1. Introduction & Background

Purpose and Scope

This document presents the findings of a transportation assessment conducted in the Lincoln Park neighborhood of Duluth, Minnesota (see Map 1.1) from June 2014 to April 2015. It was done in conjunction with the development of a small area plan (SAP) for the neighborhood led by the Planning Department for the City of Duluth. In addition to being part of ongoing transportation planning in the Duluth-Superior metropolitan area, the findings of this study were intended to inform the policies and actions ultimately called for by the SAP.

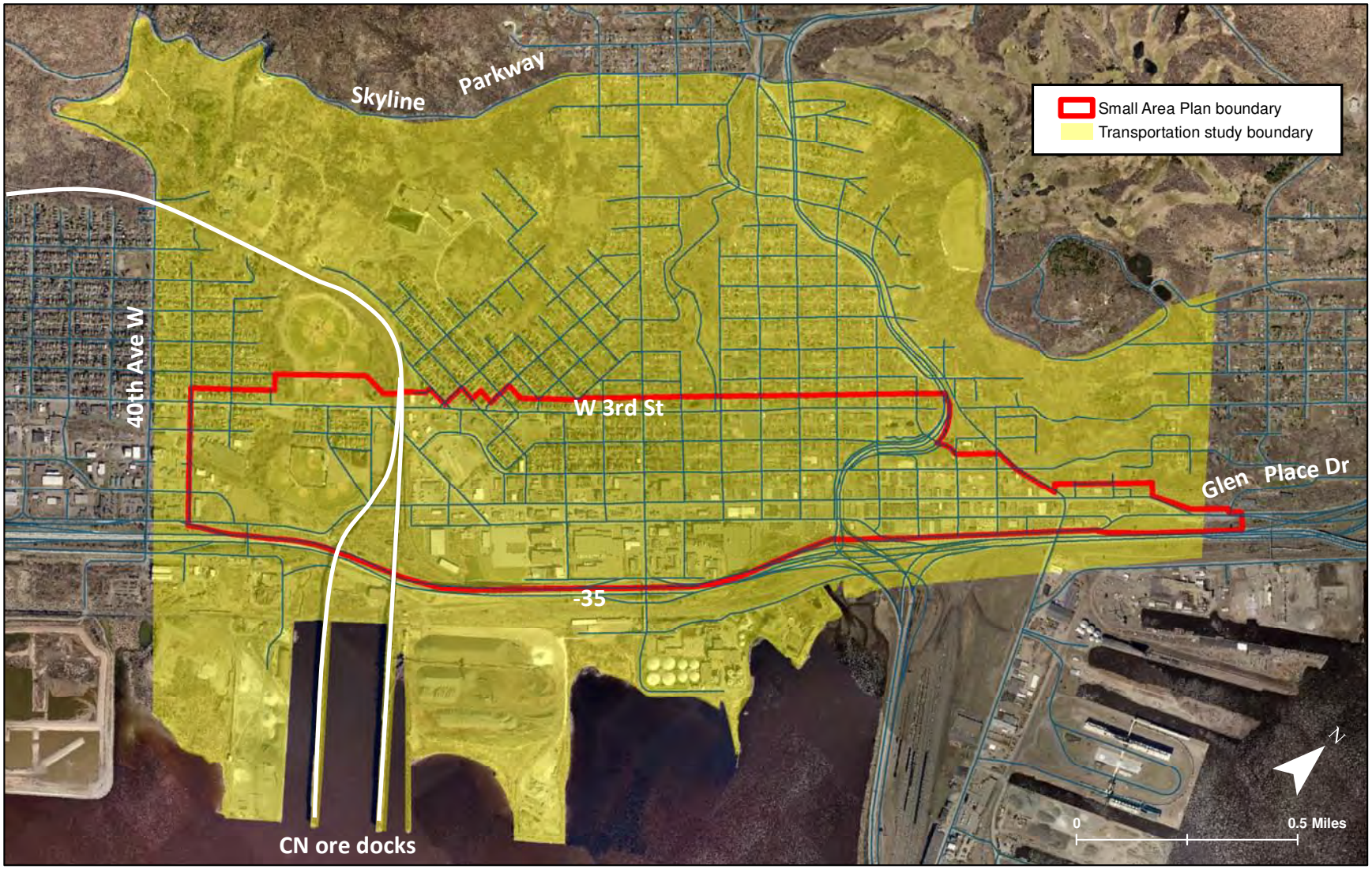
The study was undertaken to assess the issues and opportunities regarding the surface transportation assets within the neighborhood. It considered multiple modes of surface transportation: personal automobiles, commercial trucking, public transit, walking, and biking. One mode the study did not look extensively at was rail, for the reason that the rail assets in the neighborhood are privately held and would not typically be a focus of public investment. The exception to this is at-grade crossings. Only one such crossing exists in the study area (just NW of W 9th Street & 40th Avenue W), and a cursory assessment of the crossing and its crash history indicated no existing issues.

In general, the aim of the study was to identify ways in which the public transportation assets within the neighborhood can be improved for the residents, businesses, and visitors of Lincoln Park. While the city's SAP only considered a portion of the neighborhood below W 3rd Street, the area of analysis for this study encompassed the entire neighborhood, as well as the area between 40th Avenue W and the CN ore docks (see Map 1.2 on the following page). The

Image source: Bing Maps (2014)

Map 1.1 | The Lincoln Park neighborhood in Duluth, MN

This plan focuses on the approximately 2.2 square-mile neighborhood at the base of MN Highway 53, southwest of the downtown. The area is home to more than 6,300 residents and contains grade schools and the Lake Superior Community College. Several businesses exist in the neighborhood, including industrial operations near and along the waterfront of the St. Louis River.



M a p 1.2 | Study area boundaries

This transportation study looked at conditions within the area shown in yellow. The area identified by the red boundary is the focus of the City of Duluth's Small Area Plan (SAP) for the neighborhood, which was principally concerned with issues related to the existing land use regulations within that area.

larger study area was chosen in order to consider issues of accessibility and connectivity between the neighborhood's residential areas and nearby centers of commercial, employment, and recreational activities.

The Planning Context

The study was conducted from the combined vantage of three planning perspectives: multi-modal integration, optimizing public investment, and identifying future opportunities.

A "multi-modal" perspective:

The Federal Highway Administration (FHWA) defines "multi-modal" as, "the availability of transportation options using different modes within a transportation system or travel corridor."[1] Although FHWA's definition emphasizes the availability of transportation options, this study also considers the subject of multi-modalism to include aspects of connectivity, integration, mobility, and the safety of such options.

A "public investment" perspective:

The City of Duluth has 28 different neighborhoods that span over an 87 square mile area. It likewise manages a large network of public transportation utilities and maintains over 400 miles of city streets and roadways, more than 400 miles of sidewalks, and 2 miles (and growing) of paved, off-street trails. In addition, it helps finance a transit service that serves a network of more than 150 miles of transit routes, all while facing increasing maintenance costs alongside a revenue stream that has remained virtually flat year after year. This reality remained a principal consideration while performing work on this study, and it influenced how the information and final recommendations of the study are being presented in this document.

A "future opportunities" perspective

Lastly, the study was carried out in the interest of identifying potential opportunities to strengthen multi-modal connections and enhance multi-modal options within the neighborhood in the coming years. This includes opportunities to create new connections and to expand existing networks in ways that could accomplish multiple community objectives. While it is understood that not all such opportunities can be pursued, it is hoped that the findings of this study will call the attention of city staff and community stakeholders to the "menu" of possible actions which they can further investigate, prioritize, and pursue in future planning efforts.

Image source: MIC (2014)

Figure 1.1 | US Highway 53 overpass at 22nd Avenue W

This image exemplifies the multiple perspectives from which this study was approached. The recently constructed Cross City Trail intersects existing streets and travels through the footprint of the "Can of Worms" overpass, which will need to be replaced in less than 20 years. In what ways can the planning for, integration of, and investment in these public infrastructure be optimized?

Study Objectives

While the broader goal of this study has been to improve the public transportation assets in Lincoln Park in ways that capitalize on opportunities, support multi-modalism, and optimize public investment, the study was also conducted to achieve the following planning objectives specifically:

1. Identify ways to **improve access** to public transportation assets for residents, businesses, and visitors within the study area.
2. Recommend ways that future investments **increase transportation choices** for residents, businesses, and visitors within the study area.
3. Identify ways to **create or improve connections** among existing assets that better **integrate the various modes** of transportation.
4. Uncover opportunities to better utilize or make improvements to public assets in ways that **achieve greater transportation efficiencies** in terms of operations and/or maintenance.
5. Seek to **improve transportation safety** by identifying any existing hazards or potential conflicts that might be addressed through improvements to existing transportation assets.
6. Identify ways to **enhance economic and social vitality** through improvements to the existing transportation assets in the study area.
7. **Support social and environmental justice** by calling attention to ways that existing or future public transportation assets and services might disproportionally impact low-income or minority populations within the metropolitan area.

Study Limitations

This study was subject to limitations regarding both time and financial resources. As scoped, the project was conducted within a year, with limited staffing, and relied primarily on existing data produced by secondary sources. As a consequence, support for some findings is stronger than others and is the reason that a number of the study's recommendations call for additional monitoring or the gathering of additional data.

2. Stakeholder Input

This chapter describes the process that was used to achieve meaningful stakeholder involvement in the Lincoln Park Multimodal Transportation Study and its eventual recommendations. It provides a record of the stakeholder engagement activities that the MIC participated in and a summary of the various input received from those efforts.

Coordinated Engagement

Because the MIC carried out this study concurrent with the City of Duluth's development of a Small Area Plan (SAP) for the neighborhood, there was a opportunity to collaborate stakeholder engagement efforts between staff from the MIC and staff of the City of Duluth Planning Department. The MIC was, therefore, able to use the city's SAP stakeholder committee in addition to its own Transportation Advisory Committee (TAC) to help steer its study activities. This allowed for a unique model of information exchange between the planners and public officials involved in the two different initiatives, and the neighborhood residents, business interests, transportation professionals, and elected officials. (Figure 2.1).

The coordination between the MIC's study and the city's SAP process helped to keep the exchange of information and ideas current, regular, and meaningful between the two initiatives. It also provided greater convenience and minimized confusion for stakeholders in terms of disseminating information and public notices. Within this framework, the MIC was able to engage stakeholders with transportation-specific information and gather transportation-specific input while creating and retaining links to

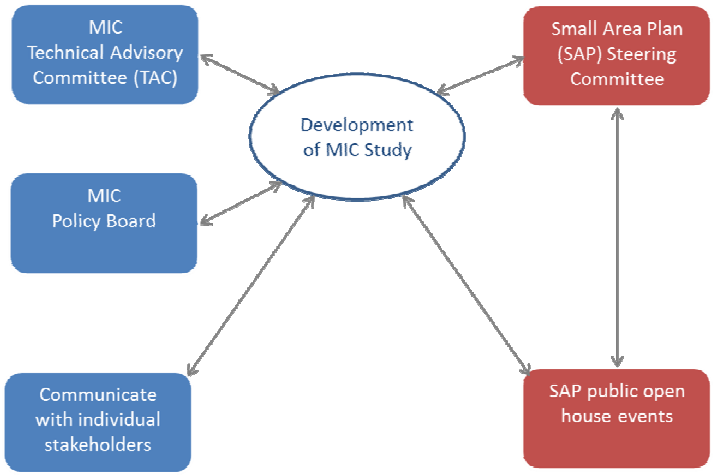


Figure 2.1 | Coordinated stakeholder engagement model

The study process was designed to facilitate multiple paths of information sharing between public officials, transportation professionals, neighborhood stakeholders, and elected representatives.

the other community concerns and objectives established through the SAP process.

