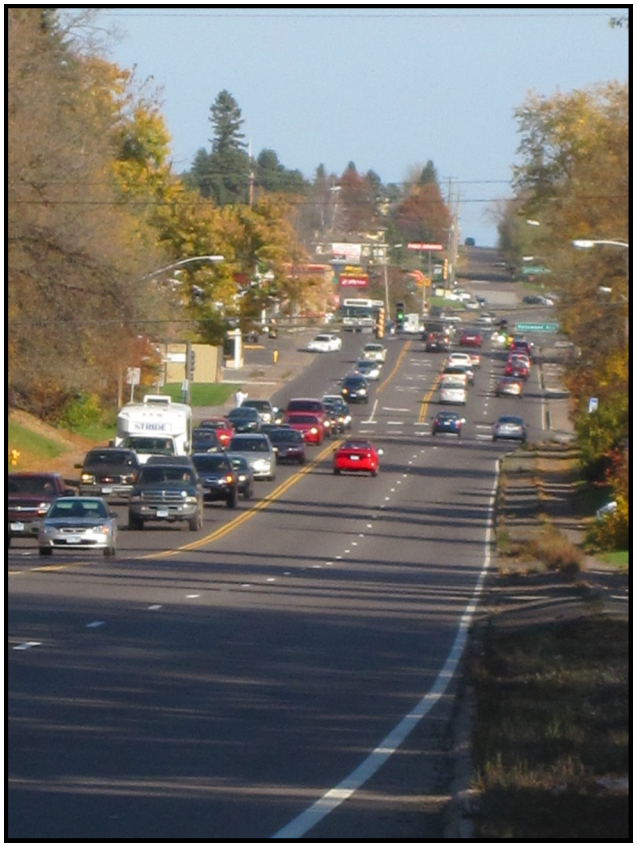
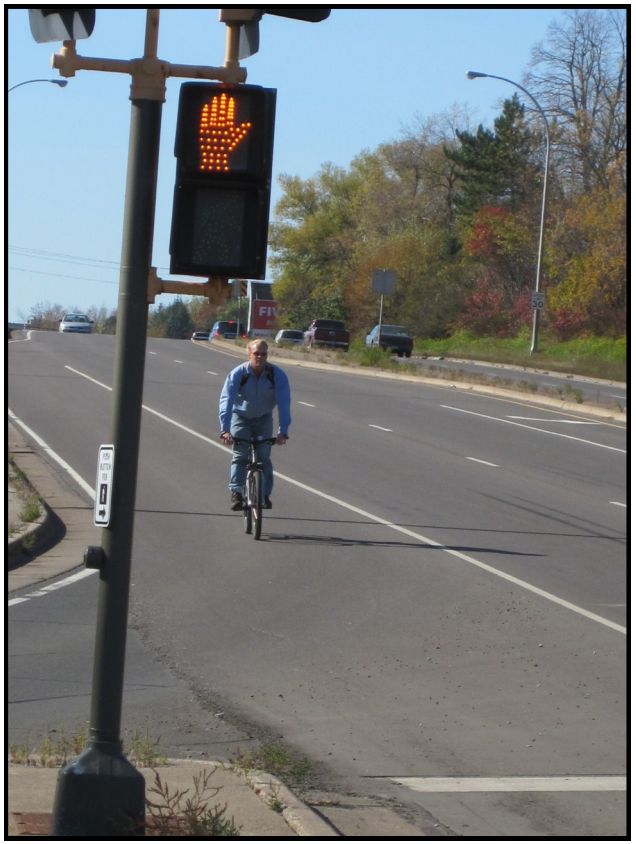
Central Entrance Corridor Study





Duluth-Superior Metropolitan Interstate Council

October 2012

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1. Introduction

The purpose of the Central Entrance Corridor Study is to identify a transportation system that will complement the land use vision outlined in the City of Duluth's *Central Entrance - Miller Hill Small Area Plan* (2009). That plan was developed to bring about a more specific vision for the future land use patterns of the city's Duluth Heights neighborhood, with specific attention paid to improving the Highway 53/194, or "Central Entrance" corridor.

The small area plan (SAP) calls for the corridor to become a more attractive and inviting place, to transition it into a more comfortable, walkable corridor, and to regain its function as the center and "Main Street" for the Duluth Heights neighborhood.

> When Central Entrance is reconstructed, it is critical that the context of the street as a walkable, urban thoroughfare be respected and the design solution permits comfortable use of the street by pedestrians and transit as well as vehicles.
>
> - *Central Entrance / Miller Hill SAP* (2009); p. 36.

As a plan, the SAP laid out some basic transportation and place-making objectives for the Central Entrance Corridor. This study identifies specific actions and improvements that will help the city to accomplish those objectives.

