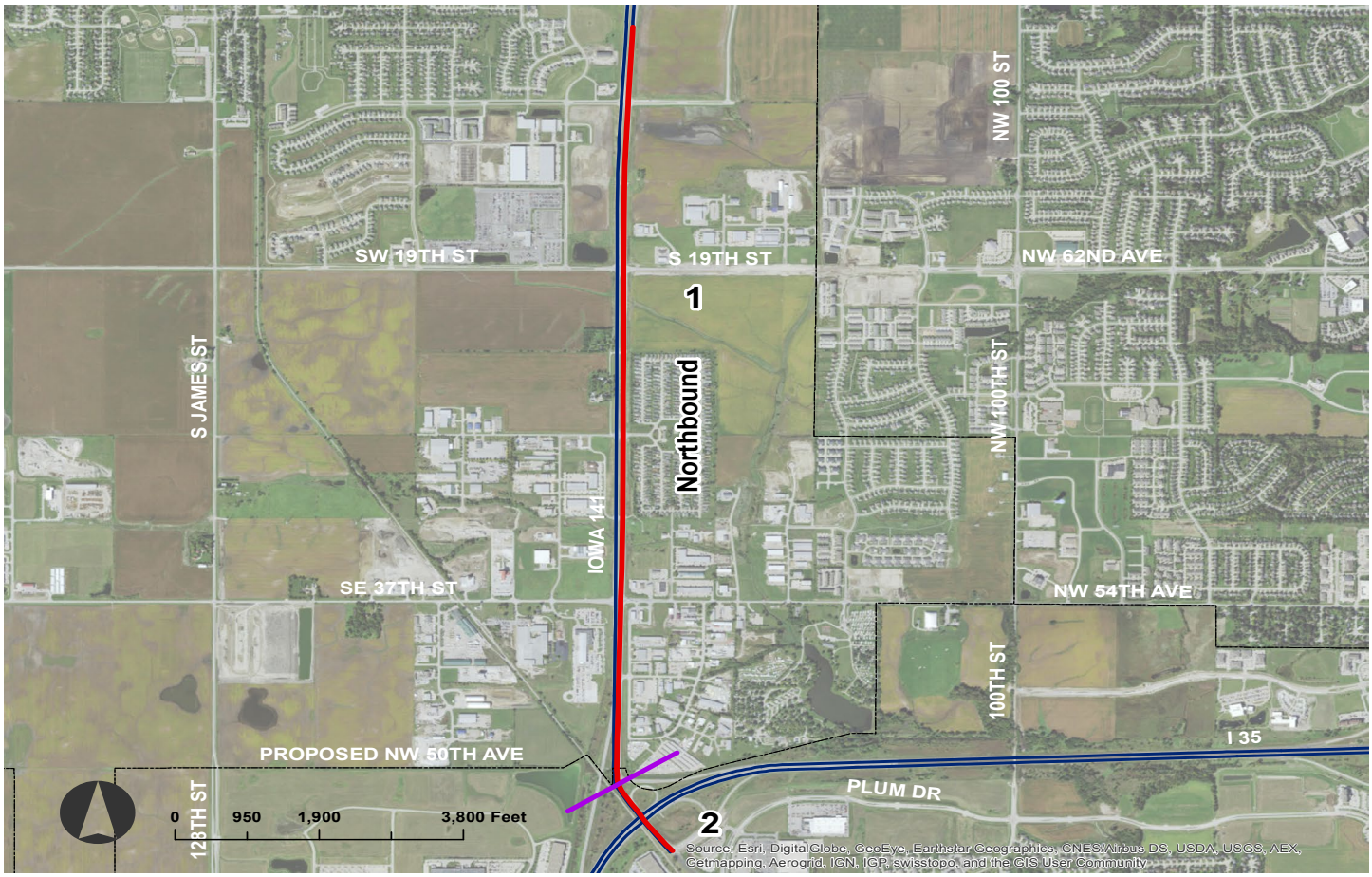
Summary of Conditions and Congestion	Congestion Measures
This road is a major thoroughfare that connects the northern and southern part of Des Moines to I-235. The road segment is bookended by 2 intersections that helps connect the road to I-235. Surrounding the road to the north and south are single family housing, including Edmunds Elementary School and Woodland Cemetery, and retail commercial properties. This roadway is considered a Principal Arterial.	Peak LOS: (1 & 2) C (North) (2 & 3) C & B (South) (1) C (South) (4) C (South) Peak TTI: (1) 1.50 (South) (2) 1.54 (North) (2) 1.59 (South) (3) 1.70 (North) (1) 1.65 (North) (4) 1.58 (North) Peak PTI: (1) 2.13 (South) (2) 2.13 (North) (2) 2.19 (South) (3) 3.25 (North) (1) 2.91 (North) (3) 2.42 (North)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Intersections are the main cause of congestion on these road segments. Revisiting traffic signal timing, or instituting adaptive traffic signalization, would be a particularly effective usage of an intelligent transportation system. Additionally, tracking traffic flows from I-235 and ramp metering would be particularly effective in this area.	Martin Luther King Jr. Way north of I-235, both ways, will see a roadway widening to increase lanes from 2 to 3 in 2050. University Avenue, adjacent to MLK, may have a transit BRT route added in 2020.

Iowa Highway 163 (Pleasant Hill)



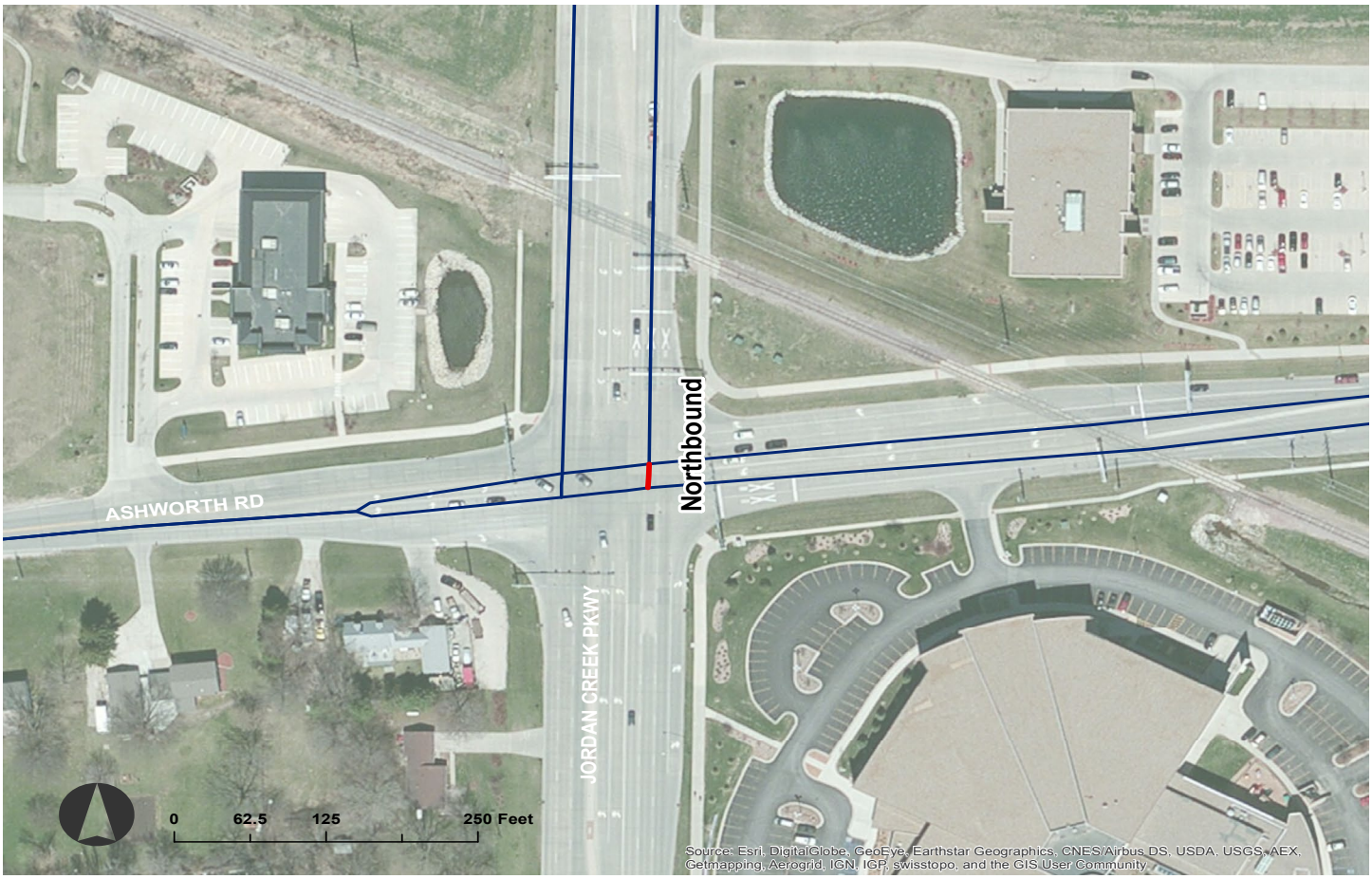
Summary of Conditions and Congestion	Congestion Measures
Highway 163 just east of US 65 is primarily surrounded by agricultural land and single family residential property, with some commercial uses. Each road segment is being congested at intersections that connects the highway to surrounding development. This roadway is considered a Principal Arterial.	Peak LOS: (1) B (Westbound) (2) A (Westbound) Peak TTI: (1) 1.69 (Westbound) (2) 2.10 (Westbound) Peak PTI: (1) 3.60 (Westbound) (2) 9.33 (Westbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Intersections are the main cause of congestion on these road segments. Revisiting traffic signal timing, or instituting adaptive traffic signalization, would be a particularly effective usage of an intelligent transportation system.	No road improvements are planned for this highway. There is also minimal road improvements planed for the surrounding area.