Project Advisory Committees

The City of Duluth Planning Department established a 17 member committee made up of various public and private interests to help steer the development of its Lincoln Park Small Area Plan (SAP). Table 2.1 lists the entities that participated in monthly SAP meetings to help steer the development of the city's SAP plan. The MIC engaged this same group with reports on the progress and findings of its study. The unique experiences and expertise of these various stakeholders provided insight that helped to direct and refine study activities. The SAP members also helped to vet recommendations that the MIC eventually put forth based findings of the study.

The MIC also used its own TAC as a second body to help steer the progression of the study. This group consists of transportation planning and engineering professionals from the region, whose expertise was used to help guide the study from a technical perspective. The organizations represented on the TAC are listed in Table 2.2.

MIC Stakeholder Engagement Strategy

Beyond the collective insight and expertise of the two advisory committees described above, the MIC staff sought to also engage a broad range of other groups with an interest or stake in transportation and land use issues within the Lincoln Park neighborhood. To do this, the MIC staff formulated a stakeholder engagement strategy as part of its project scoping process at the outset of the study. From this, the following

Table 2.1 | Stakeholders representing the City of Duluth's Lincoln Park Small Area Plan (SAP) committee

1. Lincoln Park residents
2. Lincoln Park business owners
3. City of Duluth, Housing and Redevelopment Authority
4. City of Duluth, Parks and Recreation
5. Community Action Duluth
6. Duluth Economic Development Authority (DEDA)
7. Duluth Local Initiatives Support Corporation (LISC)
8. City of Duluth, Planning
9. Duluth Port Authority
10. Duluth-Superior Metropolitan Interstate Council (MIC)
11. Duluth Transit Authority
12. Ecoloibrium3
13. Independent School District 709
14. Lincoln Park Business Group (LPBG)
15. MN Department of Health
16. Native Alliance Duluth
17. St. Louis County Public Health & Human Services

Table 2.2 | Professional transportation stakeholders representing the MIC Technical Advisory Committee (TAC)

1. Duluth Airport Authority
2. Bike/Pedestrian Advocate
3. City of Duluth Planning Dept.
4. City of Duluth Public Works
5. City of Hermantown
6. City of Proctor, City Administration
7. City of Superior, Planning Dept.
8. City of Superior, Traffic Engineering
9. Douglas County, WI, Highway Dept.
10. Duluth Seaway Port Authority
11. Duluth Transit Authority
12. MN Dept. of Employment & Economic Development
13. MnDOT District 1, Planning
14. St. Louis County, MN, Highway Dept.
15. WisDOT NW Region, Planning

stakeholder-engagement objectives were identified:

1. Engage stakeholders in identifying specific issues and opportunities.
2. Ensure a balance of modal perspectives throughout the study.
3. Provide and advertise access for input at any time.
4. Use stakeholders to vet final recommendations.
5. Seek to coordinate and capitalize on (not confuse) the City of Duluth's SAP outreach efforts.

Identifying Key Stakeholders:

The engagement strategy began with a general inventory of various transportation stakeholders in the neighborhood. This was followed up with a review of the stakeholders represented on the city's SAP steering committee to determine if there were underrepresented interests with respect to transportation specific issues in the neighborhood, or any stakeholder groups that the MIC should seek more in-depth input regarding transportation in issues and opportunities in the neighborhood. Given that the neighborhood has a relatively high percentage of lower income households, as well as a high number of businesses with substantial daily freight operations, it was deemed that the MIC should work to ensure significant and detailed input from these groups. The resulting list of key stakeholder groups is shown in Table 2.3 at right.

Phone and In-person Interviews:

MIC staff then sought to interview representatives from the groups listed in Table 2.3 either through private meetings, phone interviews, or email correspondence. Notes were compiled from these interviews and were reviewed for accuracy

Table 2.3 | Key stakeholders identified for one-on-one engagement

1. City of Duluth, Public Works - Engineering
2. City of Duluth, Parks& Recreation - Trails & Bikeways Coordinator
3. Commercial Trucking - Private operators
4. Community Action Duluth - Transportation Advocate
5. Duluth Fire Department - Fire Marshall
6. Duluth Seaway Port Authority - Facilities Manager
7. Duluth Transit Authority- Planning & Operations
8. Independent School District 709 - Transportation Director
9. Lincoln Park Business Group
10. Midtowne Manor - Property Manager
11. MnDOT District 1 - Planning
12. Western Lake Superior Sanitary District (WLSSD) - Planning

by members of those specific groups following the meetings.

A staff member from St. Louis County Health & Human Services assisted the MIC and the SAP Steering Committee by making site visits at several locations throughout the neighborhood and doing one-on-one interviews with low-income residents of the neighborhood. A summary of transportation-related comments were shared with the MIC and were regularly referred to and considered as work progressed with the study.

Focused Survey:

A short survey was designed to collect input from low-income residents of the Lincoln Park neighborhood. The survey questions were specifically about pedestrian, bike, and transit perceptions of this sub-population of the neighborhood. Because the MIC has historically had difficulty engaging low-income individuals in the region, staff from Community Action Duluth and St. Louis County Health & Human Services assisted in distributing the surveys. Despite the extra effort, however, only a few of the surveys were filled out.

Web-based Tools:

A project-specific webpage for the Lincoln Park Multimodal Study (www.dsmic.org/lpmms) was hosted on the MIC website. Stakeholders were informed during interviews and other outreach efforts that the webpage was available for them to find additional information or leave comments. The MIC staff also informed these stakeholders of related web-based materials made available through other webpages hosted by the City of Duluth and Exolibrium3.

Public meetings and open houses:

The City of Duluth Planning Department facilitated two public presentations and open house forums to inform neighborhood stakeholders of the SAP. Both events were held at the Harrison Community Club. The purpose of the first meeting, held on September 17th, 2014, was to inform the neighborhood of the study and gather initial input. The second meeting was held on March 25th, 2015 and was used to present and get feedback on draft recommendations. MIC staff assisted in events as both SAP participants and as experts to address transportation-specific issues and questions. Notes of the comments received during these events can be found in Appendix C (page, 140).

Figure 2.2 | Project webpage

A project page was hosted on the MIC's website. It provided visitors with a variety of ways to get information and provide comment.

Mapping and Referencing the Input Received

The various input received from stakeholders during the study was compiled, summarized, and referred to as the project progressed. Input that was pertinent to specific locations were noted on maps in order to continue taking stock of multiple issues and/or opportunities as the MIC staff continued to study the neighborhood. Maps 2.1 through 2.4 on the following pages, summarize much of the comments that the MIC gathered during the project.

In general, the MIC achieved the aim of getting a balance of comments that reflected the multiple modes of surface transportation that the study was focused on: motor vehicles, heavy trucks, transit, and active transportation. Active transportation issues represent the greatest number of comments received, and mostly regarding specific sidewalk segments that are in disrepair.

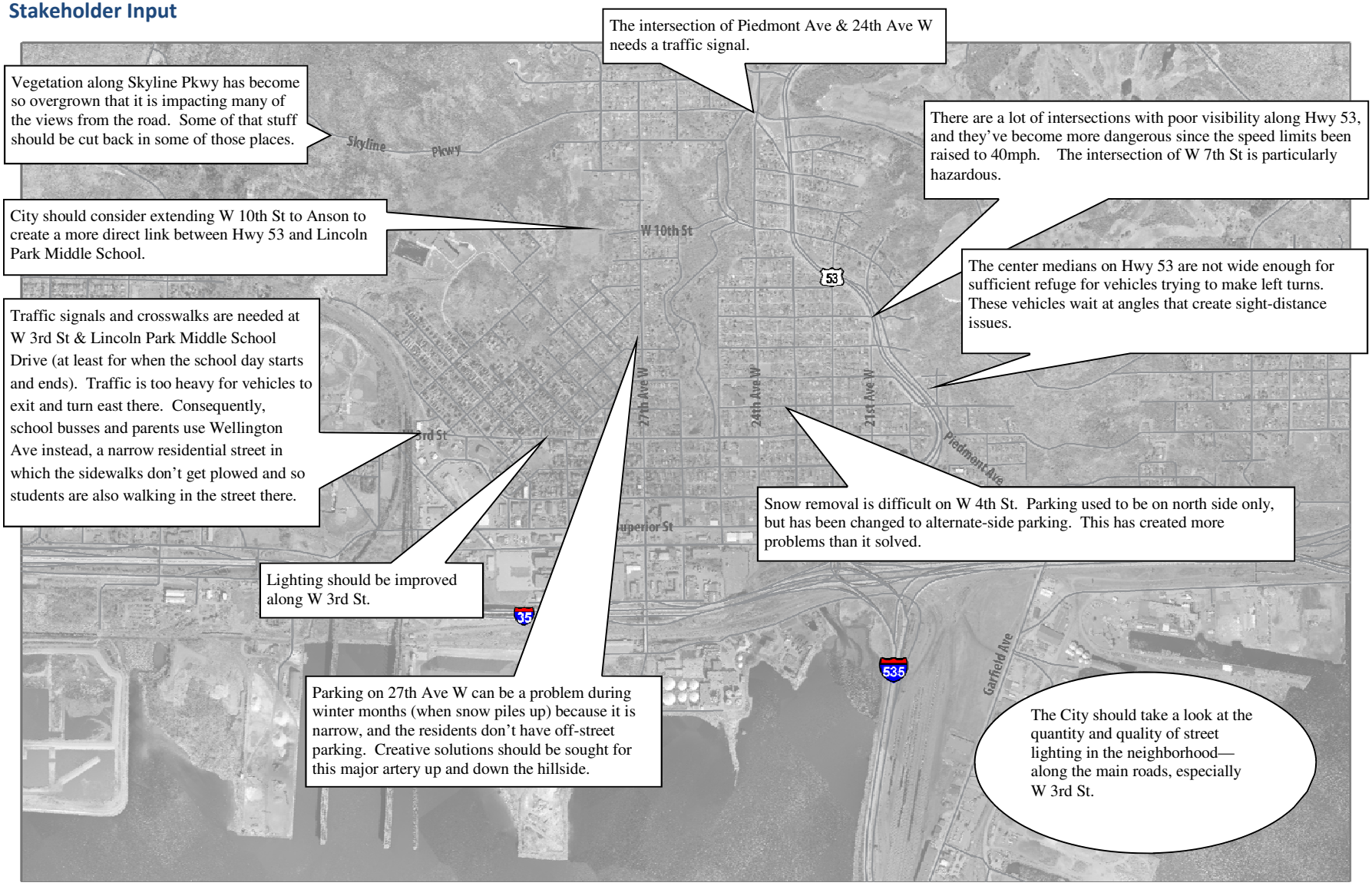
As staff assessed conditions related to each of the modes, they compared the comments received with the data and observations collected to interpret findings and develop recommendations. In a number of cases, comments received called attention to specific concerns which caused staff to collect additional data or broaden an existing assessment in order to address those concerns. In this way, the stakeholder input was invaluable to the study.