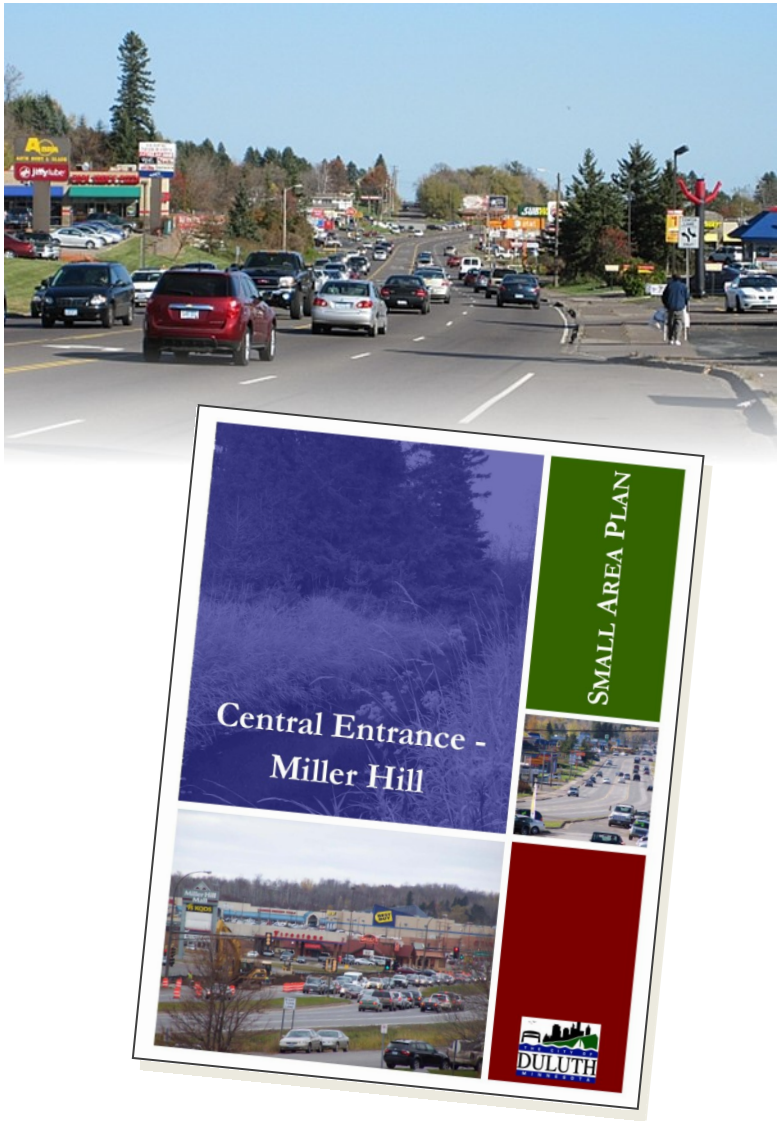


Figure 1.1: City of Duluth's Small Area Plan (SAP)

The Central Entrance Corridor Study is a follow-up to the City of Duluth's Central Entrance-Miller Hill Small Area Plans. Small area plans give more detailed recommendations for a specific area than are found in the city-wide Comprehensive Plan.

Another planning document that was referenced and examined as part of this study was the 2002 *Miller Trunk Highway Implementation Plan* produced by MnDOT. This plan was the basis for the large highway construction project in the Miller Hill Mall area in 2007-08. The plan also established several goals for the future Central Entrance corridor, which include the following:

> **Goals Identified in the *Miller Trunk Highway Plan*:**
>
> - Improve and simplify movement, circulation, and access.
> - Provide better planned access points.
> - Support business growth.
> - Improve safety and mobility for drivers, pedestrians, and transit.
> - Maintain or reduce travel time.
> - Reduce neighborhood traffic.
> - Support land use planning.

MnDOT's plan brought together many transportation strategies from a number of "Miller Hill" plans that were done in the 1990s. Some of these strategies are supportive of the objectives of Duluth's SAP, while others are not.

As part of this study, the MIC has sought to bring forth recommendations that are consistent with both MnDOT's and the city's plans, as both jurisdictions have a stake in the future development of this corridor. The recommended improvements found in Chapter 7 aim to support MnDOT's need to maintain the operational integrity of Highway 53/194 while also advancing the City's vision of a more walkable neighborhood center.

Figure 1.2: MnDOT's Miller Trunk Highway Plan

The *Miller Trunk Highway Implementation Plan* (2003) brought together strategies from a number of earlier plans. The MIC worked to align the objectives and strategies of MnDOT's plan with those of the City's SAP.

Seeking Context Sensitive Solutions

Context sensitive solutions will be necessary in order to balance the goals of moving large amounts of traffic efficiently and making Central Entrance a more "pedestrian friendly" corridor. This is something that is acknowledged and called for in Duluth's SAP:

> When Central Entrance is reconstructed, pursue a "context sensitive solution" as identified in the Institute for Transportation Engineers document "Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities."
>
> - *Central Entrance / Miller Hill SAP* (2009); p. 44

"Context Sensitive Solutions" (CSS) is a concept that the Institute for Transportation Engineers (ITE) defines in its document, *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities* (2006). It is a different way of approaching the planning and design of transportation projects, one that aims to balance the competing needs of many stakeholders. CSS also calls for flexibility in the application of design standards in order to achieve an end-design that is safe and supportive for all the users of a particular facility, regardless of the mode of travel they choose.

The ITE document was also heavily referenced for this study. The MIC worked with MnDOT, the City of Duluth, and a variety of other stakeholders to develop a set of recommended improvements to balance the needs of pedestrians, cyclists, transit riders, and drivers that will complement the city's vision for the corridor.

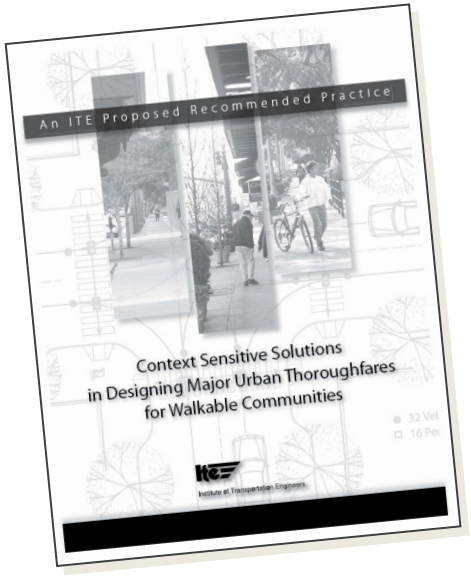


Figure 1.3: ITE's Proposed Context Sensitive Solutions

The Institute for Transportation Engineers (ITE) has published recommended context sensitive solutions for designing more walkable urban thoroughfares. There are many definitions of CSS but they share a common set of tenets:

- Create projects that balance safety, mobility, community and environmental goals.
- Involve the stakeholders early and continuously throughout planning and project development.
- Use an interdisciplinary team that is tailored to the project's needs.
- Address all modes of travel.
- Apply flexibility in design standards.
- Incorporate aesthetics as an integral part of design.

2. Land Use

As stated in the City of Duluth's *Central Entrance / Miller Hill Small Area Plan* (SAP), the city desires to transition the Central Entrance corridor into a "suburban town center" for the Duluth Heights neighborhood. This means a future corridor that is more densely developed, with a mix of commercial and residential uses, and an urban design that is more supportive of walking, biking, and transit use.

> Central Entrance from Pecan [Avenue] to Anderson Road should become the "main street" for the Duluth Heights Neighborhood. It should be a distinctive place rather than a collection of stand alone businesses lining a highway.
>
> - *Central Entrance / Miller Hill SAP* (2009); p. 36.

The character of Central Entrance as it currently exists is very different than the vision that is spelled out in the SAP. The patterns of land use found between Trinity Road and Basswood Avenue, for instance, are mostly low-density single-family houses, while eastward from Basswood Avenue to Blackman Avenue is low-density, and almost exclusively auto-oriented commercial uses.

As Map 2.1 shows on the following page, the Central Entrance corridor has four distinct *context zones* where the roadway environment changes as characteristics in both land uses and roadway design change. Table 2.1 provides estimates of how much of the corridor is occupied by commercial vs. residential uses based on acreage, and the density of those uses based on floor-area-ratio (FAR).