Iowa Highway 141 - From I-80 Interchange to Just South of 1st Street (Grimes and Urbandale)



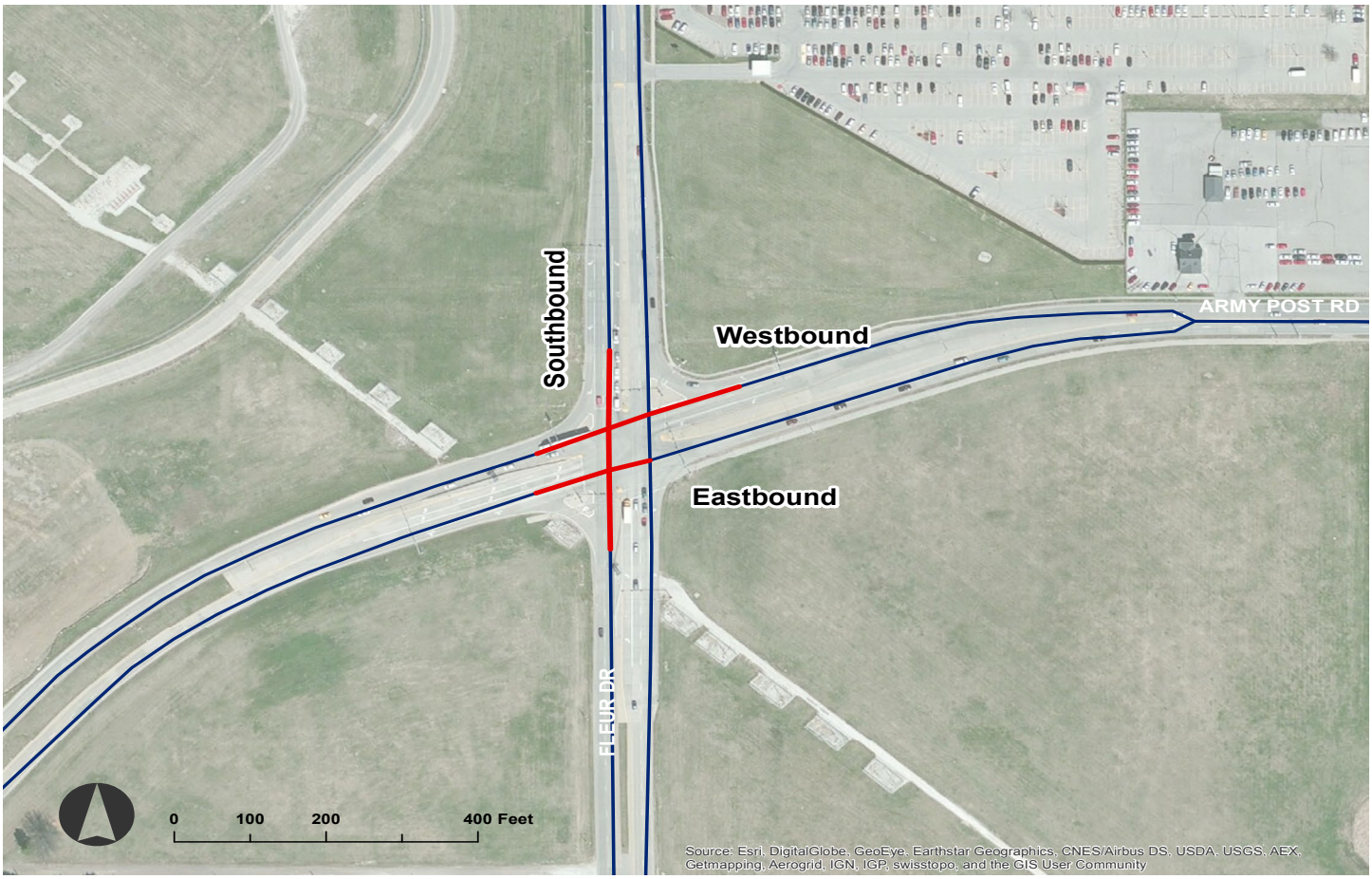
Summary of Conditions and Congestion	Congestion Measures
Highway 141 in Grimes is primarily surrounded by retail and office commercial as well as some industrial properties and single family residential. Congestion is confined to the northbound lanes of Iowa 141, however with the growth of the area there has been numerous intersections installed that has been the primary cause of congestion. This roadway is considered a Principal Arterial.	Peak LOS: (1) C & D (Westbound) (2) C & B (Westbound) Peak TTI: (1) 1.51 (Westbound) (2) 1.59 (Westbound) Peak PTI: (1) 2.08 (Westbound) (2) 2.71 (Westbound)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Intersections are the main cause of congestion on this road, as well as the configuration of the I-80/35 ramp. Access management is also an issue, but most accesses are via signalized intersections, so limiting additional intersections on the highway would help with future congestion. Adaptive traffic signalization would help ease congestion along the corridor, however due to the types of land uses adjacent to the highway and the increase in intersections present, any solution that would be given would not be as effective as eliminating some intersections that are already there.	The I-80/35 interchange will eventually be reconfigured to help ease congestion. There is no current timetable for the project, but it is expected to be finished within the next decade. Also, there are several planned projects that will widen 141 from 4 to 6 and from 6 to 8 lanes by 2020 and 2050 respectively. These projects will include additional traffic signalization and traffic sign improvements.

Jordan Creek Parkway and Ashworth Road Intersection (West Des Moines)



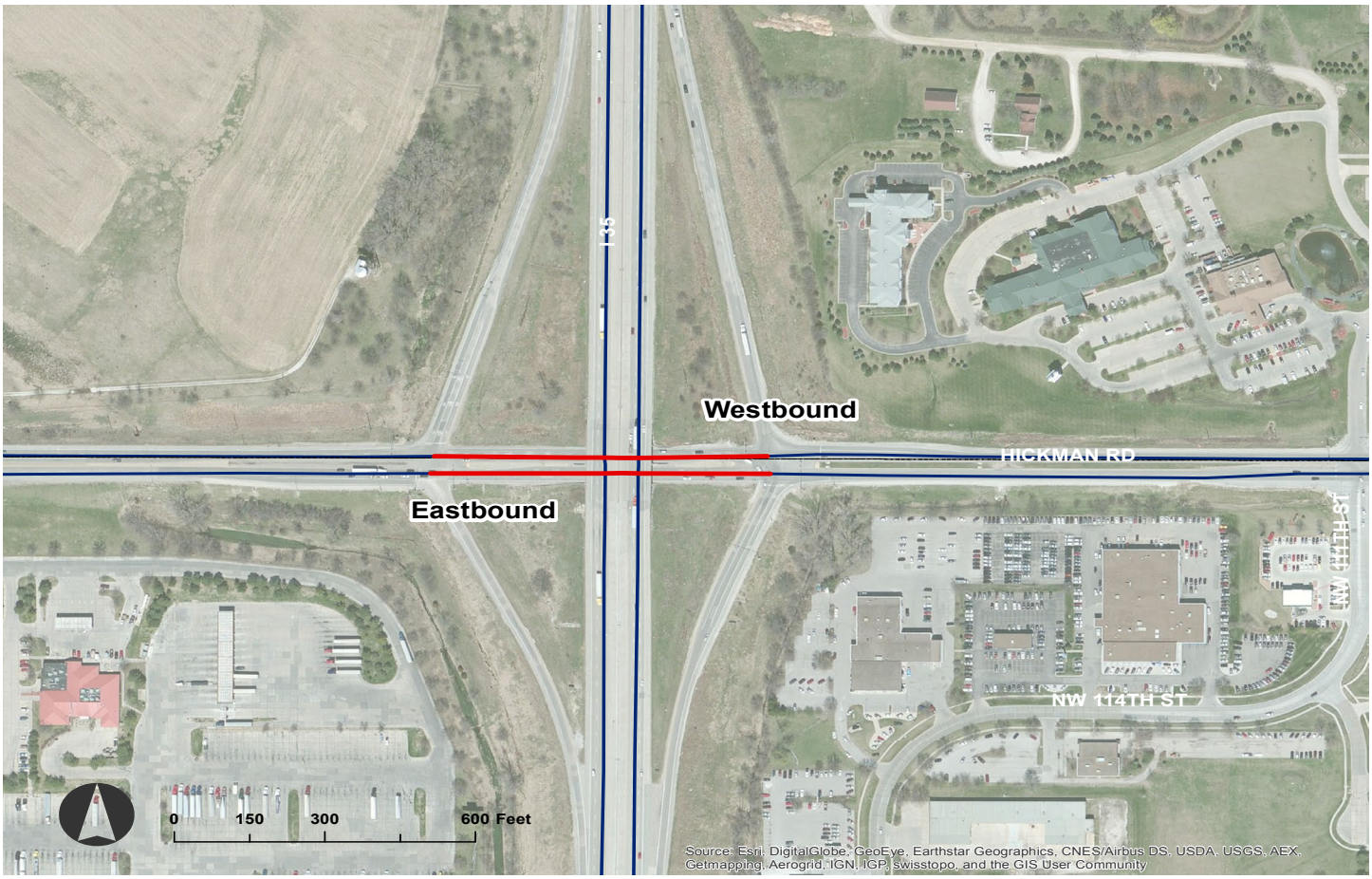
Summary of Conditions and Congestion	Congestion Measures
There are several types of land uses around, including several commercial properties, but the area is predominantly single family housing. There are also several large churches, including Lurtheran Church of Hope and St. Francis of Assini Catholic Church. There is also an agricultural presence as several nearby fields are still tilled and planted. Ashworth west of Jordan Creek is a Major Collector and east is a Minor Arterial. Jordan Creek Parkway is Principal Arterial.	Peak LOS: N/A Peak TTI: 1.70 Peak PTI: 2.50
Potential Solutions	**Planned Improvements in LRTP & TIP**
This segment is very small, 0.004 miles, or 21 feet. Considering that the surrounding area is not considered congested there may not be much that needs to be done. In particular, West Des Moines has been introducing adaptive traffic signalization and it has been working well, so beyond what the city is already doing there is not much that could, or should, be done.	Ashworth Road, from this intersection west, is expected to expand from 2 to 5 lanes by 2030.