Lastly, stakeholder input gathered as part of the city's SAP process was also referenced throughout this study. Issues and opportunities regarding parking in the business district, way-finding, and improving connections between recreational assets and activity centers in the neighborhood are also reflected in the final recommendations of this study.

Image source: MIC (2015)

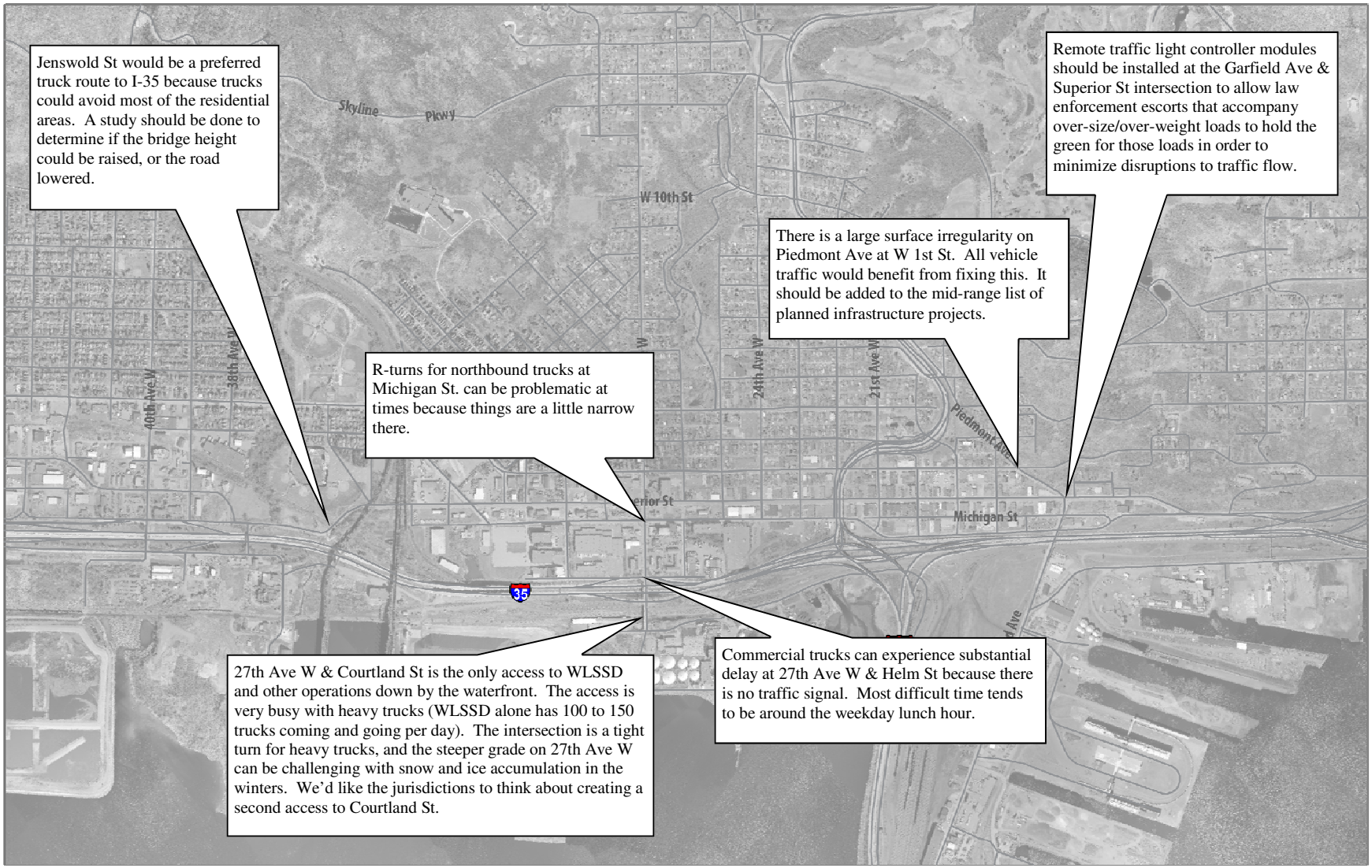
Figure 2.3 | Heavy commercial truck crossing the Cross City Trail in Lincoln Park

The image represents the coexistence of multiple user groups in Lincoln Park. Motorists, heavy trucks, and cyclists and pedestrians each have different interests and needs. The MIC sought meaningful input from multiple stakeholders in hopes of better addressing those needs and finding ways to improve integration among the different modes.



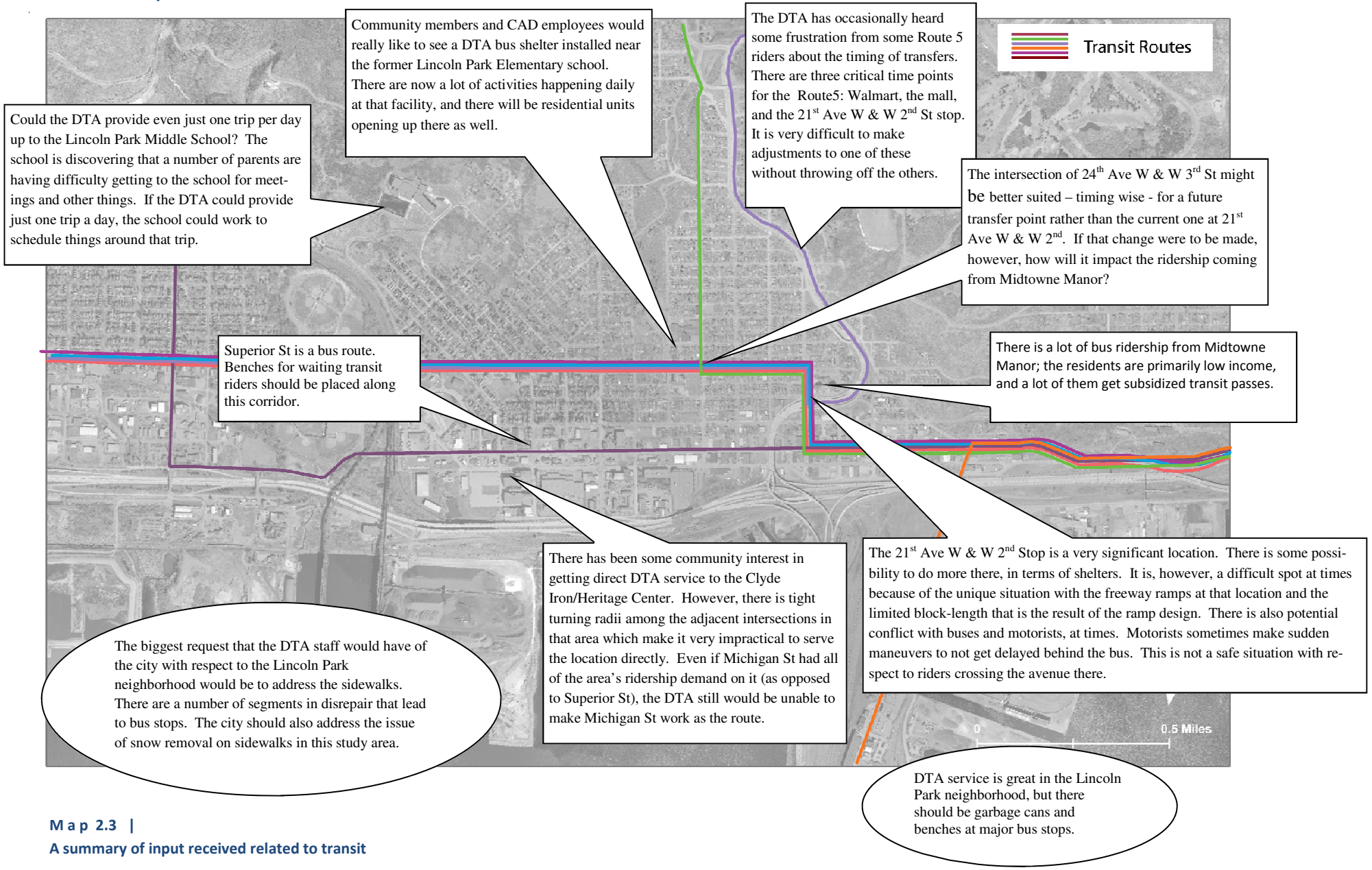
Map 2.1 | A summary of input received related to motor vehicles

The map above contains a summary of comments related to motor vehicle issues in the Lincoln Park neighborhood. These comments were collected as part of the MIC's stakeholder outreach effort for that study. Most of the comments received were area or location-specific, as displayed in the map.



Map 2.2 | A summary of input received related to Heavy Trucks

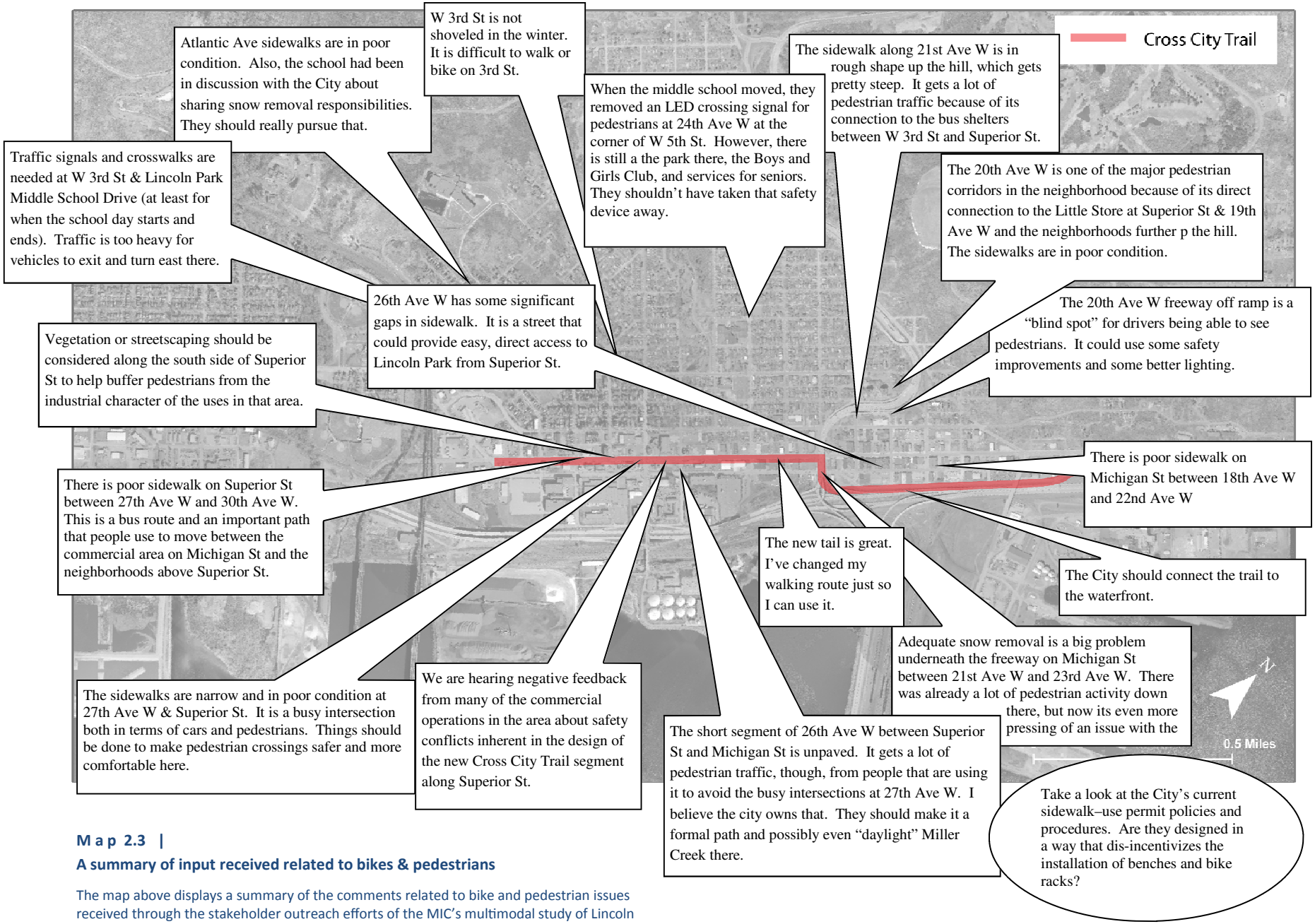
The comments shown in the map are specific to heavy truck related issues in the Lincoln Park neighborhood. The comments were gathered as part of the MIC's multimodal study of the neighborhood and represent a summary of issues called out by representatives of the Duluth Port Authority, Duluth Fire Department, WLSSD, and trucking related businesses that utilize the road network within the study area.