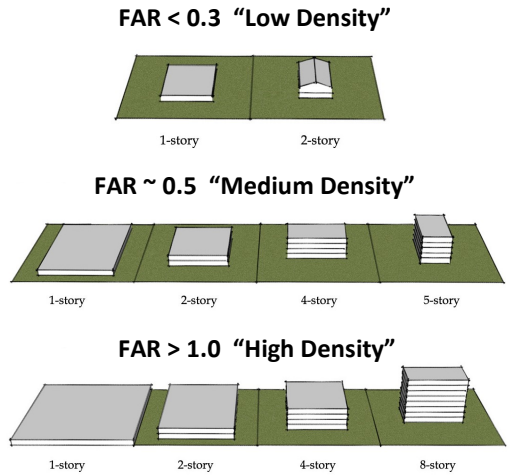


Image source: The Ontario Plan, City of Ontario, CA (2009)

Figure 2.1: A Definition of "Density"

Floor Area Ratio (FAR) is one measurement of land use density. It is the ratio of a building's total floor area to the size of the parcel of land upon which it is built. For the purpose of this study, the descriptions presented in Figure 1 are used to refer to "low", "medium", and "high" densities using FAR.

Map 2.1: Segment Comparisons: Land Uses

Table 2.1: Segment Comparisons: Land Use Types and Floor Area Ratios (FARs)

Land Use	Zone 1		Zone 2		Zone 3		Zone 4	
	Trinity Rd to Anderson Rd		Anderson Rd to Basswood Rd		Basswood Rd to Blackman Ave		Blackman Ave to Mesaba Ave	
	Acres	FAR	Acres	FAR	Acres	FAR	Acres	FAR
Single Family Residential	18.54	0.08	9.02	0.35	7.15	0.58	4.47	0.40
Multi-Family Residential	5.45	-	0.23	0.43	0.00	-	4.49	0.86
High Rise Residential	0.00	-	0.00	-	1.00	5.29	0.00	-
Strip Commercial	0.00	-	1.39	0.26	28.23	0.17	4.74	0.25
"Big Box" / Restaurant / Hotel	51.94	0.27	0.00	-	0.00	-	0.00	-
Public / Utilities / Other	0.58	-	1.89	1.18	1.16	-	26.60	0.34
Undeveloped	32.40	-	11.90	-	10.30	-	8.60	-

The four different context zones in Map 2.1 might be called "Shopping Center" (Zone 1), "Residential" (Zone 2), "Strip Commercial" (Zone3), and "Suburban Highway" (Zone 4). These different contexts carry different demands for local access, different traffic patterns, and different needs by different user groups. One thing that can be said they have in common is that they are all generally "low-density" in terms of FAR (with the exception of a few acres).

Trip Generation

Different land uses generate/attract different degrees of traffic. The types of commercial uses found along Central Entrance tend to generate some of the highest daily trip rates. Table 2.2 shows some of these rates, as estimated by the Institute of Traffic Engineers (ITE). From this table, it is apparent that Zone 1 and Zone 3 will attract a significant number of daily trips and contain a great many more turning movements on Central Entrance, while traffic is more likely to pass through Zone 2 and Zone 4. This creates different traffic contexts in addition to the differences in land use.

Orientation and Access to the Roadway

Most of the land uses along Central Entrance are set back away from the roadway with parking lots in front and direct access onto the highway. This results in an auto-oriented environment where businesses are difficult to access without an automobile and where many vehicles are entering and exiting the highway at many different spots throughout the corridor. Such an environment is not only

"Strip Commercial"

The context for much of Central Entrance is currently highway commercial, set back from the roadway and oriented principally to automobile users.

A mix of Low and High Density

A few pockets of higher density uses are interspersed along the corridor, such as Pennel Park Commons located behind this BP gas station.

"Big Box" / Restaurant / Hotel

The west end of the corridor is home to larger-scale restaurants and superstores that are set far back from the roadway and oriented exclusively to automobile access.

Table 2.2: Trip Generation Rates by Land Use

Land Use	Estimated Daily Trip Generation Rate (per 1,000 sq ft of gross floor area)[1]
Gas Station w/ Convenience Store	850
Fast Food Restaurant w/ Drive Thru	500
Chain Restaurant	130
Supermarket	110
Retail	49
General Office Building	15
Single-Family Housing*	6

Source: Trip Generation, Institute of Transportation Engineers, Sixth Edition (1997)

** Using average floor area of 1,800 sq ft.*

uncomfortable for pedestrians, but can also create unsafe conditions for motorists and non-motorists alike. This is contrary to the objectives identified in the SAP, which describes a future corridor that not only supports but attracts pedestrians, cyclists, and transit users.

In order to achieve the kind of corridor that the City of Duluth would like to see in the future, a shift away from the design conventions that are currently present along the roadway will have to occur. The number of direct accesses to Central Entrance will need to be reduced. Redevelopment should be moved closer to the roadway, with building entrances oriented to the sidewalk. Parking areas should be located behind or alongside the buildings, not in front, and vehicle access between the parking lots of different businesses should be linked together in order to minimize the number of places where vehicles are turning onto/off of Central Entrance. Without these changes, the corridor will continue to lack the "human" scale that can attract the levels of pedestrian traffic that make walkable retail areas so vital.

Potential Future Growth

The Central Entrance Corridor has the potential to grow and attract more development. Market research that was carried out as part of the SAP suggests that the area has the capacity to absorb 40,000 more square feet of retail space, 25,000 square feet of additional office space, and 150 new multi-family units. Based on future zoning changes being proposed by the City of Duluth, the area between Trinity Road and Basswood Avenue could receive much of the additional retail, with Basswood Avenue to Blackman Avenue area

Figure 2.2: Central Entrance / Miller Hill Corridor Market Analysis (2009)

The City of Duluth commissioned a market study of the Central Entrance corridor prior to developing the Miller Hill/Central SAP. The market study was used to gauge the potential for redevelopment along the corridor.

also having the potential for some modest redevelopment or infill development.

> The current vacancy rate for Miller Hill (4.0%) is below the city average, suggesting there is demand for retail in the corridor, but more in the Miller Hill area than along Central Entrance, which has developed into a pedestrian unfriendly, highly fragmented, highway strip retail core dominated by fast food and auto services.
>
> *- Central Entrance / Miller Hill Corridor Market Analysis*
> *MXD Development Strategists (2009)*

Given the commercial nature of the present corridor and the particular vision of the SAP, it can be assumed that most of any new development will be organized along the roadway. These changes might come in the form of new development or as redevelopment of existing sites, either case representing an opportunity to introduce improved urban design elements that are more supportive of the vision established in the SAP.