Fleur Drive and Army Post Road Intersection (Des Moines)



Summary of Conditions and Congestion	Congestion Measures
The surrounding area is mostly empty land, however this intersection connects the south part of Des Moines to the airport to the north, Iowa 5 to the south, and West Des Moines to the west. There is also limited commercial property to the north, south, and east, but beyond that is primarily single family residential. Fleur Drive is a Principal Arterial and Army Post is a Minor Arterial.	Peak LOS: N/A (South, West, and East) Peak TTI: 1.51 (South) 1.72 (West) 1.71 (East) Peak PTI: 2.53 (South) 2.69 (West) 2.57 (East)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Intersection flows fluctuate by direction throughout the day and implementing ITS infrastructure such as adaptive traffic signalization would help ease congestion at this intersection. A more cost effective measure would be to review the current signal timing and adjusting it based on time of day.	Plans for Fleur Drive from this intersection north are to rebuild the road, while keeping it 4 lanes, that goes beyond traditional maintenance. A off-road trail is also planned to be added by 2030 that would follow Army Post Road.

Hickman Road - Underneath I-80/35 (Urbandale and Clive)

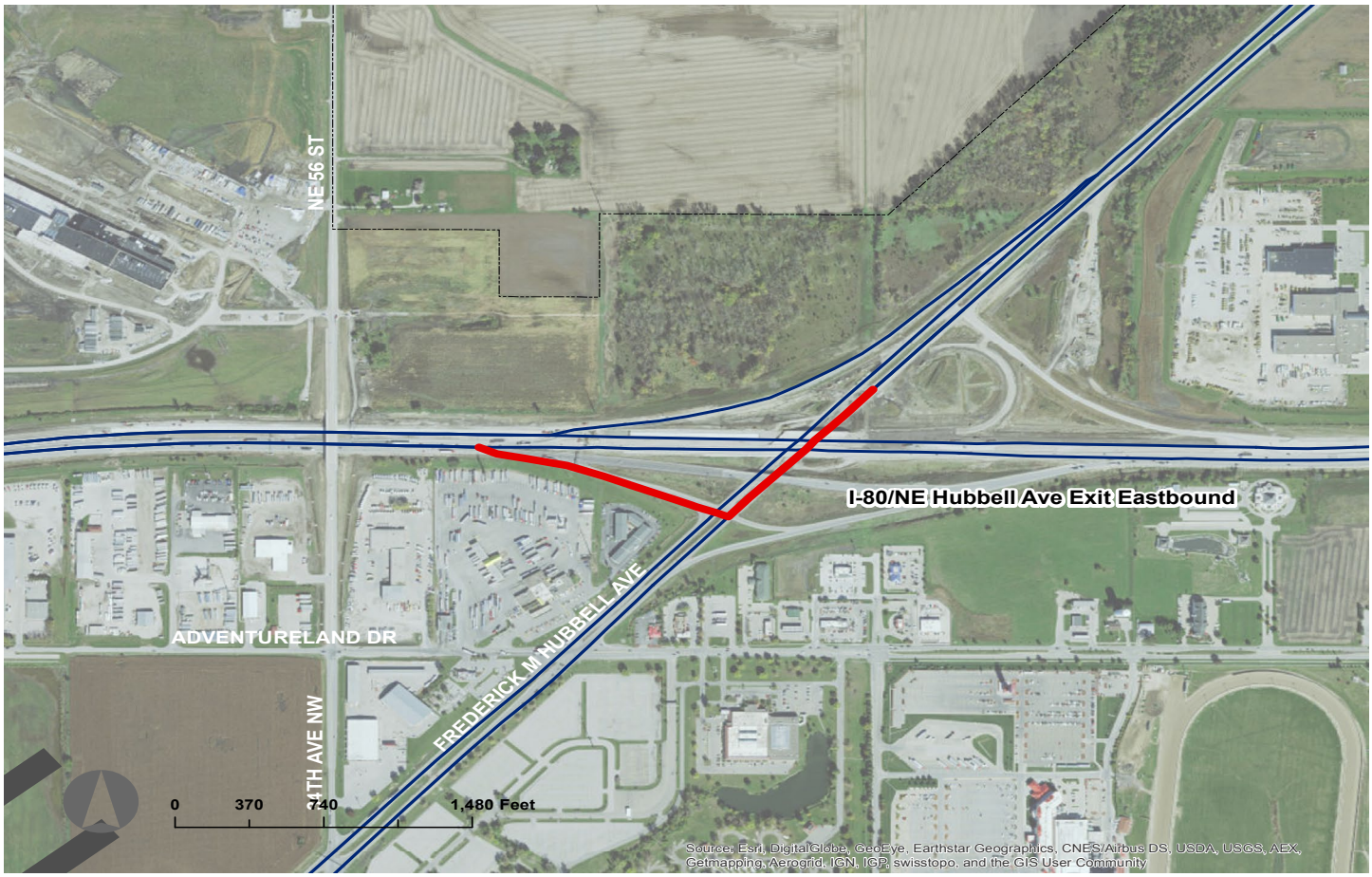


Summary of Conditions and Congestion	Congestion Measures
The surrounding area consists mostly of retail commercial properties, with areas to the southwest and southeast being single family residential. A unique landuse just north of this intersection is Living History Farms, a 500 acre open-air museum with volunteers dressing and acting like people would have throughout Iowa's history. This roadway is considered a Principal Arterial.	Peak LOS: E (West & East) Peak TTI: 1.64 (West) 1.61 (East) Peak PTI: 3.00 (West) 3.11 (East)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Many of the issues related to congestion on this road segment are related to the I-80/35 intersection. Intelligent Transportation System upgrades at the intersections and ramp metering along the interstates should help ease congestion on this stretch of road.	This interchange is slated to be reconfigured, most likely as a diverging diamond, by 2030. Hickman is also going to be widened from 4 to 6 lanes by 2030 as well.

E Broadway Ave and Hubbell Avenue Intersection (Des Moines)

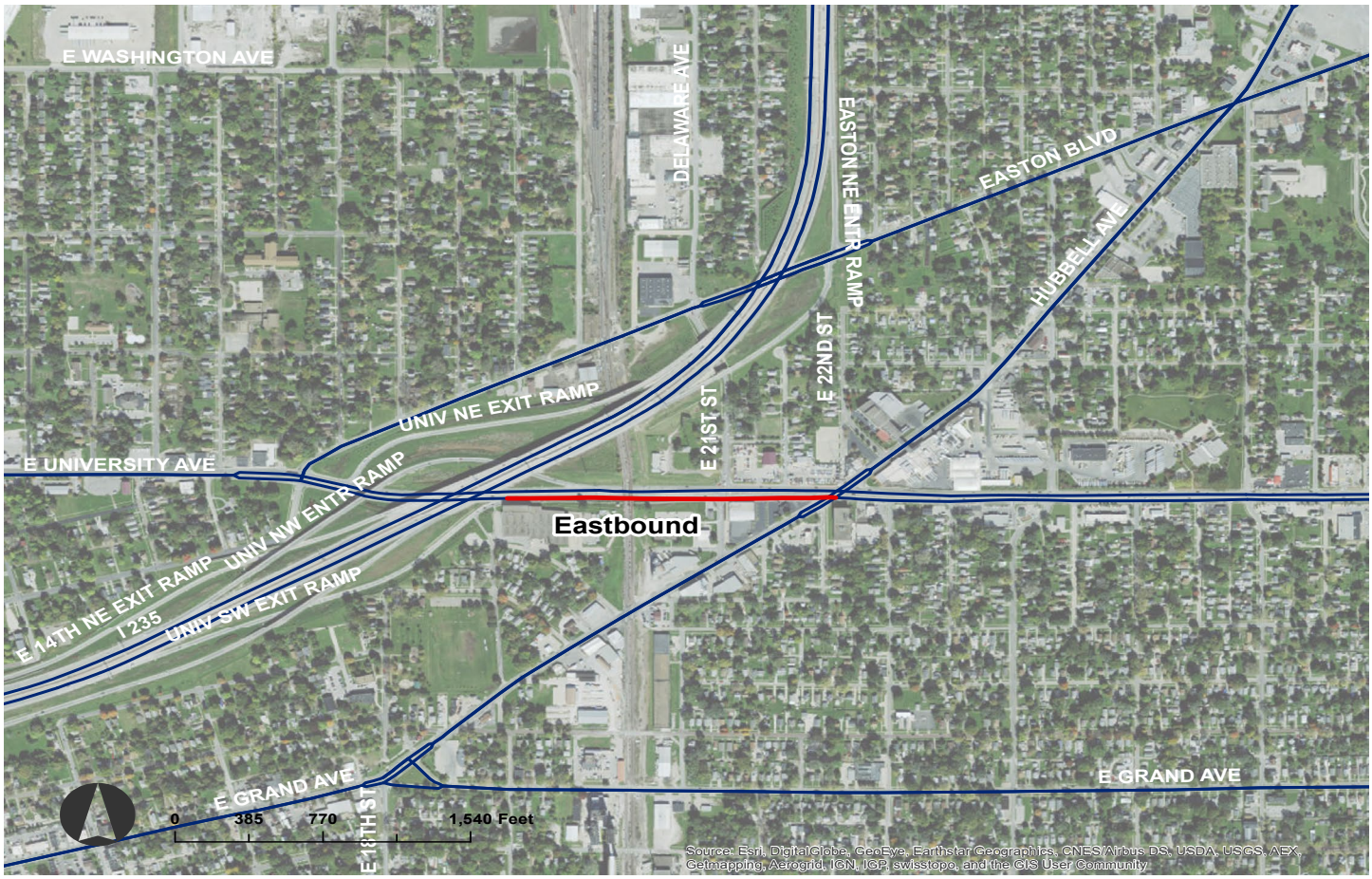
Summary of Conditions and Congestion	Congestion Measures
The surrounding area is a mix of commercial, single family residential, and agriculture. This road segment also connects to Hubbell Avenue/US 6 and US 65. This intersection is somewhat unique in its configuration, and also is popular because it connects eastern parts of Des Moines to Pleasant Hill and Altoona. This roadway is considered a Minor Arterial.	Peak LOS: B Peak TTI: 1.60 Peak PTI: 3.18
Potential Solutions	**Planned Improvements in LRTP & TIP**
Other legs of the intersection are not congested, so intersection improvements to move traffic eastbound more quickly will improve congestion. Installing a roundabout or using an Intelligent Transportation System are potential solutions to this congestion issue.	The Hubbell Avenue to E Broadway Avenue turn lane may see a Bus Rapid Transit route by 2040.