Map 2.3 |

A summary of input received related to transit

The comments shown in the map above relate to transit specific issues and opportunities in the Lincoln Park neighborhood. They are a summary of the comments received from DTA staff members, transit riders, and other stakeholders in the area.



Map 2.3 |

A summary of input received related to bikes & pedestrians

The map above displays a summary of the comments related to bike and pedestrian issues received through the stakeholder outreach efforts of the MIC's multimodal study of Lincoln Park. The newly built segment of the Cross City Trail is shown in pink, since a number comments were either about the trail or made reference to the trail.

3. Land Uses, Demographics, & Growth Scenarios

The types, locations, and densities of different land uses - as well as their proximity to different demographics - all have an influence on transportation. This chapter takes stock of those factors within the Lincoln Park neighborhood and It briefly considers how changes in those factors could move transportation issues in a positive or negative direction.

With the use of three different growth scenarios, the chapter explores what those changes might mean in terms of the objectives that were identified in Chapter 1. This chapter also provides the background information used to assess the individual modes of transportation in subsequent chapters.

Image source: MIC (2011)

Figure 3.1 |

View of Lincoln Park from Skyline Parkway

Lincoln Park is home to a wide variety of land uses, with much of the industrial uses concentrated at the southern end of the neighborhood, along the interstate.

Existing Land Use Patterns

The neighborhood is, broadly speaking, several blocks of residential development along the Duluth hillside, with commercial and industrial uses concentrated along the interstate and the waterfront. Above W 3rd Street, there is a mix of mostly single-family homes, recreational lands (such as the iconic Lincoln Park), institutional uses (eg. Lincoln Park Middle School), and undeveloped lands. Below W 3rd Street is a mix of multi-family residences, commercial uses, and industrial uses, with light industry (e.g. warehousing, manufacturing, etc.) north of I-35, and heavy industry (eg. ore docks and waste treatment plant south of I-35.

Types and densities of land uses:

Using the land use classification scheme shown in Table 3.1, the

Table 3.1 | Land-use types in Lincoln Park[1]

Land Use Category	Acres	%
Single Family Residential	207.8	20%
Multi-family Residential	65.5	6%
Mixed-use Commercial	4.5	0%
Commercial	53.8	5%
Public/Semi-public	122.9	12%
Light Industrial	48.6	5%
Industrial	211.7	20%
Transitional	3.8	0%
Recreational	83.0	8%
Undeveloped	255.4	24%
TOTAL	*1,057.0*	*100%*

Data source: MIC estimates

1. Does not include estimate of land occupied by public roadways.

lands in the Lincoln Park neighborhood (as defined by the study boundary and excluding the areas occupied by roadways) is roughly 26% residential, 25% industrial, and 24% "undeveloped"- which is represented by unoccupied, vegetated lands that often impede the ability to build on them because of aspects of topography, geology, and hydrology. The remaining 25% is a mix of public/semi-public (schools, churches, post offices, etc.) (12%), recreational (8%), and commercial uses (5%).

Each land-use type and density has different rates of trip-generation. In order to better study the effects of the different land uses and densities within Lincoln Park, the study area was divided into eleven sub-areas. The boundaries of those sub-areas were based on major roadways, or physical or natural features that could be considered as potential impediments or delay to movement of motorized or non-motorized trips across them. The sub-areas, as well as the various land uses found within them, are displayed in Map 3.1 shown on page 16.

Table 3.2 shows the densities of buildings, residents, and employees found within each of the sub-areas. Concentrations of residents or employees create patterns of higher travel demand, and it can be seen by these numbers that sub-areas 4, 5, and 8 are the densest residential areas in the neighborhood, whereas sub-area 9 represents a dense employment area with some residential, like apartments above shops at street-level (Figure 3.2).

The impacts that the various mixes of land uses and densities might have on travel demand throughout the neighborhood is explored later in this chapter. Before doing so, however, it is also important to consider the potential ramifications that zoning regulations may have on these patterns over time.

Table 3.2 | Density ratios for the study sub-areas

Sub-area	Acres	Percent acres occupied by building footprints	Residents/ acre	Employees /acre
Sub-area 1	431.7	2.8%	2.9	0.2
Sub-area 2	269.2	2.8%	3.0	0.3
Sub-area 3	112.4	6.9%	6.1	0.4
Sub-area 4	120.1	12.4%	11.3	0.2
Sub-area 5	86.8	13.3%	14.1	0.1
Sub-area 6	112.3	8.5%	2.0	1.7
Sub-area 7	77.2	13.8%	8.1	5.9
Sub-area 8	75.4	17.1%	14.0	4.0
Sub-area 9	66.5	17.7%	4.6	14.4
Sub-area 10	116.1	17.7%	0.0	7.5
Sub-area 11	376.2	4.4%	0.0	0.1

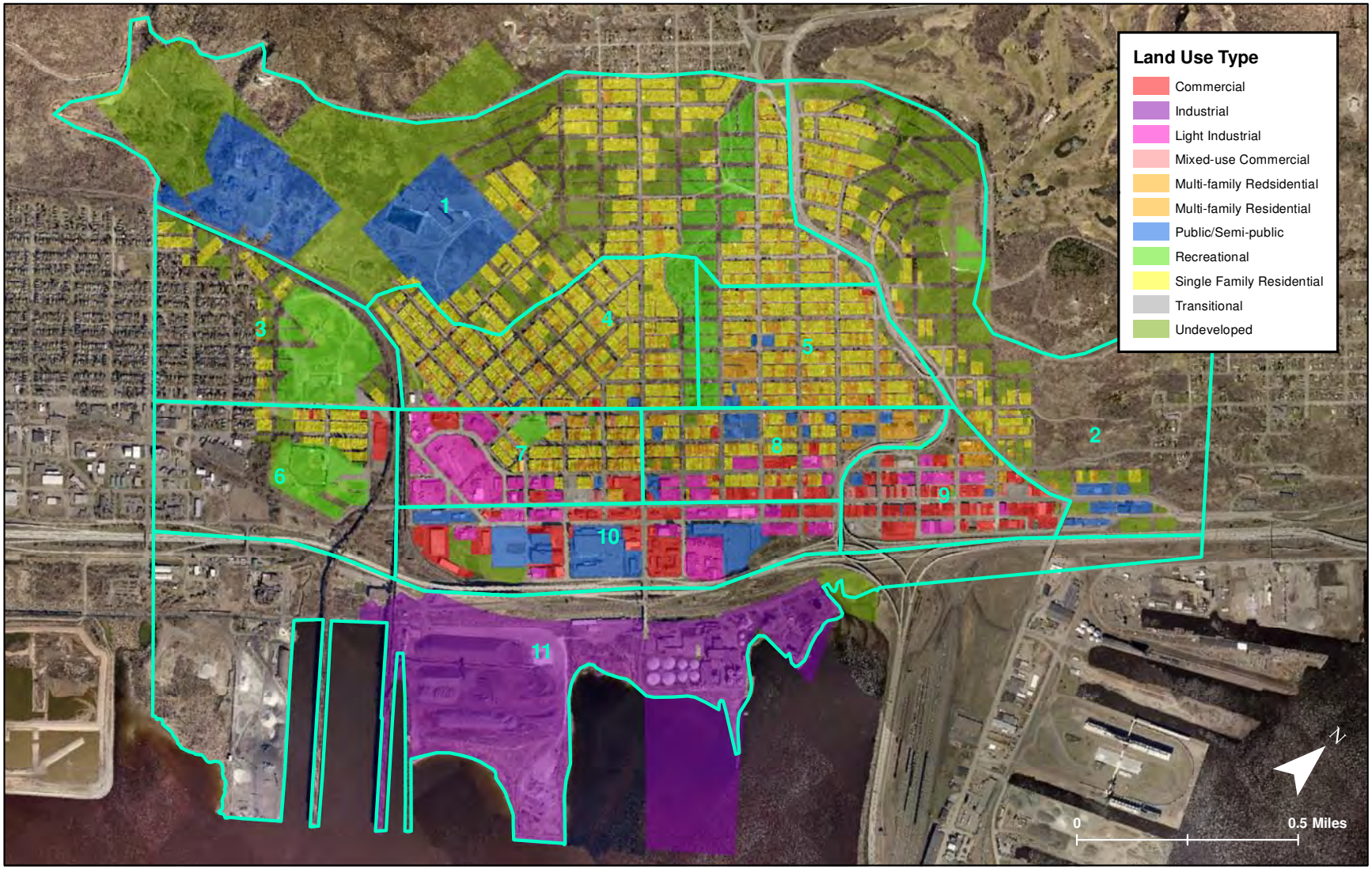
Data source: US Census Bureau 2010 SF 100%; US Census Bureau LEHD; MIC estimates.