Additional development will not come without a cost in terms of traffic, however. Each new use has the potential to generate additional vehicle trips, and as is indicated in Table 2.2 on page 6, certain uses can generate significantly more trips than others. One notable development opportunity along the corridor is the reuse of the old Central High School site (Figure 2.3), in which a visioning process conducted by the City of Duluth has identified a future office park and high-density residential development as the preferred land uses. These uses could bring additional vehicle trips to the corridor

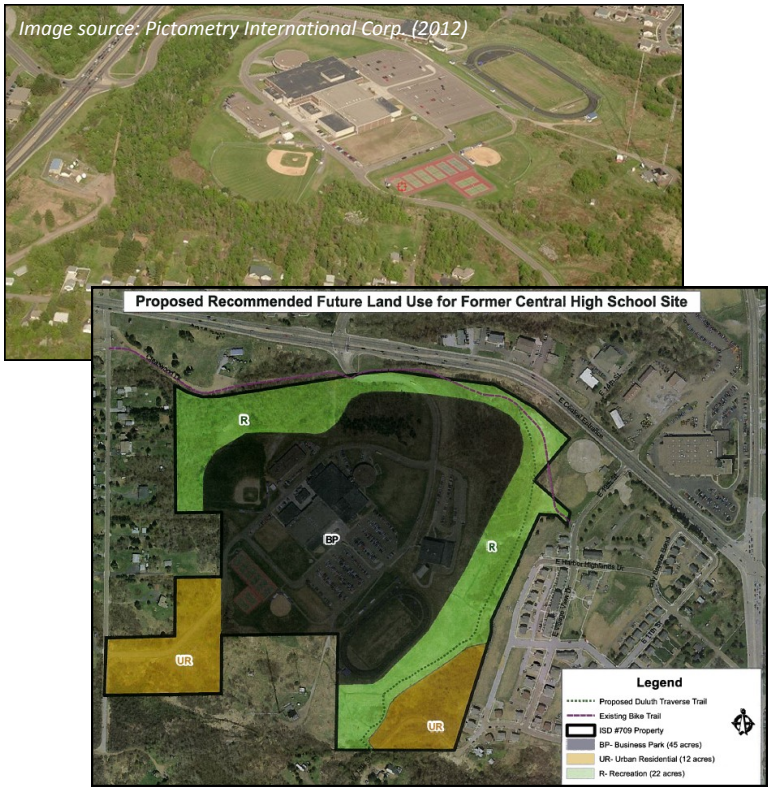


Image source: Duluth Planning Department (2012)

Figure 2.3: Former Central High School Site

The site of Duluth's former Central High School is currently available for redevelopment. The size (79 acres) and relative isolation of site poses some unique implications for future land use and transportation patterns in the Central Entrance corridor.

per day. The impact of this additional traffic on the Central Entrance corridor was explored as part of this study and is discussed in the following chapter.

The Rate of Redevelopment

The rate of redevelopment along the Central Entrance corridor will depend on a wide variety of economic factors, and cannot be predicted with any certainty. However, given modest growth projections for the region (Figure 2.4), it can be reasonably assumed that redevelopment throughout the corridor will be piecemeal and will not occur uniformly over time. The inclination of developers, therefore, will most likely be to replicate the forms of development that are already there: low-density, strip-commercial.

In order to create a roadway environment that is substantially different from the one there today, significant effort will be required on the part of city officials to craft and implement effective land use policies for the corridor, and to work effectively with future developers to realize the vision identified in the SAP.

> Significant changes are needed to the development standards for the area, and the city's new Unified Development Code will incorporate plan recommendations relating to the building and parking placement and other design enhancements to improve the appearance and walkability of the area.
>
> - *Central Entrance / Miller Hill SAP* (2009); p. 1.

Because urban land use patterns have a longevity that policy initiatives often do not, streetscape planning and design standards

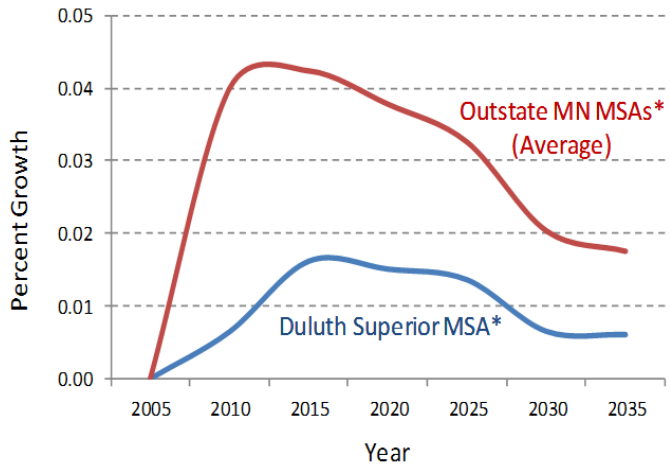


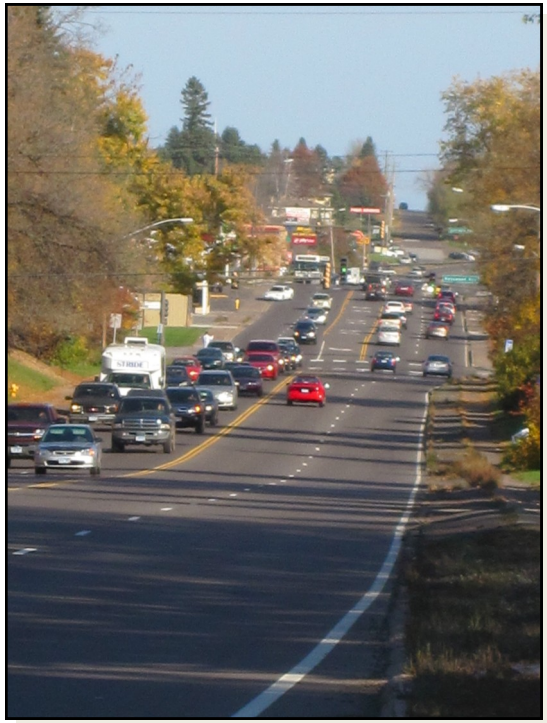
Figure 2.4: Projected Rates of Population Growth

The Minnesota State Demographer's Office projects a rate of growth for the Duluth metropolitan lower than the average rate for all the outstate metropolitan areas. This suggests that urban redevelopment will likewise be slower.

Data source: MN State Demographic Center (2012)

** Metropolitan Statistical Area*

that are supported through local land use ordinance would be the most effective means with which to effect the desired transition over time.