Hubbell Avenue and I-80 Interchange (Altoona)



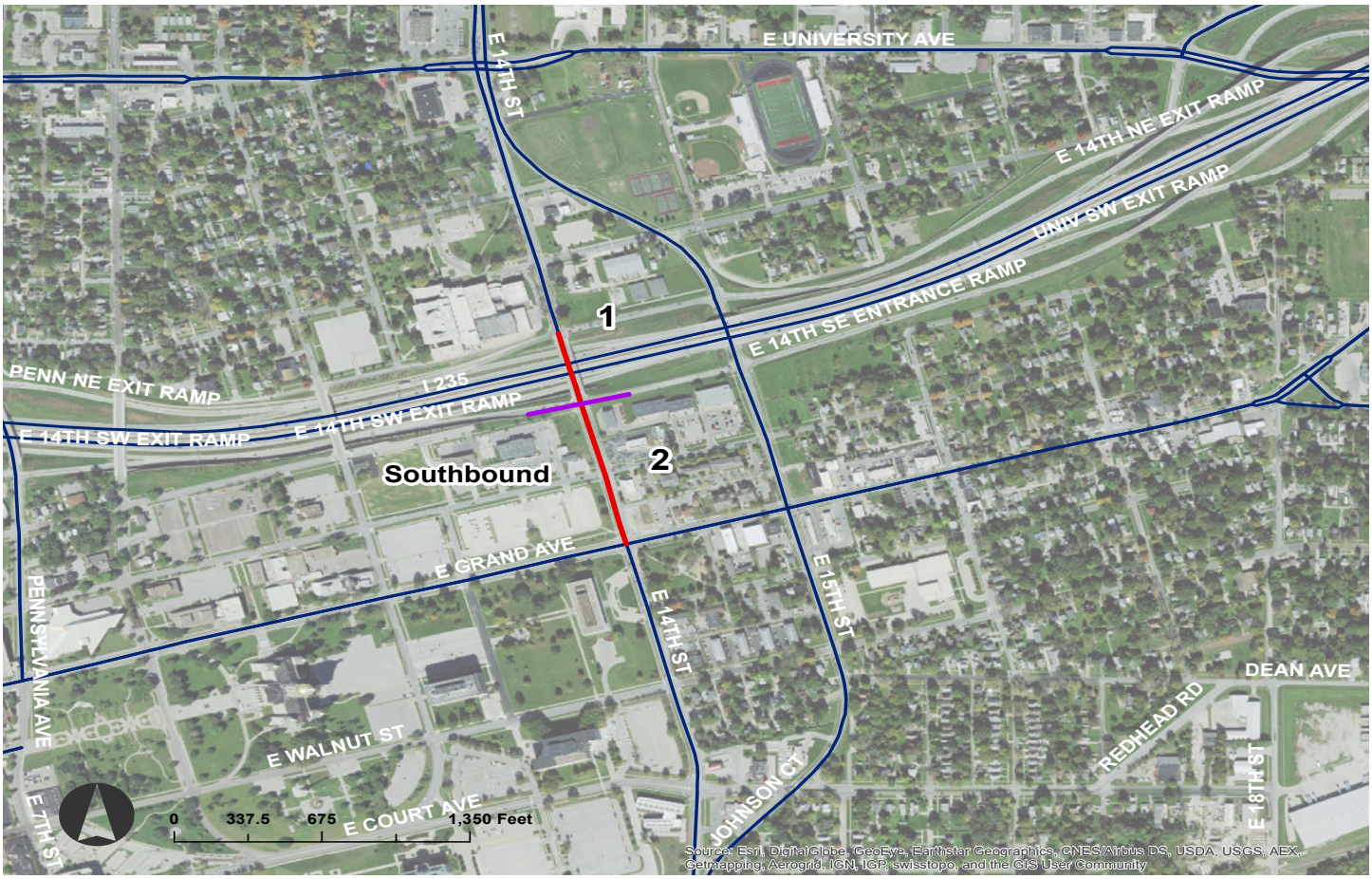
Summary of Conditions and Congestion	Congestion Measures
The area south of I-80 is mostly commercial properties and has agricultural fields to the north. The Facebook data centers are located just to the northwest and the Adventureland theme park is to the south. The eastbound leg of the I-80 off ramp and northeast part of Hubbell Avenue is considered congested, while no other legs are considered congested Hubbell Ave going southwest ending at the eastbound offramp is close, with a travel time index of 1.43. Hubbell Avenue is a Principal Arterial while I-80 is an Interstate.	Peak LOS: B & A Peak TTI: 1.84 Peak PTI: 2.77
Potential Solutions	**Planned Improvements in LRTP & TIP**
Intersection upgrades that include intelligent transportation systems infrastructure and ramp metering along I-80 would help reduced congestion on this road segment. Planned reconfiguration of the ramp will also help ease congestion.	This ramp is slated for reconfiguration by 2020.

East University Avenue - From I-235 to Hubbell Avenue (Des Moines)



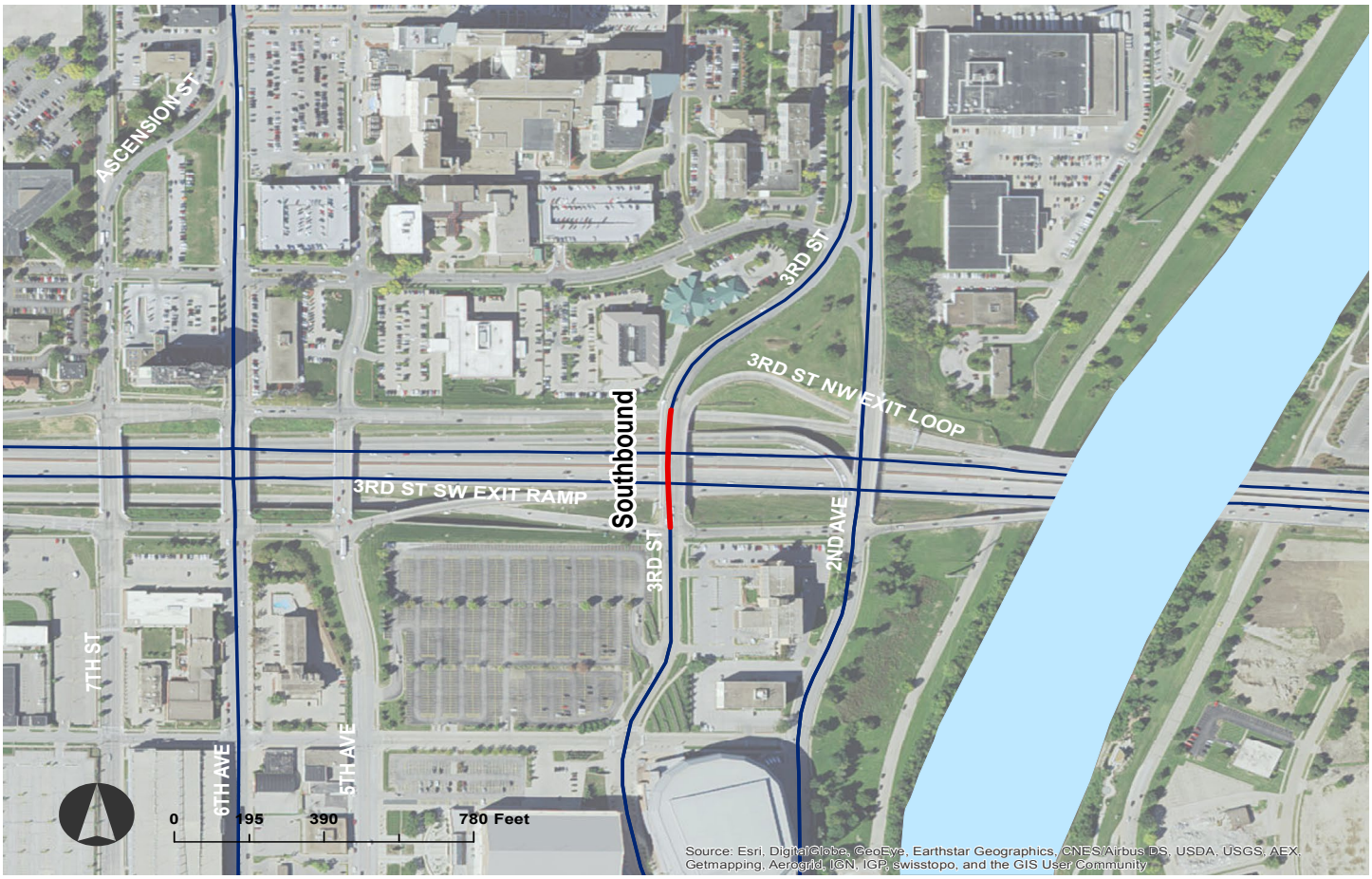
Summary of Conditions and Congestion	Congestion Measures
The eastbound section of E University has mostly commercial property along the corridor, with single family residential the primary land use type in the surrounding neighborhoods. No other parts of the network are congested, but the primary issues appear to be the off-ramp from I-235 that has short merging lanes and then there are several intersections along the corridor. This roadway is considered a Principal Arterial.	Peak LOS: B Peak TTI: 1. 56 Peak PTI: 2.69
Potential Solutions	**Planned Improvements in LRTP & TIP**
Reconfiguration of the interchange by adding longer merging lanes would be helpful. Utilizing intelligent transportation systems at intersections, in conjunction with ramp metering and monitoring, would ease intersection backup on this road segment.	The East University to and up Hubbell Avenue may see a Bus Rapid Transit route by 2040.