Image source: MIC (2011)

Figure 3.2 |

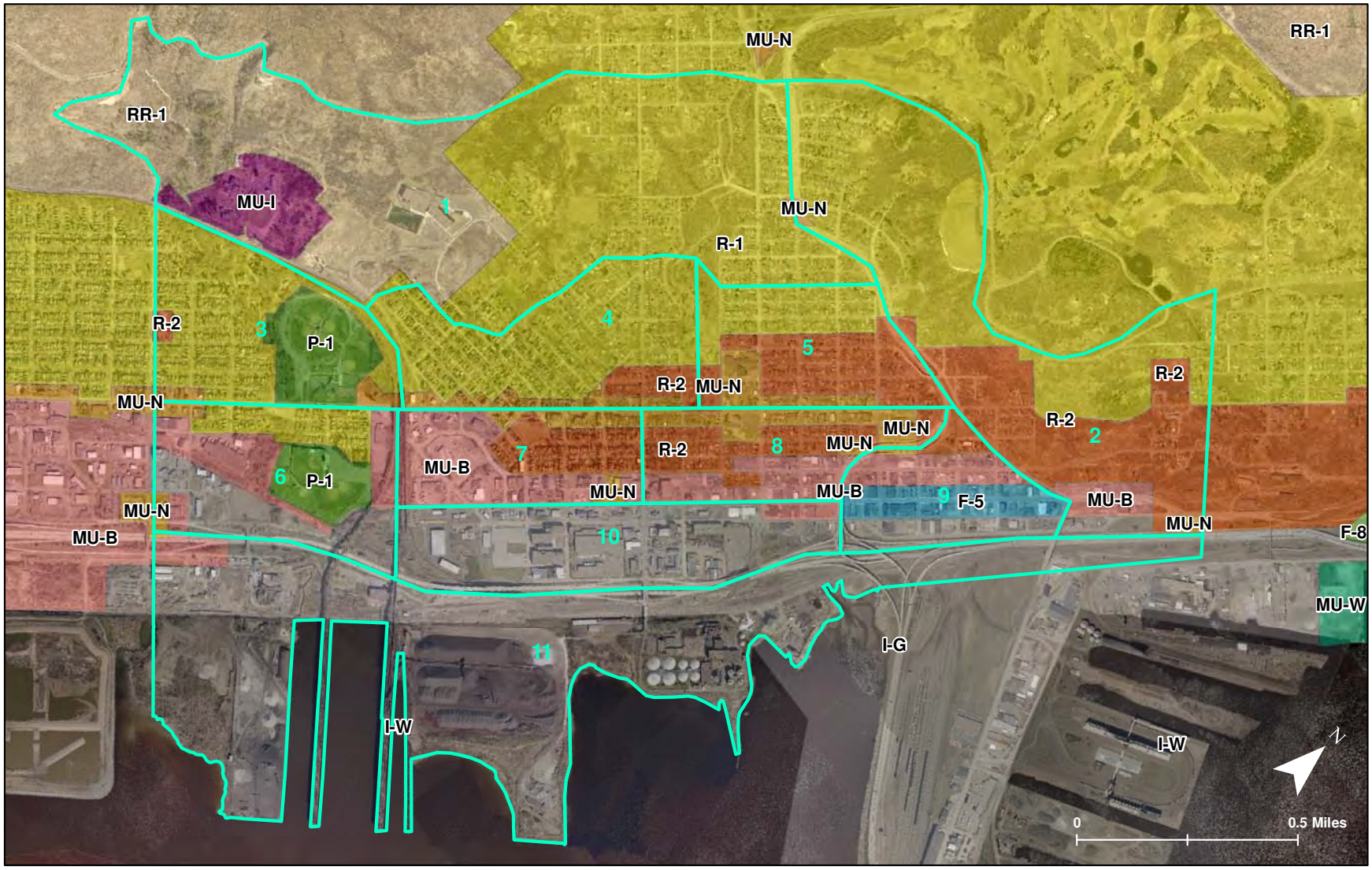
Higher density, mixed-use urban form in sub-area 9

The kinds of urban density found in sub-area 9 produces greater travel demand, but also creates a situation where some of that travel demand can be satisfied by walking, biking, or public transit.



Map 3.1 | Land Uses within the Lincoln Park Study Area and Sub-areas

The boundaries of the study's eleven sub-areas were laid over the available land use data to help define the different contexts in each of the sub-areas.



M a p 3.2 | Land use zoning districts within the Lincoln Park Study Area and Sub-areas

The study's sub-area boundaries were also referenced against the current zoning districts in the neighborhood in order to compare the existing zoning regulations to the actual land uses on the ground. Descriptions for each of the zoning districts shown in the map above can be found in Table 3.3 on page 18.

Table 3.3 | Zoning Districts within the Lincoln Park study area

Zoning District	Characteristics	Min Lot Size*
Rural Residential (RR-1)	Large lot, single-family, detached residential uses; 5-acre minimum per dwelling.	5 Acres
Residential-Traditional (R-1)	Single-family, detached residences, duplexes and townhomes on moderately sized lots; minimum lot size less than an acre.	0.05 Acres*
Residential-Urban (R-2)	Allows for multi-family apartments and townhouses in an urban setting; minimum lot size less than an acre.	0.05 Acres*
Mixed-Use Neighborhood (MU-N)	Accommodates a mix of residential and non-residential uses that serve the neighborhood in close proximity.	0.05 Acres*
Mixed-Use Business (MU-B)	Intended to accommodate light industrial and technology-based operations.	NA
Mixed-Use Industrial (MU-I)	Established to accommodate the kinds of development needs and impacts that are unique to large institutional developments, while also protecting surrounding neighborhoods from adverse impacts of those developments.	NA
Form Based District 5 (F-5) Mid-Rise Community Shopping and Office	Intended to protect the form and style of existing structures; allows for a mix of residential, commercial, and public uses.	NA
Industrial-General (I-G)	Intended to provide for general to heavy-impact processing or manufacturing operations.	NA
Industrial-Waterfront (I-W)	Intended to provide for water-dependent and port-dependent industrial uses.	NA
Park and Open-Space (P-1)	Intended to protect and reserve lands for recreational, scenic, and natural resource uses.	NA

Source: City of Duluth Unified Development Code.

* Minimum lot size allowed, dependent on the specific use (e.g. townhouse vs. single-family dwelling).

Zoning:

Map 3.2 on page 17 shows the current zoning districts relative to the eleven sub-areas. It is presented next to Map 3.1 in order to compare differences between the existing land uses and zoning in the neighborhood. By referencing the general descriptions of the different zoning districts in Table 3.3 on page 18 with the information in maps 3.1 and 3.2, some inconsistencies between zoning and the actual uses can be recognized. In particular, sub-area 10 contains a lot of commercial uses that are not consistent with the uses allowed in an Industrial-General (I-G) district.

Discrepancies between land uses and zoning in the neighborhood exist largely because market demand has been increasingly nudging the existing land use patterns on the northern side of the interstate to transition to more commercial and recreational uses. In many ways, that transition is positive for the neighborhood's residents: it brings more goods, services, and recreational opportunities in closer proximity to them, while moving the potentially undesirable impacts of industrial activities further away.

The City of Duluth's Small Area Plan (SAP) process has been aimed at identifying ways to adjust the zoning in Lincoln Park in order to both correct existing discrepancies and also support a transition to land use patterns that are deemed more desirable by the neighborhood's residents. Some preliminary recommendations that have come out of that process are to change the I-G zoning in sub-area 10 to Mixed-Use Business (MU-B) and to extend the Form-Based District 5 (F-5) in sub-area 9 further westward along Superior Street into sub-areas 7 and 8. These changes would effectively move more industrial

activities further away from the residential areas and encourage the development of a more walkable, mixed-use commercial district between the residential and industrial areas.

Changes like those being proposed in the SAP would not happen overnight, but would change transportation patterns significantly. The higher densities of commercial and residential uses would lead to greater levels of traffic in those sub-areas. And yet, depending on the actual developments that locate in there (as well as certain aspects of the transportation system) a significant portion of that added traffic could be met by modes other than personal automobiles.

Major activity centers:

Besides the general patterns of land use, the presence and locations of major "activity centers" - places that attract large groups of people (at least occasionally) - also have a great deal of impact on transportation in an area. The Lincoln Park neighborhood contains a number of such centers.

For the purpose of this study, activity centers were defined as places where more than 100 people would likely travel to and congregate at any given time. Once identified, these locations were classified as either "Regular" or "Occasional" activity centers. They are shown in Map 3.3 on page 20 according to that distinction.

Improving connections between a number of the neighborhood's activity centers is an objective that has been identified in the SAP process. In particular, improving non-motorized connections between the Lincoln Park Middle School and nearby recreational opportunities has been called out as a priority This objective has been carried forward in this study and is discussed more in Chapter 7.

Zones of employment:

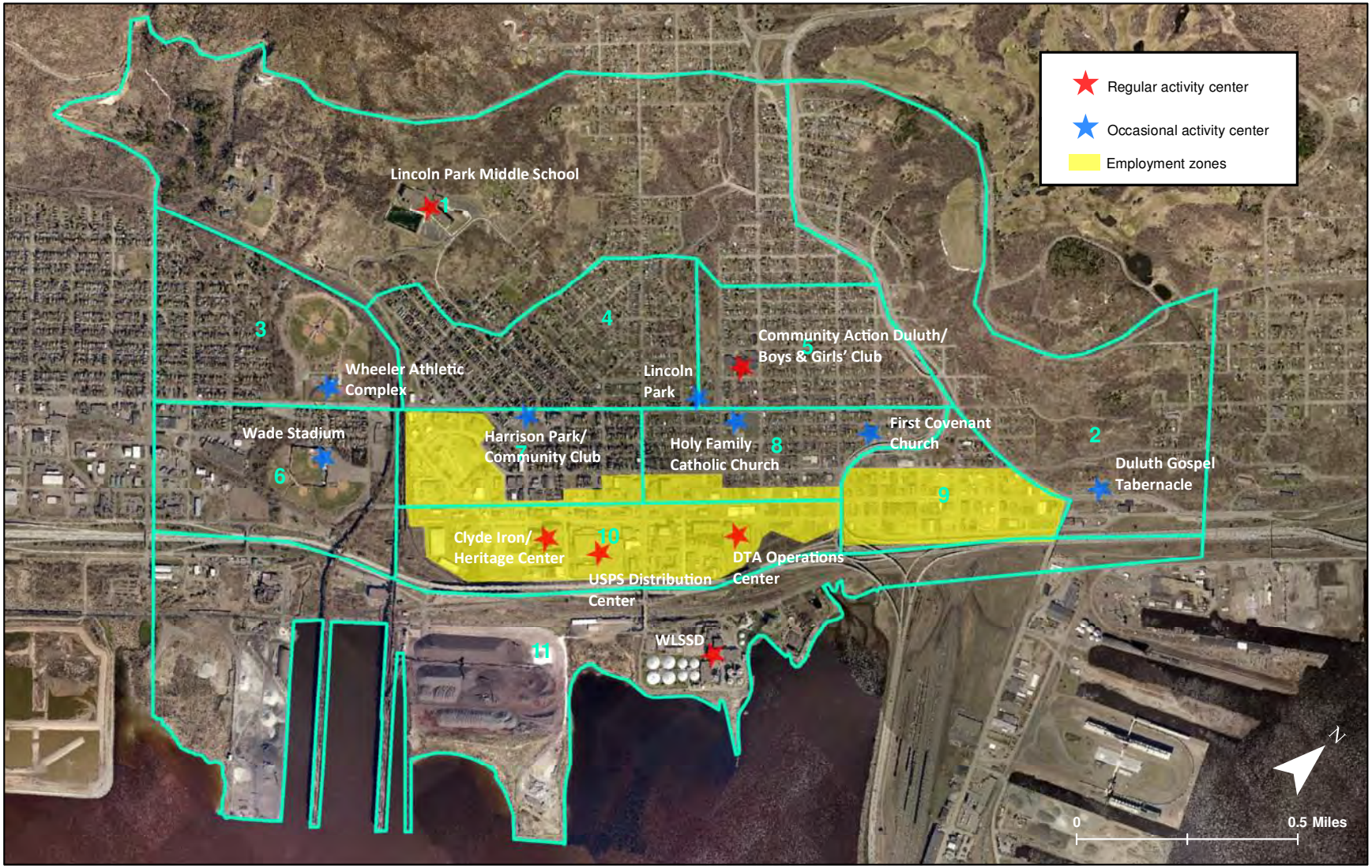
While not every place of employment can be considered an activity center as defined above, places of employment tend to exist together within areas of regular activity. Map 3.3 on the following page identifies such an area within the Lincoln Park neighborhood - an area where the employment density averages more than 10 employees per acre.