Similarly, any changes to the design of the highway itself are also a long way off. Central Entrance (State Trunk Highway 194), was last reconstructed in the 1980s and was overlaid with new blacktop as recently as 2009. MnDOT's current life-cycle projections estimate the roadway will not need to be rebuilt until sometime after the year 2020. This has two implications. On the one hand, any redevelopment that happens before then will continue to take its cues from the existing roadway design, which will tend to reinforce the existing land use patterns. On the other hand, there is ample time for the City of Duluth and MnDOT to cooperatively plan for and implement a future highway design that better supports the changes the city has called for in the SAP.

The chapters that follow take a closer look at the existing roadway and the types of improvements that will support the city's vision while continuing to meet the transportation demands that future development may bring.

3. Transportation

This chapter describes the current transportation network in the Central Entrance corridor in terms of the roadway, pedestrian, bike, and transit users. With the changes in land use proposed in the City of Duluth's Small Area Plan (SAP), adjustments to this network will need to be made.

The City of Duluth is responsible for land use regulations in and around the corridor, but MnDOT is the agency responsible for the operations and maintenance of Central Entrance (STH 194) itself. Likewise, St. Louis County is responsible for Arlington Avenue, which is an important connection to the corridor. The efforts of these three jurisdictions will need to be coordinated to successfully make the changes needed in order to support the objectives of the city's SAP.

Roadway

Central Entrance is a primary roadway in Duluth, connecting the Miller Hill commercial area to Mesaba Avenue, 6th Avenue East, and the central area of Duluth. As defined in this study, Central Entrance is the 2.4 mile stretch of State Highway 194 from Trinity Road eastward to Mesaba Avenue. Characteristics of the roadway described below include daily traffic volume, functional classification, level of service. It ends with a discussion of the results of a traffic modeling effort to look at the impacts of the land use changes identified in the SAP.

Central Entrance Annual Average Daily Traffic (AADT) 1999-2009			
Year	Mesaba Ave to Arlington Ave	Arlington Ave to Anderson Rd	Anderson Rd to Trinity Rd
1999	18,200	18,200	21,800
2000	20,900	21,900	22,000
2002	19,800	21,900	20,000
2003	19,800	21,900	20,000
2004	20,500	22,500	22,000
2006	23,000	24,600	24,000
2007	23,000	24,600	24,000
2009	24,100	23,800	NA

Table 3.1: Annual Average Daily Traffic (1999-2009)

Central Entrance facilitates the movements of more than 24,000 vehicles a day. This is roughly 6,000 (33%) more than a decade ago.

Average Annual Daily Traffic (AADT)

As Table 3.1 on the previous page shows the annual average daily traffic (AADT) for Central Entrance in three segments. AADT are estimates developed by MnDOT that are adjusted for seasonal variation. On the whole, Central Entrance serves more than 24,000 vehicles a day. This is roughly 6,000 more trips per day than a decade ago, but as Figure 3.1 illustrates, this is an increase that has been slowing since 2006, a pattern that has likely been influenced by recent road construction projects in the area, but which also mirrors state and national reductions in the amount of miles being traveled. This slowing trend is anticipated to continue based on demographic projections.

Functional Classification

It is important to remember that roads do not work independent of each other, but make up a network. Functional classification is how roadways are defined in terms of this network. It groups them into "classes", or systems, according to the way people use them, and describes how those roadways provide mobility versus access (see Figure 3.2).

Central Entrance is classified as a principal arterial, and as such its "function" is to serve mobility over access. Although many business and other facilities have direct access onto Central Entrance, it is important to keep this in mind and to seek ways to manage access in order to maintain a good degree of mobility, or level of service (LOS), into the future.

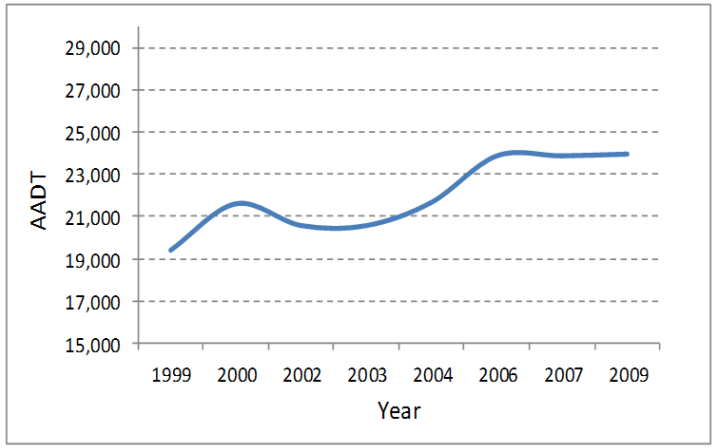


Figure 3.1: Central Entrance AADT (1999-2009)*

The increase in AADT on Central Entrance has been slowing in recent years. Some of this is due to recent road construction projects, but it also mirrors state and national declines in the amount of daily miles traveled.

** Average of all segments*

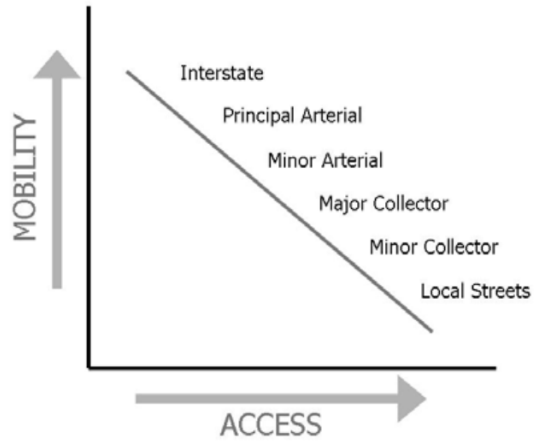


Figure 3.2: Functional Classification

Functional classification is a hierarchy that defines the role of a particular roadway. It describes the different balances between the need for mobility and access.

Level of Service (motorized travel)

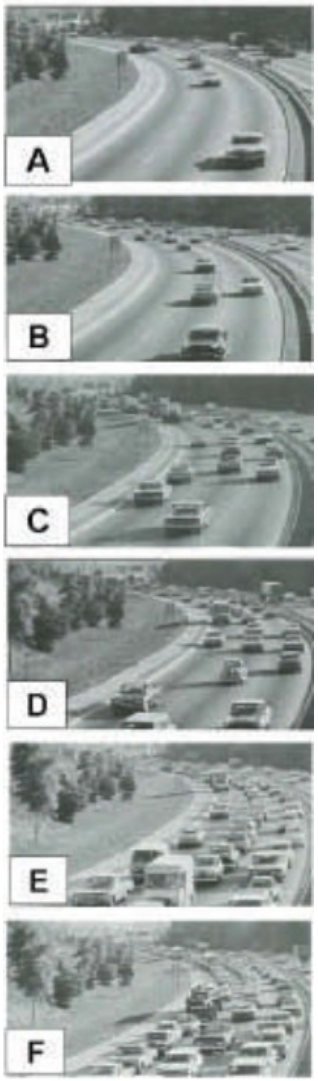
As it relates to automobiles, Level of service (LOS) is a measure of roadway capacity and mobility. It is measured in terms of vehicles-to-capacity (V/C) ratio, but it is generally communicated using a letter grade: A through F. An LOS "A" equates to no congestion, and an LOS "F" means total congestion. The photos in Figure 3.3 illustrate this concept.