East 14th Street - From Just North of I-235 to East Grand Avenue (Des Moines)



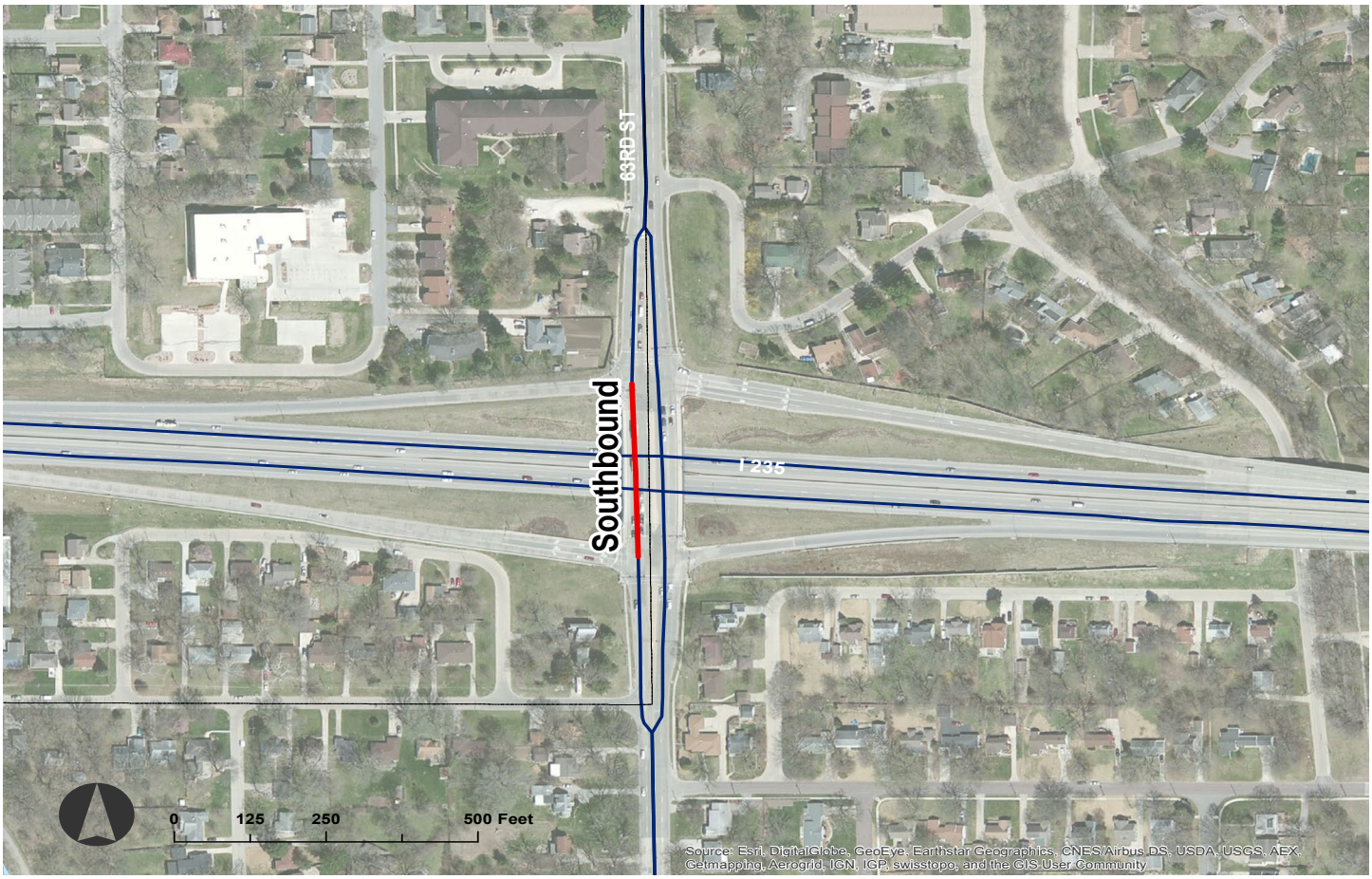
Summary of Conditions and Congestion	Congestion Measures
This section of East 14th Street is primarily surrounded by commercial property and single family residential in the surrounding neighborhood, including East High School to the northeast. The primary cause of congestion are the intersections caused by the I-235 entrance and exit ramps. This roadway is considered a Principal Arterial.	Peak LOS: B (1 & 2) Peak TTI: (1) 1. 61 (2) 1.70 Peak PTI: (1) 2.54 (2) 2.62
Potential Solutions	**Planned Improvements in LRTP & TIP**
Utilizing intelligent transportation systems at intersections, in conjunction with ramp metering and monitoring, would ease congestion as they are the major cause of traffic disruption.	East 14th Street north of I-235 will see a widening from 4 to 5 lanes by 2050, as well as other road improvements and maintenance.

East 3rd Street - From the I-235 Westbound Exit Ramp and School Street (Des Moines)



Summary of Conditions and Congestion	Congestion Measures
East 3rd Street is surrounded by parking lots, downtown businesses, and the Mercy Hospital complex. It is also connected to I-235 via exit and entrance ramps. This road section is bounded by these ramps, which are the major source of congestion. This roadway is considered a Principal Arterial.	Peak LOS: C Peak TTI: 1.58 Peak PTI: 2.19
Potential Solutions	**Planned Improvements in LRTP & TIP**
Utilizing intelligent transportation systems at intersections, in conjunction with ramp metering and monitoring, would ease congestion as they are the major cause of traffic disruption.	No major transportation projects are planned for this road segment and surrounding area.

63rd Street - From the I-235 North and South Exit/Entrance Ramps (Windsor Heights)

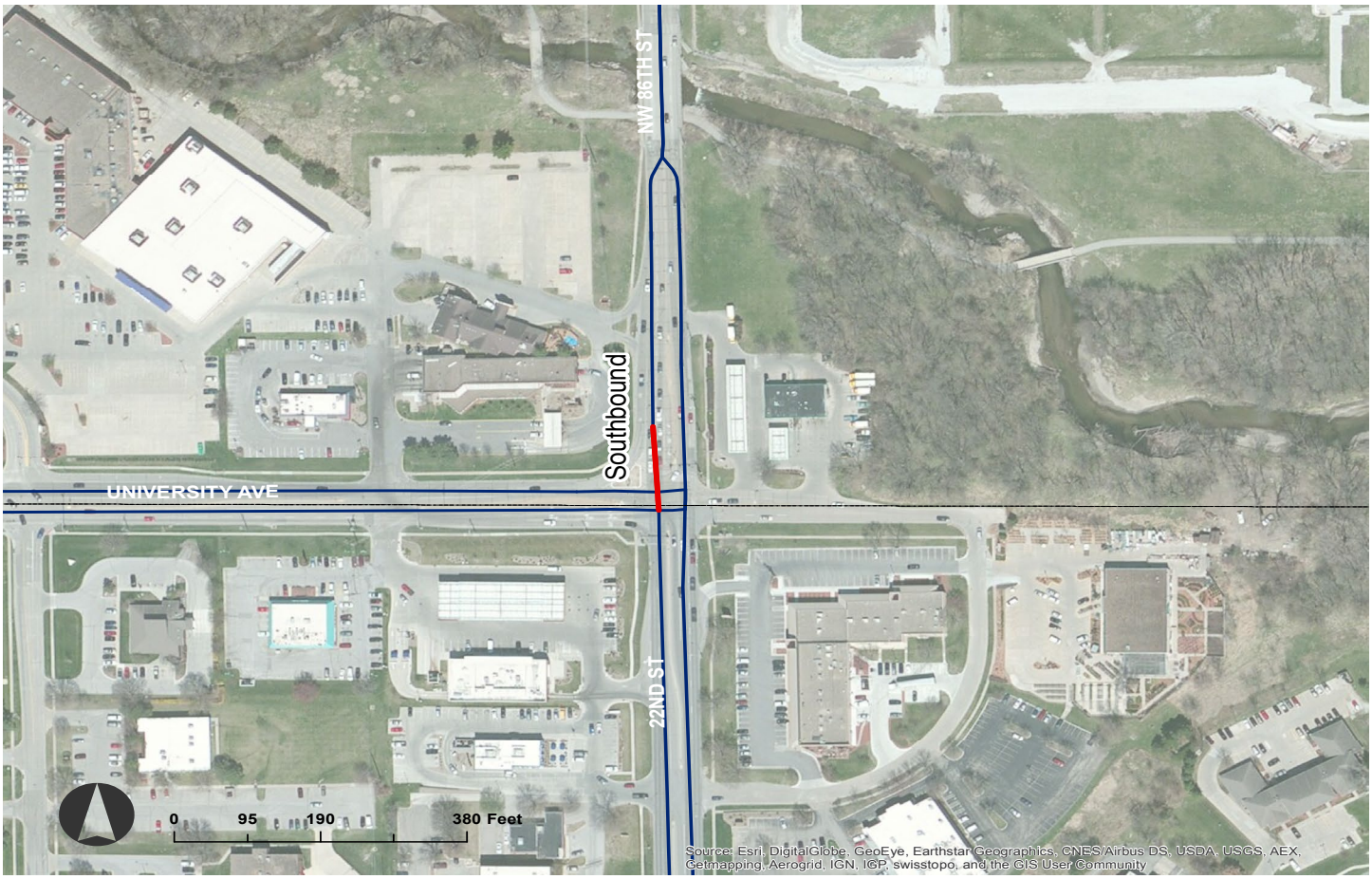


Summary of Conditions and Congestion	Congestion Measures
63rd Street is surrounded by single family residential properties, with some apartment complexes nearby. It is also connected to I-235 via exit and entrance ramps. This road section is bounded by these ramps, which are the major source of congestion. This roadway is considered a Principal Arterial.	Peak LOS: E Peak TTI: 1.61 Peak PTI: 2.38
Potential Solutions	**Planned Improvements in LRTP & TIP**
Utilizing intelligent transportation systems at intersections, in conjunction with ramp metering and monitoring, would ease congestion as they are the major cause of traffic disruption.	63rd from I-235 going north is expected to be widened from 2 to 4 lanes by 2050.