Sub-areas 9 and 10 contain the greatest concentration of jobs, while sub-areas 7 and 8 contain smaller "zones" of employment concentration. Because most people tend to work eight hour days between approximately the hours of 8 AM and 5 PM, large flows of employees are expected to move to and from these zones during morning and evening peak travel periods. Also, different degrees of customer–related and delivery-related traffic will be drawn to those zones, depending on the types of employment there (e.g. manufacturing, retail, etc.). Table 3.4 shows the number of estimated jobs found in the employment zones in each sub-area, as categorized according to three general job types. It also shows three trip-generation rates typically used to estimate trips based on those job types. The estimates suggest that the neighborhood's busiest employment zones attract about 2,500 trips daily.

Table 3.4 | Job and trip-generation estimates of employment zones

	Retail	Service	Other	Trip Gen Score
Trip Gen Weight	*9.28*	*3.09*	*1.10*	*NA*
Sub-area 7	7	305	131	1,152
Sub-area 8	7	105	27	419
Sub-area 9	116	398	214	2,542
Sub-area 10	143	156	572	2,438

Data source: US Census Bureau LEHD 2011; MIC estimates.



M a p 3.3 | Zone of concentrated employment and the location of major neighborhood activity centers within the Lincoln Park Study Area

Most of the jobs within Lincoln Park are located in sub-areas 9 and 10, which attracts concentrated movements of commuter traffic during regular AM and PM peak travel periods on a daily basis. Major activity centers are scattered throughout the neighborhood that can generate significant traffic at off-peak times.

Land Use	Unit	Trip Rate (trips per unit)	Lincoln Park Study: floor area of land use per sub-area										
			1	2	3	4	5	6	7	8	9	10	11
City park	Acres	0.19				8.3	6.9				0.1		
Recreational community center	1,000 SF	1.45			3,000		167,000		3,300			86,000	
Multi purpose recreational facility	Acres	5.77			23.0			10.0	3.0				
Middle School/Elementary School	1,000 SF	1.19	320,000										
Daycare	1,000 SF	12.46				860				3,200			
Church	1,000 SF	0.55		18,000		19,000	29,000			82,000			
Assisted Living Facility	Beds	0.22								150			
Convenience market (open 15-16 hrs)	1,000 SF	34.57											
Convenience market with gas pumps	1,000 SF	50.92									4,600	17,500	
Slavation Army (Apparel Store)	1,000 SF	3.83									6,800		
Fast food resturant w/ drive thru	1,000 SF	33.84											
Fast food resturant w/o drive thru	1,000 SF	26.15										8,900	
Bakery (Coffee/Donut shop w/o drive thru)	1,000 SF	40.75								1,200			
Resturaunt	1,000 SF	7.49					2,400			3,000	3,800	16,000	
Drive-in Bank	1,000 SF	24.3						2,000			9,400	2,900	
US Post Office	1,000 SF	1.22										8,700	
Drinking Place	1,000 SF	11.34								12,000	20,000	2,500	
Liqour Store (using "supermarket")	1,000 SF	9.48						2,400		2,400			
Auto Parts and Service Center	1,000 SF	4.46				6,500	9,000			6,900			
WLSSD*	NA												NA

Table 3.5 |

Unit estimates of key land use types in each sub-area in the Lincoln Park neighborhood

Land Use	Unit	Trip Rate (trips per unit)	Lincoln Park Study: estimated daily trips to sub-area										
			1	2	3	4	5	6	7	8	9	10	11
City park	Acres	0.19	0.0	0.0	0.0	1.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Recreational community center	1,000 SF	1.45	0.0	0.0	4.4	0.0	242.2	0.0	4.8	0.0	0.0	124.7	0.0
Multi-purpose recreational facility	Acres	5.77	0.0	0.0	132.7	0.0	0.0	57.7	17.3	0.0	0.0	0.0	0.0
Middle School/Elementary School	1,000 SF	1.19	380.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Daycare	1,000 SF	12.46	0.0	0.0	0.0	10.7	0.0	0.0	0.0	39.9	0.0	0.0	0.0
Church	1,000 SF	0.55	0.0	9.9	0.0	10.5	16.0	0.0	0.0	45.1	0.0	0.0	0.0
Assisted Living Facility	Beds	0.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0
Convenience market (open 15-16 hrs)	1,000 SF	34.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Convenience market with gas pumps	1,000 SF	50.92	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	234.2	891.1	0.0
Slavation Army (Apparel Store)	1,000 SF	3.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0	0.0	0.0
Fast food resturant w/ drive thru	1,000 SF	33.84	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fast food resturant w/o drive thru	1,000 SF	26.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	232.7	0.0
Bakery (Coffee/Donut shop w/o drive thru)	1,000 SF	40.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.9	0.0	0.0	0.0
Resturaunt	1,000 SF	7.49	0.0	0.0	0.0	0.0	18.0	0.0	0.0	22.5	28.5	119.8	0.0
Drive-in Bank	1,000 SF	24.3	0.0	0.0	0.0	0.0	0.0	48.6	0.0	0.0	228.4	70.5	0.0
US Post Office	1,000 SF	1.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	0.0
Drinking Place	1,000 SF	11.34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	136.1	226.8	28.4	0.0
Liqour Store (using "supermarket")	1,000 SF	9.48	0.0	0.0	0.0	0.0	0.0	22.8	0.0	22.8	0.0	0.0	0.0
Auto Parts and Service Center	1,000 SF	4.46	0.0	0.0	0.0	29.0	40.1	0.0	0.0	30.8	0.0	0.0	0.0
WLSSD*	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Number of jobs (x2 trips)	NA	NA	150	196	94	56	10	376	908	610	1,910	1,742	74
Estimated daily trips	NA	NA	**531**	**206**	**231**	**108**	**328**	**505**	**930**	**989**	**2,654**	**3,220**	**174**
Attraction weight	NA	NA	5	2	2	1	3	5	9	9	25	30	2

Table 3.6 |

Trip generation rates and daily for Lincoln Park neighborhood sub-areas

Data sources: US Census Bureau LEHD 2011; Trip Generation, 7th Ed, ITE (2003)

** WLSSD has reported an average of 100 service trucks traveling to their site daily.*

Trip generation estimates:

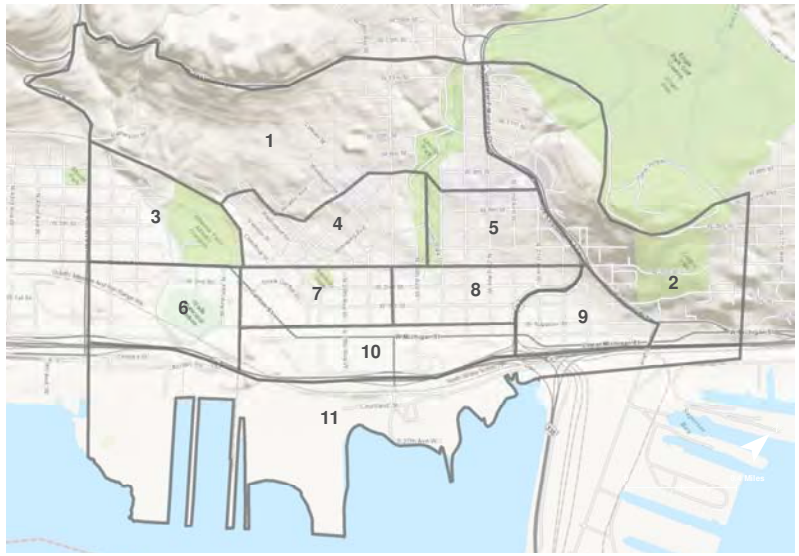
Another way to assess the relative degrees of travel demand to the different sub-areas of the neighborhood is to use trip generation estimates specific to the land uses found within those sub-areas. Table 3.5 on the page 21 provides a general summary of the degree which different land uses are found in each of the sub-areas, while Table 3.6 shows the conversion of those differences into estimated daily trips added to the estimated number of employees in each sub-area to derive a relative estimate of travel demand. The information in Table 3.6 indicates that sub-areas 9 and 10 generate more than 16x the levels of traffic than is generated in each of the other sub-areas. It should also be noted that these estimates do not account for trips produced by the households within the sub-areas.

Topography:

In addition to land use type and densities, slope can have an impact on travel behaviors. A lower percentage of daily trips will be made by walking, biking, or even public transit, if slopes are excessive in an area.

Slopes are a significant factor in the Lincoln Park neighborhood, as the majority of the residential areas sit along the Duluth hillside. There are some dramatic elevation changes in sub-areas 1, 2, and 3. Slopes are also a significant feature in sub-areas 4 and 5, as well (see Map 3.4).

According to American with Disabilities Act Accessibility Guidelines (ADAAG), a maximum grade for running slope is at 5%. As shown in Table 3.7, a substantial portion of the roadways (and sidewalks) within sub-areas 1 through 5 exceed that threshold. This poses a significant challenge for meeting the objectives for multi-modal integration and non-motorized connectivity between activity centers and recreational areas.



Map 3.4 | Topographic characteristics within the study's sub-areas

Sub-areas 1 through 5 have significant slopes that can make non-motorized travel difficult

Table: 3.7 | Average running slope for roads within the Lincoln Park sub-areas

Sub-area	Miles of roads	Percent of roads over 5% slope
Sub-area 1	8.1	64.3%
Sub-area 2	9.8	65.3%
Sub-area 3	2.1	10.0%
Sub-area 4	4.6	51.3%
Sub-area 5	3.2	60.4%
Sub-area 6	3.5	2.9%
Sub-area 7	2.3	0.0%
Sub-area 8	2.0	15.8%
Sub-area 9	3.6	20.5%
Sub-area 10	2.7	10.8%
Sub-area 11	3.8	8.1%

Data source: USGS (2014); MIC estimates (2014).

Demographics

Characteristics at the household level also have an affect on transportation patterns in an area. Attributes such as household size, household income, and the number of vehicles per household tend to translate into different travel behaviors and needs. Household incomes below national poverty guidelines, for example, are more likely to face transportation challenges and tend to be more dependent on public transit services.