Although LOS is relatively straight-forward concept, the methods for determining V/C ratios typically factor in a number of variables including design features such as number or lanes, width of lanes, the free-flow speed of traffic, peak volumes of traffic, etc. These factors become part of the inputs into computerized traffic models. Such a model was developed for this study to provide LOS estimates for Central Entrance as it would be in the future with the changes being promoted in the Central Entrance / Miller Hill SAP.

Central Entrance Small Area Model

This section describes the results of the Central Entrance Small Area Model. It contains a brief description of the model and its results. A more detailed description of the modeling effort can be found in the appendices.

The purpose of the model was to determine the traffic impact of expected changes in nearby land uses on Central Entrance and other connecting and parallel roadways. The model was used to assess how well the network in and around the corridor will be functioning under projected traffic levels in 2030, including the increased trips due to the land use changes described in the SAP. Particular



Figured 3.3: Level of Service (LOS) Explained: LOS is a qualitative statement about the road's operation, but is based more quantitatively on the measure of vehicles present compared to a road's capacity, as illustrated below.

attention was given to how well the corridor's seven signalized intersections would operate under these future conditions. The signalized intersections with Central Entrance are Trinity Road, Mall Drive, Anderson Road, Basswood Avenue, Arlington Avenue, Pecan Avenue and Mesaba Avenue (see Map 3.1)

Modeling the future 2030 scenario involved making a few assumptions about growth and the location of land use changes. A uniform 5% growth rate was applied to the regional traffic volumes over the 19 year period, and additional vehicle trips resulting from land use changes with in the corridor were estimated based on the following locations and mix of land uses:

1) Redevelopment on both sides of Central Entrance from Bass-

Map 3.1: Signalized Intersections on Central Entrance

wood Avenue to Anderson Road (residential land uses changing to commercial/office uses).

2) Redevelopment of the former CHS site (former high school changing to a mixed use commercial, business, multi-family residential area.

Several changes to Central Entrance and connecting roadways were also assumed for the 2030 projection. These included the coordinated operations of all the traffic signals along Central Entrance, an additional traffic signal at Blackman Avenue, two additional mid-block, pedestrian-actuated crossings in the corridor, a more complete system of backage roads, and additional raised medians in certain areas. All these changes reflect recommendations proposed in Chapter 7.

Results of the modeling show that increased delay can be expected at the traffic signals due to the additional traffic, but that interconnection and coordination of these signals would move traffic through the corridor more efficiently. Certain left turn movements would operate at LOS E, but vehicle queues would be very manageable and allowed to, in most cases, clear every cycle.

In general, the modeling shows that, with the recommended changes to the road network and signal operations, there is enough capacity at the intersections to account for the traffic increases expected from the type of growth and redevelopment being proposed in the SAP. The modeling also showed that interconnected and coordinated traffic signals result in better corridor operation and that the two mid-block pedestrian actuated signals can provide pedestrians ad-

ditional opportunities to cross the busy corridor without greatly impacting traffic.

Pedestrian Environment

The sidewalk network in the Central Entrance corridor is incomplete. There is no sidewalk on the north side of Central Entrance from the transit stop just west of Pecan Avenue to Arlington Avenue (a distance of 0.7 miles). The presence of a dirt path there indicates that many pedestrians are walking along that side of the roadway.

Having sidewalks on only one side of the road makes it not only difficult to travel by foot and access transit, but difficult for customers to access businesses too. According to a study done by the Seattle Department of Transportation, the more walkable a business district is, the more successful businesses are. To complement the vision of the Central Entrance / Miller Hill SAP, to make this area more walkable, the pedestrian network should be completed. This includes sidewalk along both sides of Central Entrance from Mesaba Avenue to Mall Drive.

In addition, the lack of crosswalks in the corridor is also a problem. In some segments of Central Entrance, there are large gaps between traffic signals, which makes it difficult for pedestrians to safely cross the street. The following gaps can cause Central Entrance to become a barrier for pedestrians:

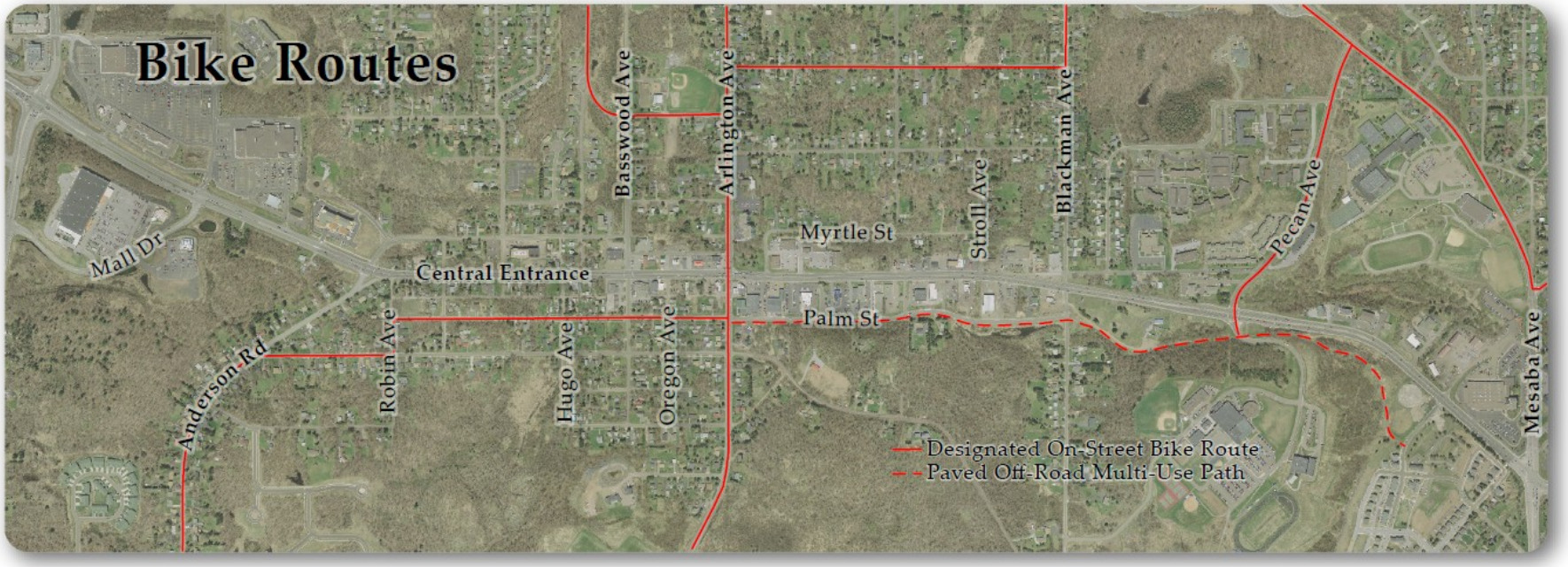
- Mesaba Avenue to Pecan Avenue: 0.5 miles
- Pecan Avenue to Arlington Avenue: 0.75 miles
- Basswood Street to Anderson Road: 0.37 miles