63rd Street - From Ashworth Road to Grand Avenue (West Des Moines and Des Moines)

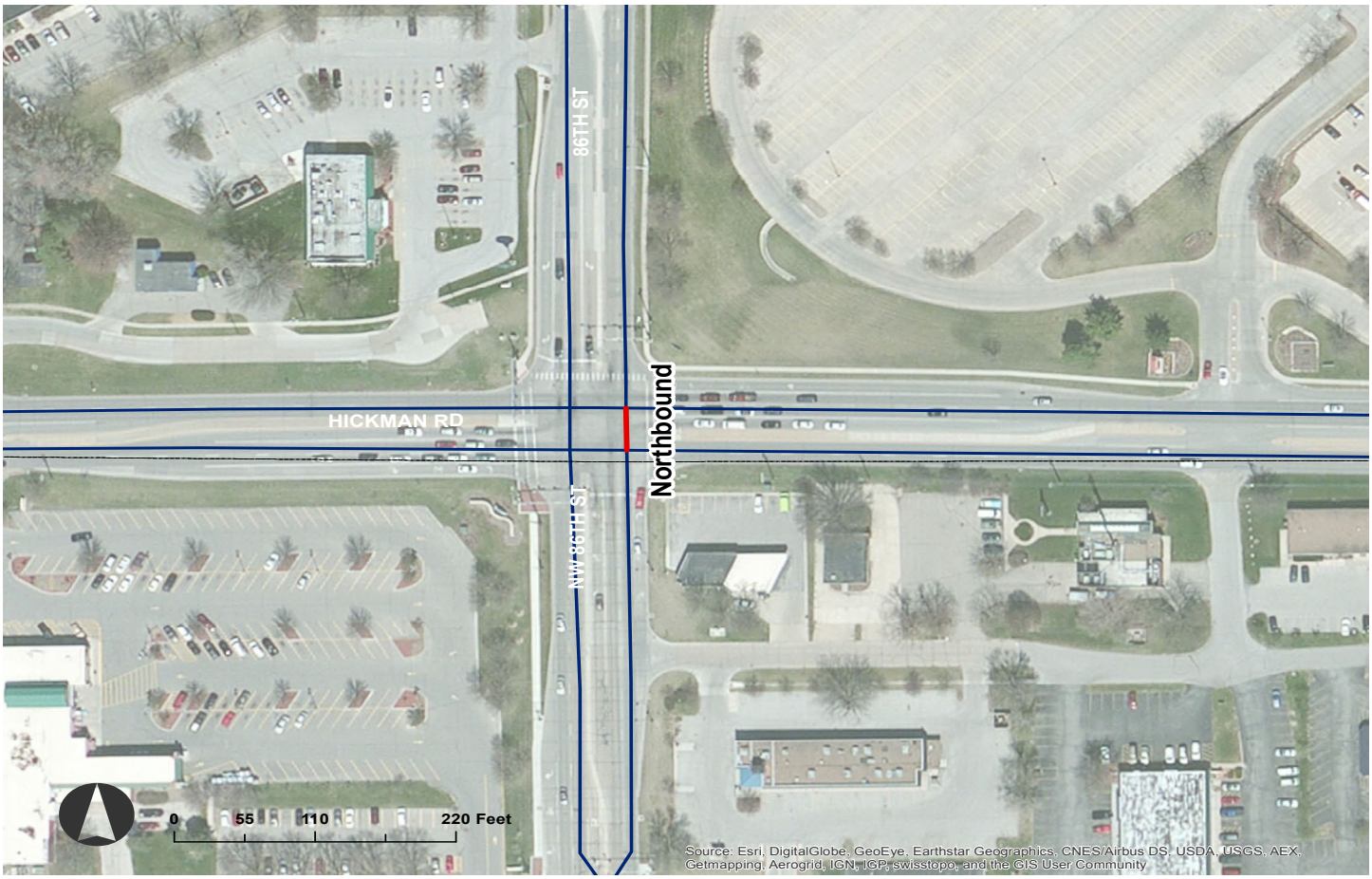
Summary of Conditions and Congestion	Congestion Measures
This section of 63rd Street is surrounded by commercial properties to the west and is bounded by Walnut Creek to the east. It is also comprised of single family residential in the surround neighborhoods. This roadway is considered a Principal Arterial.	Peak LOS: D Peak TTI: 1.59 Peak PTI: 2.67
Potential Solutions	**Planned Improvements in LRTP & TIP**
Utilizing intelligent transportation systems at intersections, such as dynamic traffic signalization, would help ease congestion for southbound traffic. More intensive possibilities include widening the roadway.	A trail and levee renovation project is planned for Walnut Creek and should take place by 2020, however this roadway is not slated to see any major projects in the future.

NW 86th Street - From North of University to University Avenue (Clive)



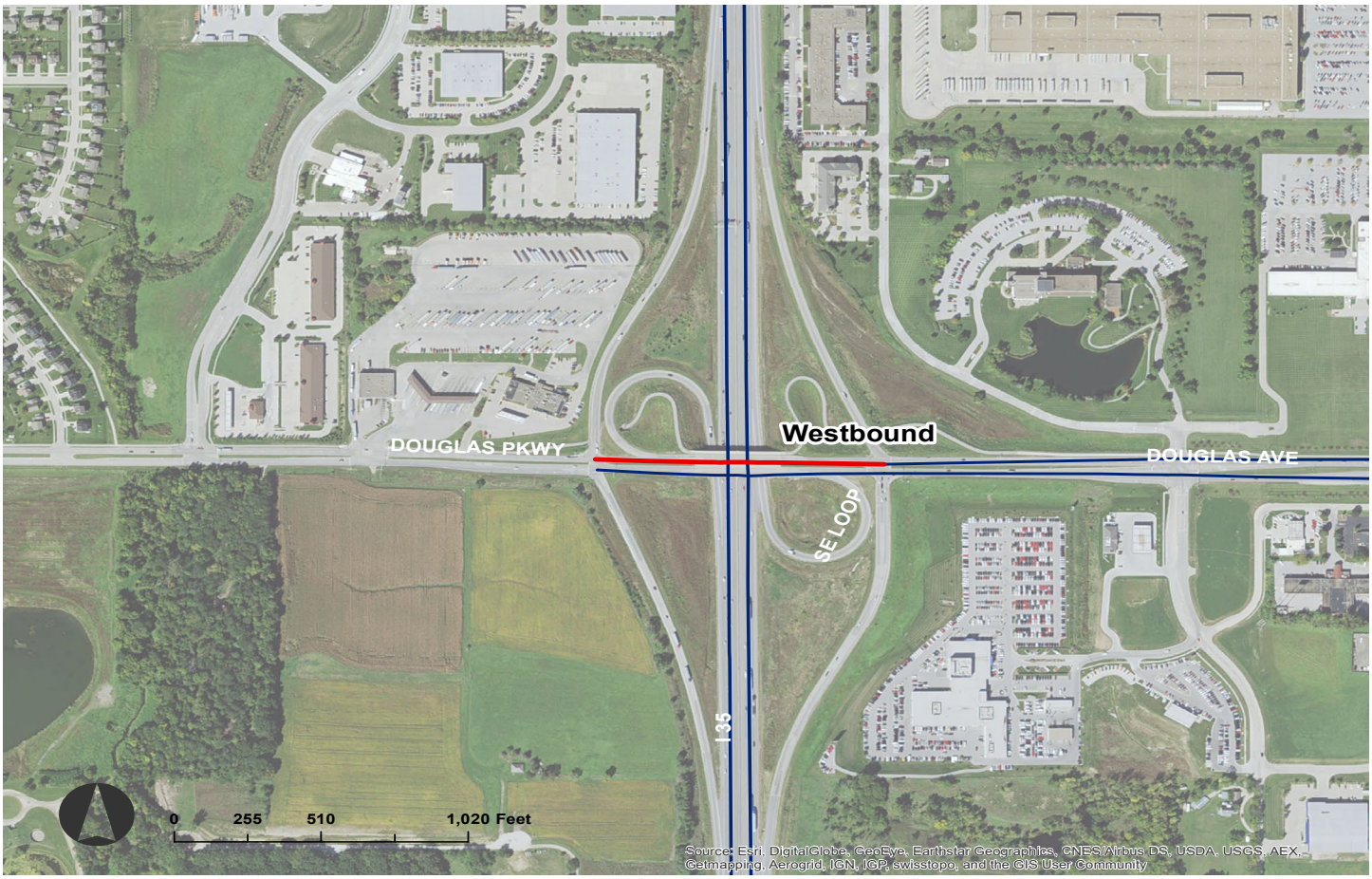
Summary of Conditions and Congestion	Congestion Measures
This section of 22nd Street is surrounded by commercial properties with some single family residential to the east. This is a major commercial corridor for the metro and connects to I-235 to the south. Also, this road serves as a connector between University Avenue and University Boulevard. This roadway is considered a Principal Arterial.	Peak LOS: C Peak TTI: 1.52 Peak PTI: 2.8
Potential Solutions	**Planned Improvements in LRTP & TIP**
Utilizing intelligent transportation systems at intersections, such as dynamic traffic signalization, would help ease congestion for southbound traffic. Since this roadway involves multiple jurisdictions, coordination amongst key players across metro communities could help alleviate congestion metro-wide.	NW 86th street is expected to widen from 5 to 7 lanes and see an extensive overlay in 2040. DART also plans to expand transit services in this area. University Avenue to the west will also see an overlay by 2050 and University Avenue to the east will be extended by 2030.

Hickman Road and NW 86th Intersection (Clive and Urbandale)