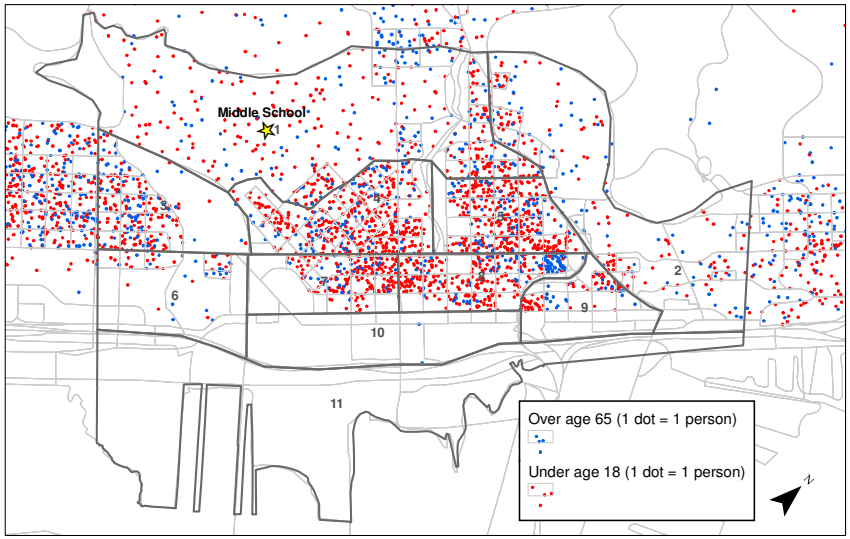
Table 3.8 shows the average household characteristics for the eleven sub-areas, while Map 3.6 on page 23 shows the location and concentrations of people in the neighborhood (by census block), as well as the differences in median household income among the various sub-areas. Sub-areas 6, 7, and 9 each have median household incomes below the national poverty guideline for a family of four in 2015 ($24,250), as well as substantial concentrations of residents. Thus, the demand for "active transportation" options (e.g. walking, biking, public transit) is expected to be higher in these sub-areas. Sub-area 8, however, appears to have the greatest number of households with no auto-ownership (Table 3.8). This is largely due to the presence of Mid Towne manor, a senior living facility. This facility also generates a high degree of demand for alternative modes of transportation.

Map 3.5 at right shows the concentration of residents under 18 years of age or over age 65. Such concentrations would indicate areas where active transportation amenities such as quality sidewalks or paths are anticipated to be in higher demand. These patterns also provide an indication of where transportation challenges and inefficiencies might exist, such as the location of the Lincoln Park Middle School relative to the concentration of students of lower-income families in sub-areas 7, 8, and 9. These

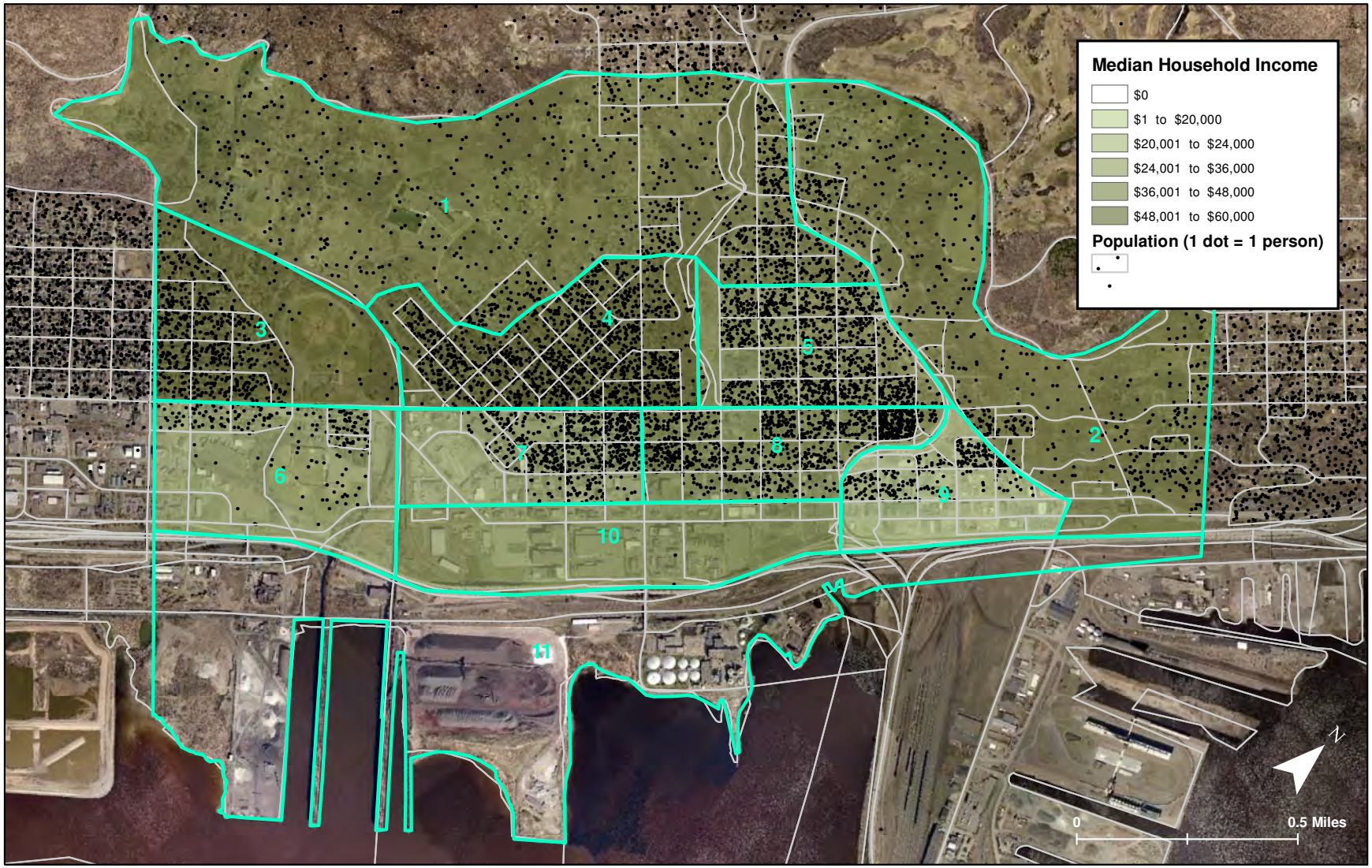
Table 3.8 | Household (HH) characteristics by study sub-area

Sub-area	Number of HHs	Average HH size	Median HH income	Est. HHs with no vehicles
Sub-area 1	520	2.4	$35,245	15 (2.8%)
Sub-area 2	407	2.0	$41,786	12 (1.5%)
Sub-area 3	300	2.3	$51,563	14 (2.3%)
Sub-area 4	543	2.5	$51,563	15 (2.3%)
Sub-area 5	521	2.3	$29,514	24 (1.9%)
Sub-area 6	108	2.0	$24,138	14 (0.8%)
Sub-area 7	267	2.3	$22,474	34 (1.6%)
Sub-area 8	530	2.0	$29,514	68 (1.7%)
Sub-area 9	165	1.9	$9,375	21 (0.7%)
Sub-area 10	1	2.0	$29,514	0 (0.1%)
Sub-area 11	0	0.0	$22,474	0 (0.0%)

Data sources: US Census Bureau 2010 SF 100%; US Census Bureau 2012 5-yr ACS 2014; MIC estimates



Map 3.5 | The location Lincoln Park residents under age 18 or over age 65



Map 3.6 | Median household income levels and the concentrations of population and within the Lincoln Park Study Area

Lincoln park residents are concentrated in in the center of the neighborhood. Some areas of the neighborhood, such as sub-areas 7 and 9 have concentrations of individuals living at or near nationally recognized poverty levels.

challenges are addressed further in the discussions regarding specific modes of transportation in subsequent chapters.

Growth Scenarios

As with any neighborhood, the land use, employment, and demographic patterns in Lincoln Park are expected to change over time. While it is difficult to predict what those changes will be exactly, or how fast they will occur, some best guesses can be brought forward based on the existing conditions and trends observed. Those guesses can be grouped and modified under different scenarios for the purposes of planning.

Three basic scenarios were considered while conducting this study: a "Low Growth" scenario, a "High-growth, Low-density" scenario, and a "High-growth, High-density" scenario. They are based on variations in the patterns previously discussed in this chapter. Aspects of each scenario are compared and contrasted throughout the following chapters in order to help identify potential challenges or opportunities regarding the neighborhood's transportation assets in coming years. The different characteristics of each scenario are summarized in Table 3.9, and the implications of those differences are discussed in the summaries below.

"Low Growth" scenario:

Under the low growth scenario, it is assumed that economic and social conditions will not dramatically change the existing land use patterns in the neighborhood in coming decades. Based on this assumption, adaptive reuse of existing facilities is expected, and only small increases in the number of households and jobs follow. A general lack in reinvestment throughout the neighborhood reflects a shift towards an older and lower-income population with increasing mobility challenges.

Table 3.9 | Growth scenarios and assumptions used for analysis

Scenario 1: "Low Growth"

- Land-use mix stays the same
- Land-use density stays the same
- Housing stock ages / minimal revitalization
- Median household income goes down
- Overall population stays the same
- Household density goes up modestly
- Proportion of residents older than 65 goes up
- Proportion of residents younger than 18 goes up modestly

Scenario 2: "High-growth, Low-density"

- Growth mainly occurs outside the neighborhood
- Land-use patterns stay approximately the same
- Modest increases in density commercial and light-industrial uses
- Substantial reinvestment and redevelopment of single family homes
- Median household income goes up
- Overall population sees a modest increase
- Household density goes down modestly
- Proportion of residents older than 65 goes up modestly
- Proportion of residents younger than 18 goes up modestly

Scenario 3: "High-growth, high-density"

- Substantial growth within the neighborhood
- Land-use patterns change: less industrial, more commercial uses.
- Land-use density goes up
- Increased mixed-use development
- Household density goes up substantially below 5th street (goes down modestly above 5th St)
- Median household income goes up
- Overall population goes up
- Proportion of population ages 19-40 goes up

"High-growth, Low-density" scenario:

Under this scenario, high rates of growth are expected to occur in the City of Duluth, but mostly as lower-density development outside of the Lincoln Park neighborhood. Some multi-family units are built in sub-area 6 in response to targeted, public-private investments in the area, but - either because zoning regulations had not allowed for higher densities elsewhere in the neighborhood, or because the real estate market did not produce the demand for it – most of the growth in new households has occurred in the small amounts of buildable lands remaining in sub-areas 1 and 2.

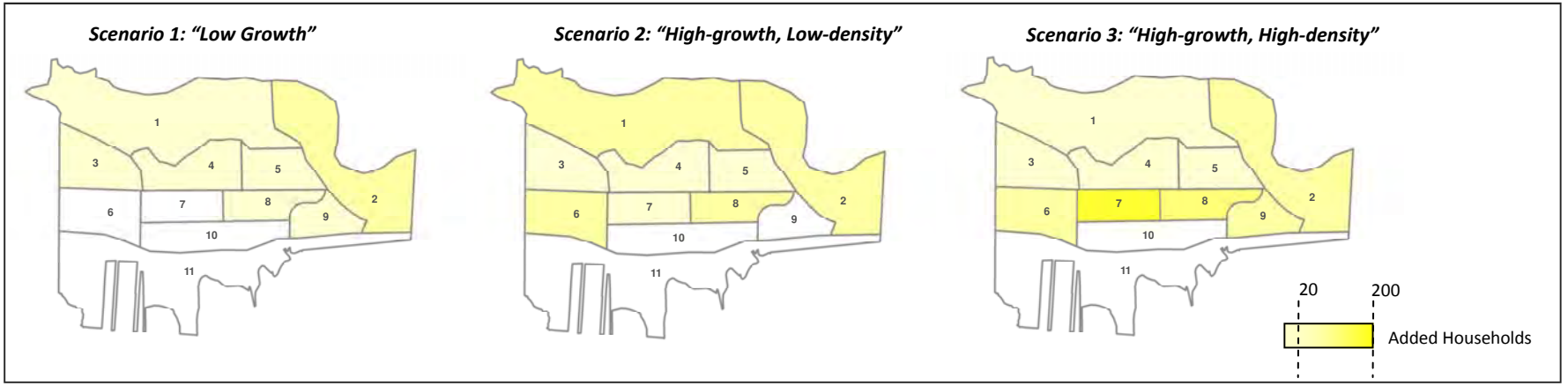
Efforts to revitalize older houses in sub-areas 5 and 7 as starter homes for new families results in a thinning of the housing stock and only very minimal increases in the number of households those areas. Meanwhile, a growing portion of the neighborhood's population has gotten older and now has lower incomes. More of these individuals have become concentrated within shared dwellings in sub-area 8.