Bicycle Network

The high volumes of traffic on Central Entrance are not conducive to a good biking environment. Currently there is a parallel bike trail along Palm Street from Arlington to Blackman Avenue. This bike path continues along the south side of Central Entrance until 13th Street. It provides bikers of all levels with a safer alternative to riding on Central Entrance.

Map 3.2 shows the on street bike route network in the Central Entrance area, as well as the off street multi-use path. From Arlington Avenue westward, the recommended bike route is on-street, following Palm Street to Robin Avenue, and then south to Orange Street, west to Anderson Road to Trinity Road.

Map 3.2: Bike Routes Near Central Entrance



More advanced, confident bikers do ride along Central Entrance because it is more direct, and they can ride at speeds closer to that of the traffic on the east bound direction down the hill. The current bike facility that parallels Central Entrance, while needing improvements, does give less advanced riders an option of traveling through the corridor by bike without riding in heavy traffic. It also provides an alternative route for advanced riders to ride up the hill with less traffic.

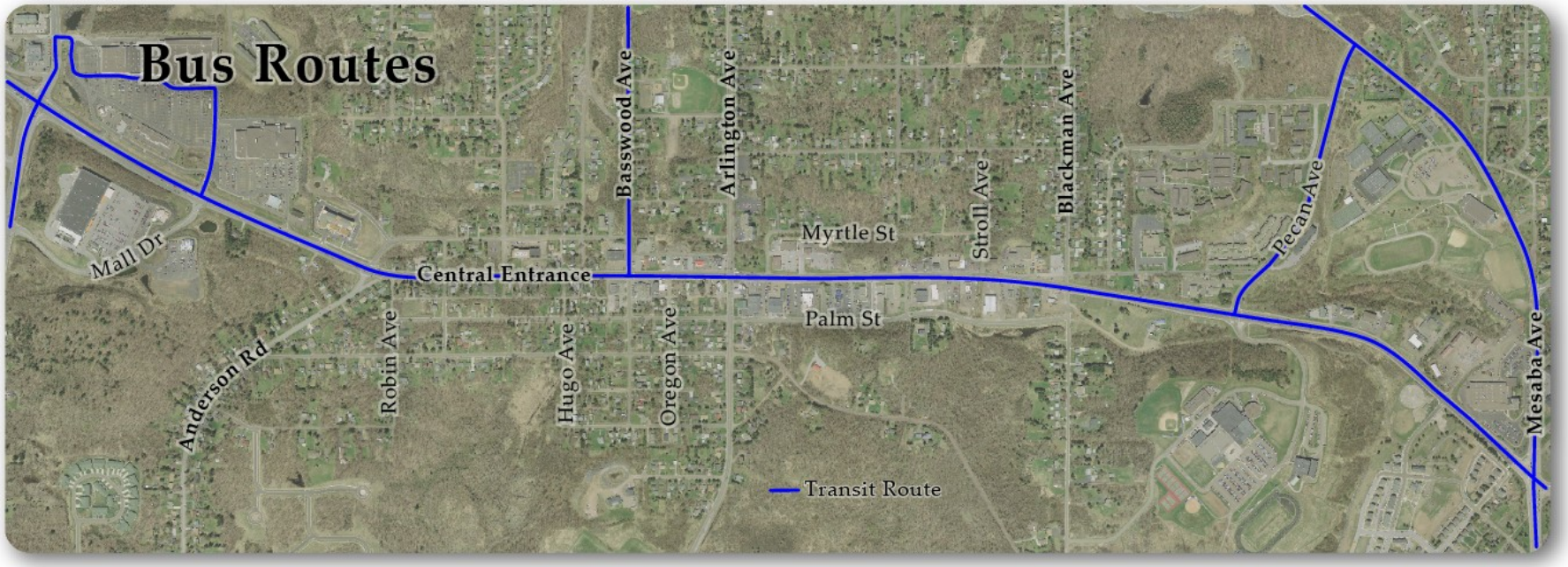
Transit

Transit service along Central Entrance includes routes 10, 14, 18 and 20. Route 10 originates downtown and runs almost the full length of the study area from Mesaba Avenue to Mall Drive where it turns south toward Home Depot and eventually the Miller Hill Mall. Route 14 also originates downtown and runs along Central Entrance in our study area from Mesaba Avenue to Basswood Avenue where it turns north through the Duluth Heights neighborhood and serves the Miller Hill Mall. Both routes 10 and 14 run both ways on Central Entrance. Route 18 originates at UMD and runs along Central Entrance for a short distance from Pecan Avenue to Blackman Avenue and loops back to UMD. This route allows UMD riders access to Miller Hill Mall routes without having to go through downtown. Route 20 originates downtown and goes to the Airpark area and then to Walmart in Hermantown and follows Central Entrance back toward downtown. See Map 3.3 on next page.

As the variety of route options suggest, the Central Entrance corridor is well connected to transit service. However, every transit trip be-

gins and ends as a pedestrian trip. As already discussed, the corridor has some significant gaps in the sidewalk connection, as well as significant challenges with regards to crossing the roadway. The city's vision of making this area a with higher commercial and residential densities will likely increase the demand for transit service along this corridor, and therefore improved sidewalk connections to transit should be a development objective moving forward.

Map 3.3: Transit Routes in the Central Entrance Area



4. Access Management

This section of the plan describes access points (public and private) onto Central Entrance. The information collected shows the numbers and spacing of these accesses as well as the associated land use and design characteristics of the corridor. The chapter provides the information needed to identify strategies to manage the impacts of accesses over time in order to successfully carry out the goals outlined in Duluth's *Central-Entrance / Miller Hill Small Area Plan* (2009).