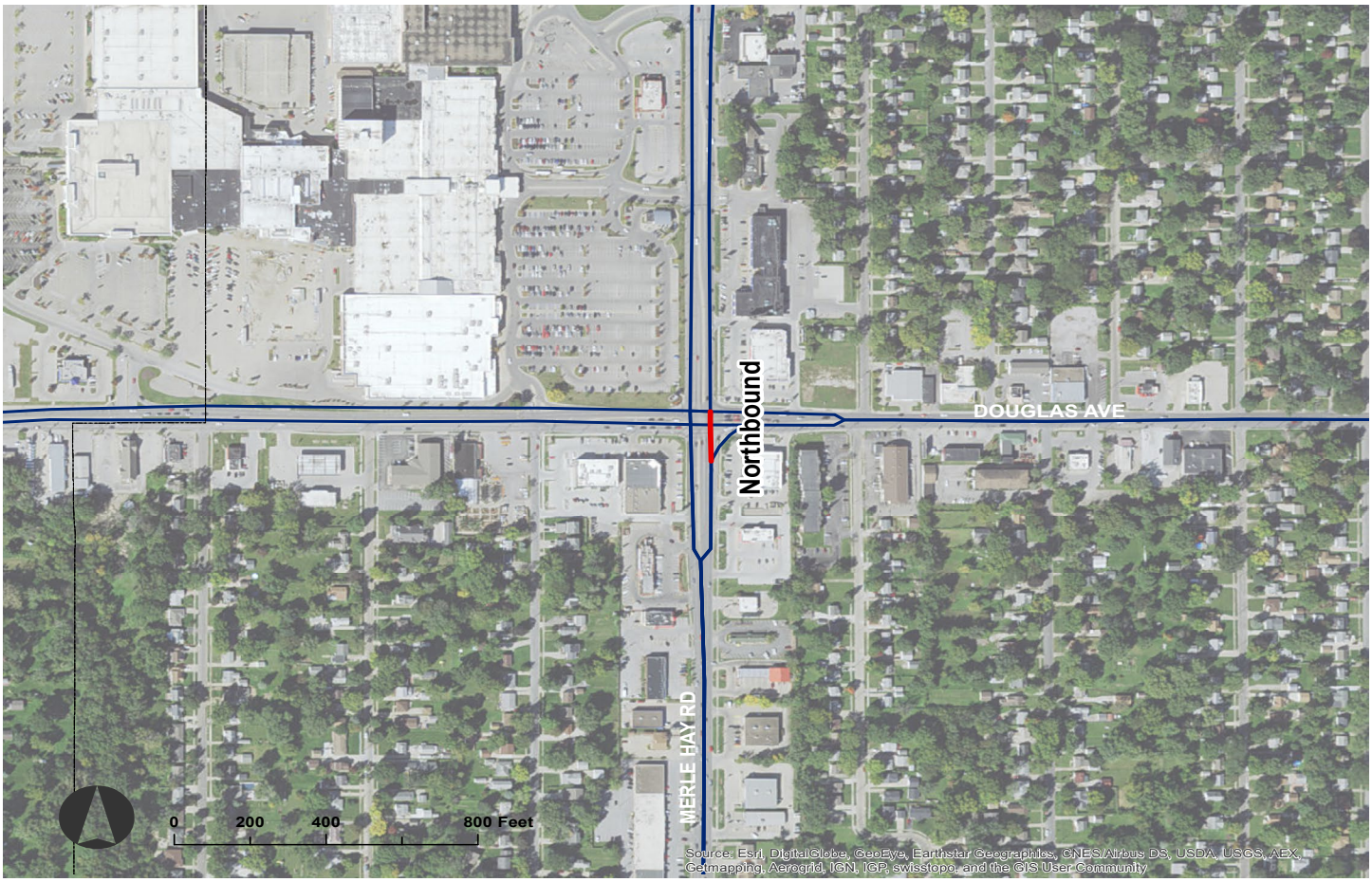
Summary of Conditions and Congestion	Congestion Measures
This intersection has primarily commercial property surrounding it, with single family residential to the southwest and multi-family residential to the northwest. This is the intersection of two major thoroughfares on the west side of the metro. This roadway is considered a Principal Arterial.	Peak LOS: NA Peak TTI: 1.52 Peak PTI: 2.82
Potential Solutions	**Planned Improvements in LRTP & TIP**
Utilizing intelligent transportations systems at intersections, such as dynamic traffic signalization, would help ease congestion for southbound traffic. Since this roadway involves multiple jurisdictions, coordination amongst key players across metro communities could help alleviate congestion metro-wide. Also, given the segments small size of 0.0075 miles, or 40 feet, there may not be much that can, or should, be done.	NW 86th street from this intersection south is expected to widen from 5 to 7 lanes and see an extensive overlay in 2040. DART also plans to expand transit services in this area.

Douglas Avenue and Parkway - Between the I-80/35 Entrance/Exit Ramps (Urbandale)



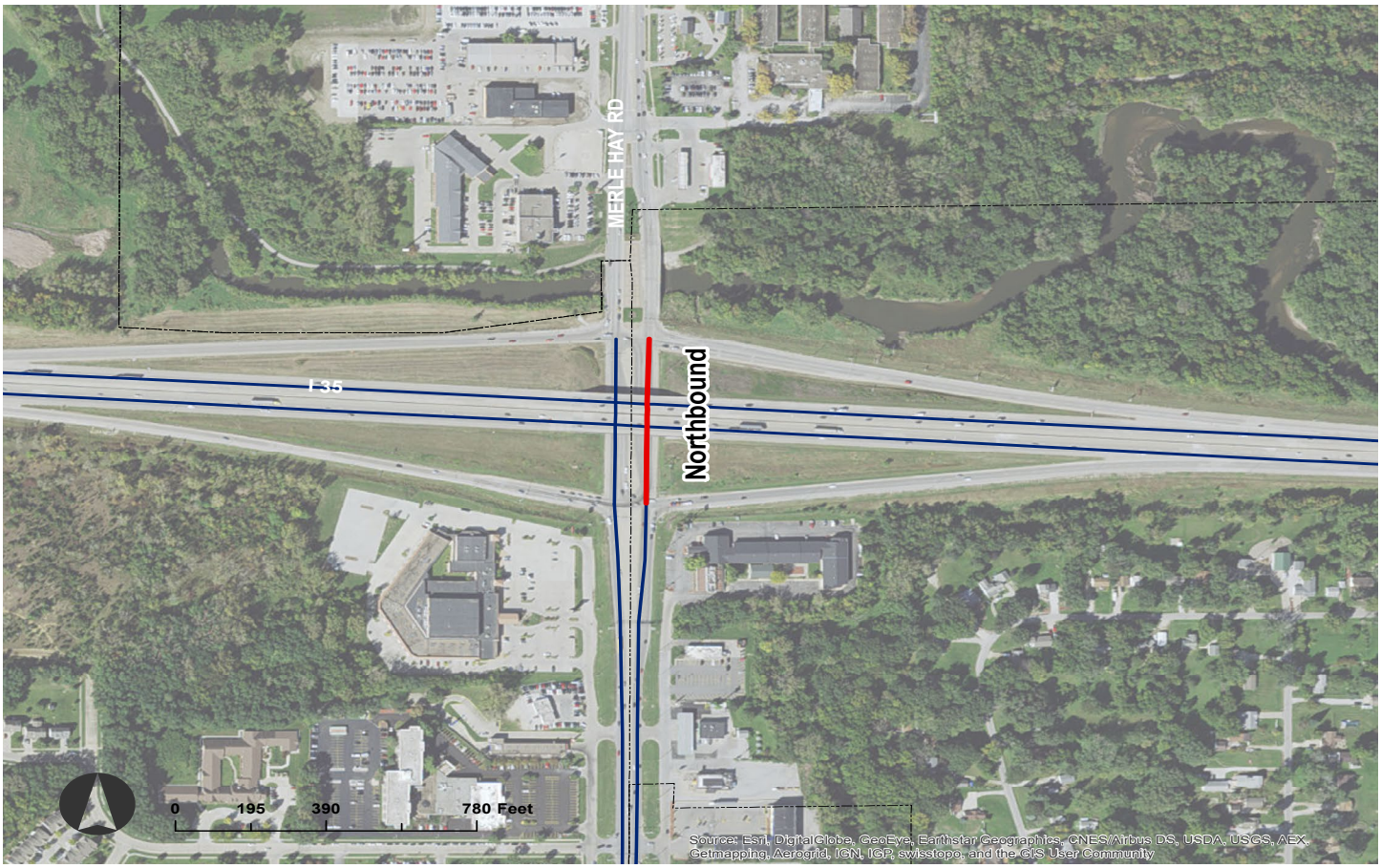
Summary of Conditions and Congestion	Congestion Measures
This intersection has primarily commercial property surrounding it. Such commercial land use is characterized by large scale limited access development. West of I-80/35 is considered a Minor Arterial while east is a Principal Arterial.	Peak LOS: NA Peak TTI: 1.52 Peak PTI: 2.82
Potential Solutions	**Planned Improvements in LRTP & TIP**
Upgrade intersections through the use of intelligent transportations systems, including dynamic traffic signalization, would help alleviate congestion. Reviewing traffic signal timing may improve congestion, depending on how long it has been since it has been looked at by city staff. A capital intense solution could be to reconfigure the interchange, however this would probably not solve all of the congestion problems.	Douglas Avenue to the east will see a street beautification project by 2020.

Douglas Avenue and Merle Hay Road Intersection (Des Moines)



Summary of Conditions and Congestion	Congestion Measures
This intersection has primarily commercial property surrounding it. One of the 4 major shopping centers is located on the northwest corner of the intersection in Merle Hay Mall. Both of these roadways are considered Principal Arterials.	Peak LOS: NA Peak TTI: 1.62 Peak PTI: 3.62
Potential Solutions	**Planned Improvements in LRTP & TIP**
Upgrade this and surrounding intersections through the use of intelligent transportations systems, including dynamic traffic signalization, would help alleviate congestion. Since this area has a major destination improving transit access and use may also help ease congestion.	Douglas Avenue is slated to see a Bus Rapid Transit route by 2040 and Merle Hay Road from this intersection going south will see a road widening by 2030.