Corresponding to the modest increases in households in the neighborhood, there has also been a modest growth in new jobs, occurring primarily in sub-areas 8, 9, and 10. The new jobs are mostly service based, some of which have replaced an outflow of industrial based jobs from the area. As a result, there is only a moderate increase in the number of additional trips generated in those areas.

"High-growth, High-density" scenario:

This scenario represents a renaissance of the Lincoln Park neighborhood. There has been a growing interest in the neighborhood's many amenities, and economic and market conditions have been such that large scale redevelopment of the neighborhood has happened over the years. Mixed-use, residential developments have been built in sub-areas 7 and 8, increasing both the residential and employment densities there, while significant reinvestment in the housing stocks in sub-areas 4, 5, and 6 have occurred along with increases in median household income throughout the neighborhood. While the higher densities

Figure 3.3 | Estimates of future households by study sub-area by year 2040



increase the demand for walking, biking, and transit trips, higher household incomes also result in more automobile trips.

A significant transformation of the neighborhood business district in sub-area 9 has occurred, with an influx of new retail jobs and higher demand for residential units in the area. Meanwhile, a substantial change over of the industrial uses in sub-area 10 to commercial uses oriented has increased the amount of traffic being generated there.

Growth projections and trip generation estimates:

The growth scenarios used in this study were based on household and employment projections similar to those used in the MIC's long range transportation plan for the Duluth-Superior metropolitan area, *Connections 2040*. The rates of household and employment growth are shown in Figures 3.5 and 3.6, respectively.

Growth in the number of households is expected to be relatively modest under the "Low Growth" and "High-growth, Low-

Figure 3.5 | Household projections for the Lincoln Park study

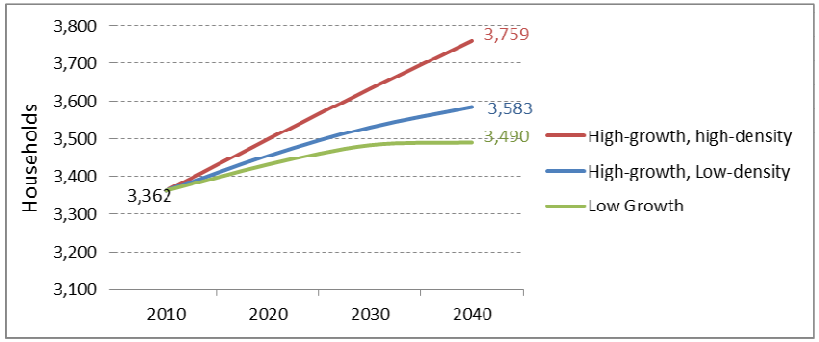


Figure 3.6 | Employment projections for the Lincoln Park study

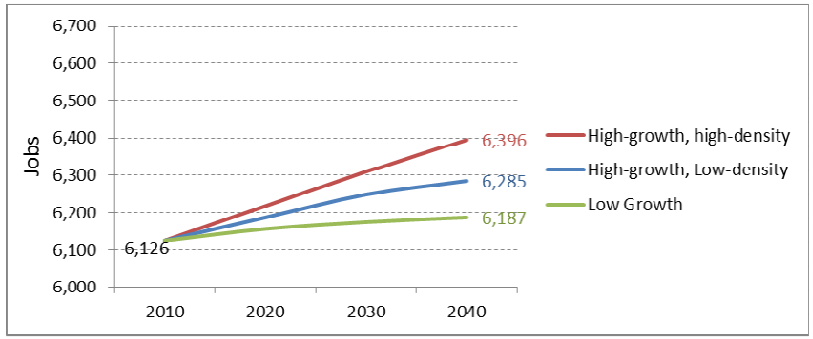


Figure 3.4 | Estimates of added jobs by study sub-area by year 2040

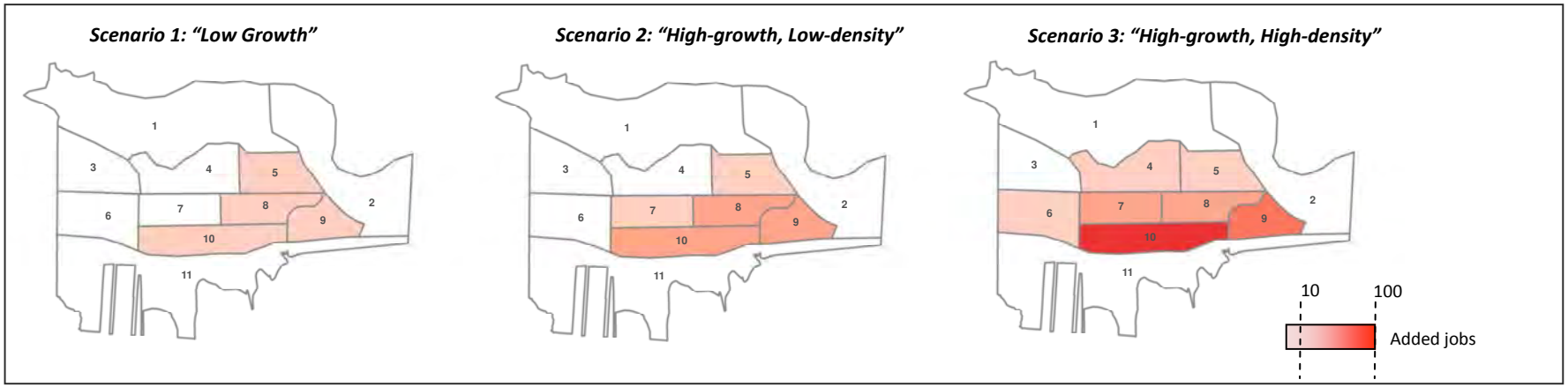


Figure 3.7 | Estimated changes in job types by growth scenario (year 2040)

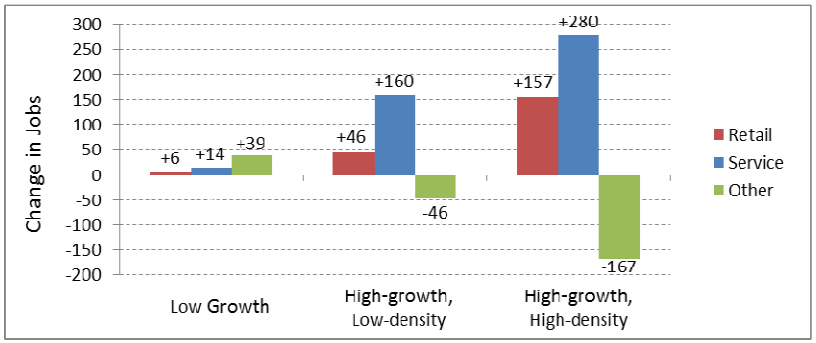
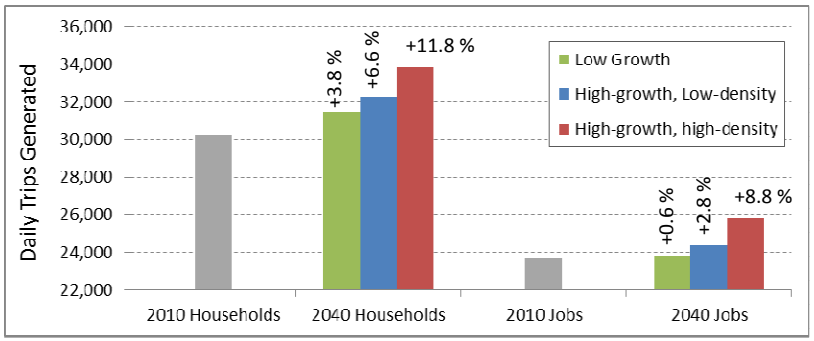


Figure 3.8 | Daily trip estimates of future growth scenarios (year 2040)



density" scenarios and begin to flatten by 2040, whereas the "High-growth, High-density" scenario is imagined as a strong average rate of growth through the future decades. Under the "Low Growth" scenario, 148 additional households are forecasted, while only 61 new jobs are expected. Whereas, nearly 400 households and 270 jobs are projected under the "High-growth, High-density" scenario.

It is envisioned that the higher rates of growth under the "High-growth, high-density" scenario will occur in tandem with a high degree of reinvestment activity. Thus, a transition of some of the industrial uses towards more retail- and service-related ventures is imagined. Estimates for what this transition might look like under the different scenarios are shown in Figure 3.7.

The different mix of jobs imagined in each scenario will also result in different levels of additional trips generated in the area. By applying the trip-generation rates previously discussed on page 19 to the different employment scenarios, while also applying an average rate of 9 trips/day per household, the different daily trip estimates shown in Figure 3.8 were derived.

Under the "Low Growth" scenario, job related trips are expected to grow only marginally (~150 trips/day), while household related trips would increase by more than 1,000 trips/day. Under the "High-growth, high-density" scenario, job related trips would grow by approximately 2,000 trips/day, and household related trips by more than 3,500. While there would likely be some overlap between the job and household based trips, the "High-growth, high-density" scenario could be expected to add somewhere around 4,000 additional trips to Lincoln Park's street network by 2040.

What the different levels of future traffic might mean for the various modes of transportation in the neighborhood is given further consideration in the chapters that follow. A general

discussion of their ramifications with regards to the three planning perspectives of this study is offered in the chapter summary below.

Chapter Conclusion

The information established in this chapter has the following implications with regards to the three planning perspectives that are a focus of this study:

Multi-modal integration:

The current topography and general layout of the neighborhood present some difficulties for multi-modal integration. Encouraging higher-density, mixed-use development in areas where the neighborhood's major residential and commercial/industrial uses converge (in sub-areas 7, 8, and 9) would create conditions that are more supportive of multi-modal integration.

Public investment:

Under a lower growth scenario, the maintenance of existing transportation infrastructure (i.e. roads and sidewalks) would continue to be a challenge like it is for the City of Duluth today. Encouraging higher residential densities could serve more residents with less infrastructure, and thus reduce this burden in the future, but the higher residential and commercial densities would also have the effect of serving more transit riders at lower operational cost.

The levels of travel demand projected under a "high-growth, high-density" scenario may produce demand for additional capacity on certain roadways. Some of that added travel demand, however, could be offset by the higher density, mixed-use development that is imagined in that scenario.

Future opportunities:

Opportunities to adjust current zoning regulations, as well as enhance connectivity between the neighborhood's activity centers and recreational areas have already been identified the City of Duluth's SAP committee. Many of these opportunities exist within the lower portion of the neighborhood (sub-areas 6 through 10) where future redevelopment opportunities are envisioned and could both be a part of, as well as help to encourage such redevelopment.