Merle Hay Road - Between the North and South I-80/35 Entrance /Exit Ramps (Polk County)

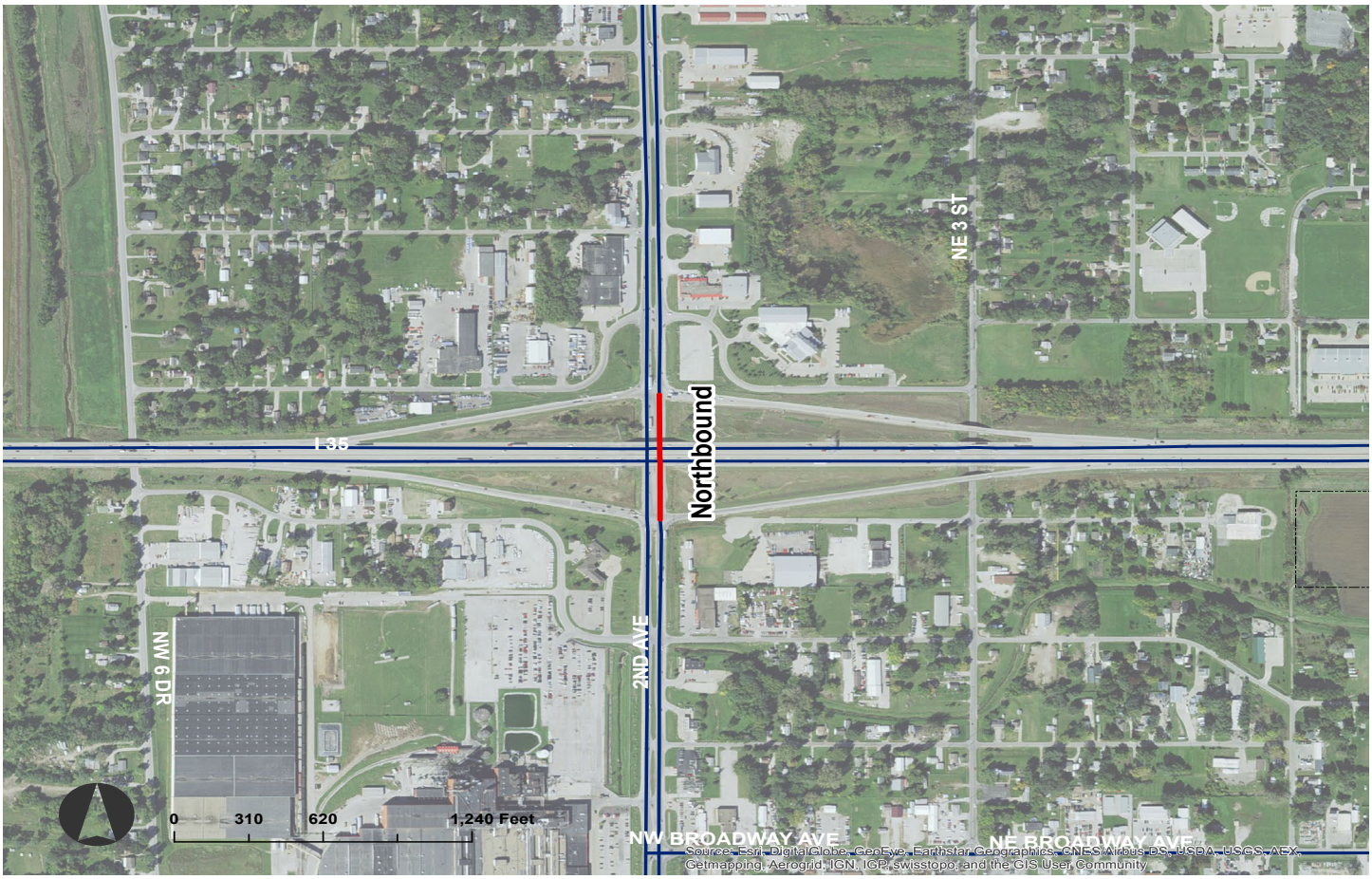


Summary of Conditions and Congestion	Congestion Measures
Merle Hay Road is surrounded by commercial property, with single family residential properties, with much of the commercial being car dealerships and related services. It is also connected to I-235 via exit and entrance ramps. This road section is bounded by these ramps, which are the major source of congestion for this road segment. North of I-80/35 is a Minor Arterial and south is a Principal Arterial.	Peak LOS: D Peak TTI: 1.52 Peak PTI: 2.70
Potential Solutions	**Planned Improvements in LRTP & TIP**
Upgrade this and surrounding intersections through the use of intelligent transportations systems, including dynamic traffic signalization with ramp metering and monitoring, would help alleviate congestion. Reviewing traffic signal timing would be a cheaper option (although less effective) than implementing dynamic technologies.	This road segment is not slated to see any improvement, however Merle Hay Road to the north will see an asphalt overlay project, including intersection/ access management improvements were necessary.

Douglas/Euclid Avenue and Martin Luther King Jr. Parkway Intersection (Des Moines)

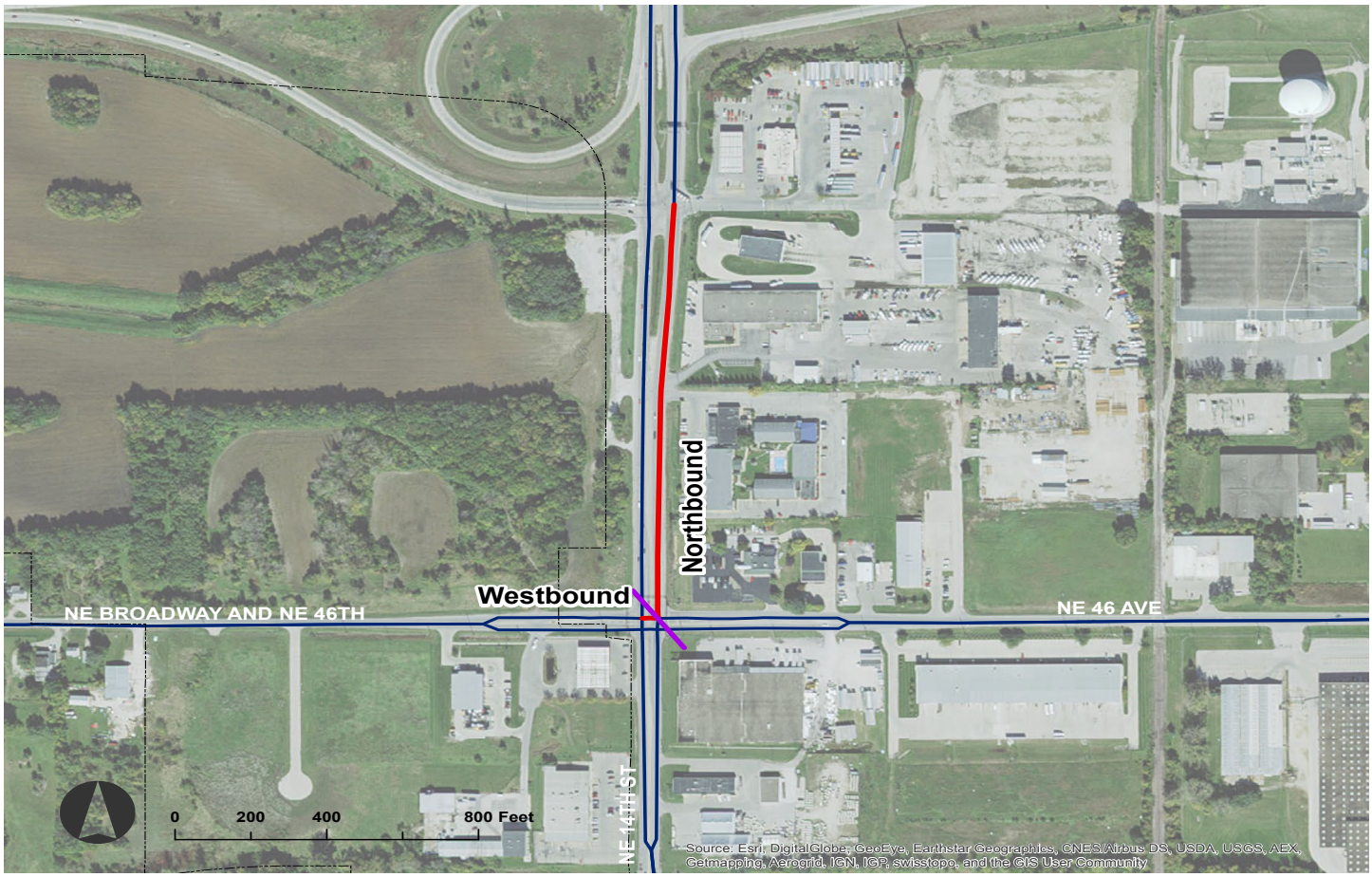
Summary of Conditions and Congestion	Congestion Measures
This intersection is surrounded by commercial property, with single family residential properties to the southwest. Additionally there is a major governmental building just northwest of the intersection. The High Trestle Trail runs by the intersection as well. This is a major intersection given that these roads are considered major thoroughfares in the metro. Both of these roadways are considered Principal Arterials.	Peak LOS: C Peak TTI: 1.63 Peak PTI: 2.33
Potential Solutions	**Planned Improvements in LRTP & TIP**
Upgrade this and surrounding intersections through the use of intelligent transportations systems, including dynamic traffic signalization with ramp metering and monitoring, would help alleviate congestion. However given the small size of this road segment, 0.039 miles (205 feet), there may not be much that can, or should, be done.	MLK from the south to this intersection will be widened from 4 to 5 lanes by 2050. MLK up to and including Douglas Avenue may receive a Bus Rapid Transit route by 2040.

2nd Avenue - From the North and South Exit/Entrance Ramps of I-80/35 (Polk County)



Summary of Conditions and Congestion	Congestion Measures
2nd Avenue is surrounded by commercial properties with the Bridgestone/Firestone plan to the southeast, a major area employer. Single family residential properties are also available to the north, east, and south. It is also connected to I-235 via exit and entrance ramps. This road section is bounded by these ramps, which are the major source of congestion. This roadway is considered a Principal Arterial.	Peak LOS: C Peak TTI: 1.66 Peak PTI: 2.50
Potential Solutions	**Planned Improvements in LRTP & TIP**
Upgrade this and surrounding intersections through the use of intelligent transportations systems, including dynamic traffic signalization with ramp metering and monitoring, would help alleviate congestion.	No improvements are planed for the interchange or 2nd Avenue.

NE 14th Street and NE Broadway Avenue (Polk County)



Summary of Conditions and Congestion	Congestion Measures
These roads are bounded by commercial properties, with the areas to the west being agriculturally farmed at this time. Congestion exists at the intersection and going northbound on NE 14th Street. NE 14th Street is a Principal Arterial and NE Broadway Avenue is a Minor Arterial.	Peak LOS: B (North and West) Peak TTI: 1.79 (North) 1.64 (West) Peak PTI: 2.92 (North) 2.18 (West)
Potential Solutions	**Planned Improvements in LRTP & TIP**
Upgrade this and surrounding intersections through the use of intelligent transportations systems, including dynamic traffic signalization, would help alleviate congestion. Creating roundabouts would also add to the capacity of this intersection. However, due to the land use types around this area, other forms of solutions such as transit are not currently feasible.	No improvements are planed for the intersection or surrounding roadways.

The Des Moines Area Metropolitan Planning Organization (MPO) has prepared this report with partial funding from the United States Department of Transportation's (DOT) Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), and in part through local matching funds provided by the MPO member governments. These contents are the responsibility of the MPO. United States Government and its agencies assume no liability for the contents of this report or for the use of its contents.