What is Access Management, and Why is it Important for Central Entrance?

Access Management is about identifying and pursuing strategies that can help a community to preserve the capacity of its roadway(s) and reduce the need for more costly road improvements. In general, the strategies of Access Management are aimed at optimizing the number and spacing of access points along a corridor. But successful access management can also improve safety along a corridor by reducing the number of potential conflict points.

Central Entrance is a principal arterial that is designed for a high level of mobility between the city's downtown and the Miller Hill Mall area. It is a primary objective of both MnDOT and the City of Duluth to maintain the roadway's ability to move approximately 25,000 vehicles a day without compromising safety for all users of the corridor. Yet, the corridor already has an abundance of access points

Goals of Access Management:

- Increased safety
- Improved operations
- More comfortable customer access to businesses.

Strategies of Access Management include:

- Developing frontage/backage road systems.
- Consolidating and sharing accesses.
- Managing movements with medians.
- Managing the spacing and design of future accesses with land use ordinances.

which together can impede mobility and increase the risk for vehicle collisions and pedestrian strikes.

The city's future vision for the corridor, further complicates the situation; the desire to make the Central Entrance corridor a higher-density, walkable, mixed use commercial district will likely bring even more traffic to the area and create more demand for access.

As future development happens along the corridor, a failure to manage access will likely result in added congestion, longer commute times, increased crashes, more cut-through traffic in nearby neighborhoods, and increased fuel consumption and vehicle emissions. Adjacent businesses could also suffer as customers and freight deliveries begin finding it more difficult and uncomfortable to travel to their sites. It is therefore important to put in place the tools that can help the community direct future redevelopment in ways that will improve access in the area, not compound the problem.

Source: Pictometry International Corp. (2012)

Accesses Management on Central Entrance: Existing Conditions

The Central Entrance corridor currently has 90 points of access along its 2.4 miles between Trinity Road (US Hwy 53) and Mesaba Avenue (STH 194). A third of these are associated with the intersection of public cross streets, while the remaining 60 accesses represent a combination of private business and residential driveways that produce varying degrees of traffic.

To provide a more detailed assessment of traffic conditions, the

corridor was divided into the four zones described in Chapter 2. The impact of accesses on the traffic operations and safety of the corridor were also studied in terms of these four distinct areas.

Map 4.1 below shows the number of access points on Central Entrance per each of the four zones, as well as the access densities and corresponding crash rates of each of the segments.

Table 4.1 on the following page summarizes the key characteristics within these zones that relate to access management issues. Chief among these are the relationship between the density of access points and the rate of crash occurrences. As the table shows, the segment of Central Entrance between Basswood Avenue and Blackman Avenue (Zone 3) has the highest access densities *and*

Map 4.1: Number of Access Points on Central Entrance

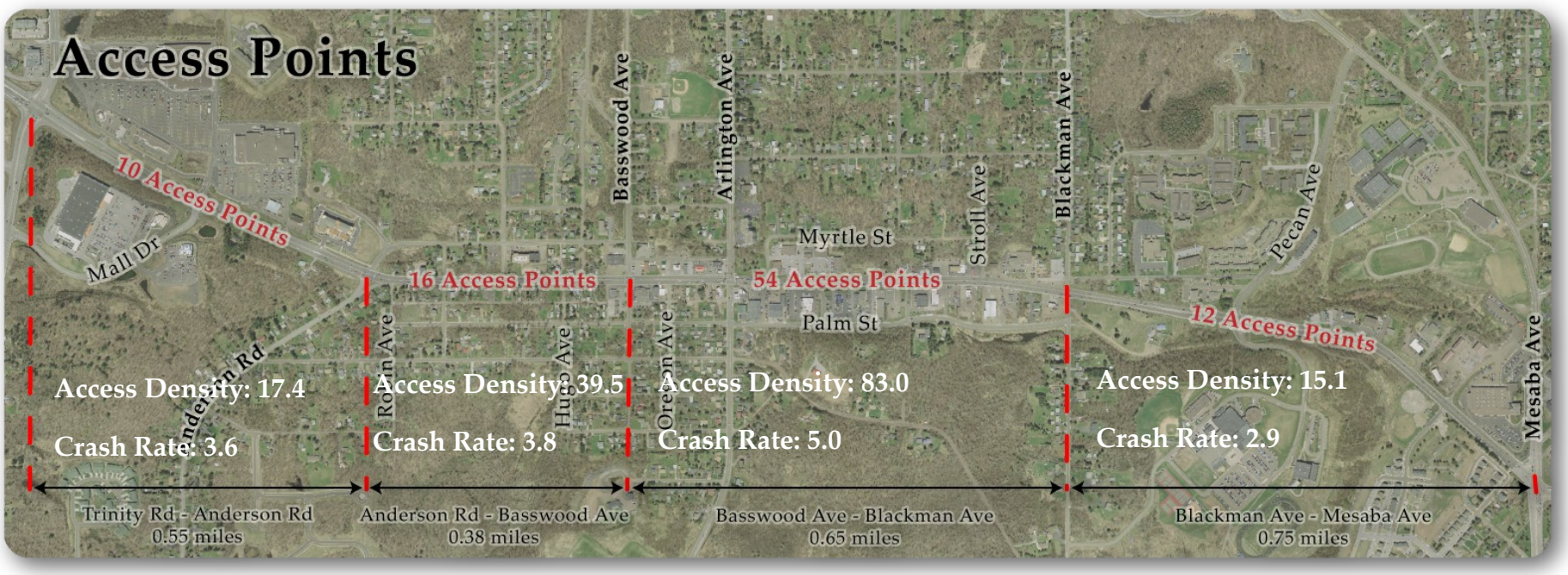
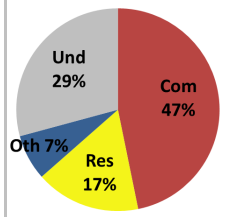
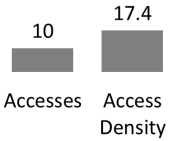
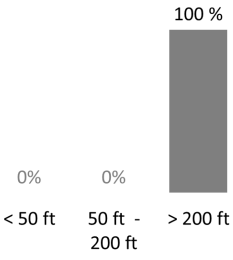
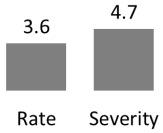
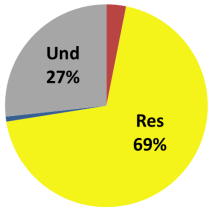
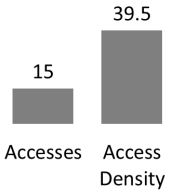
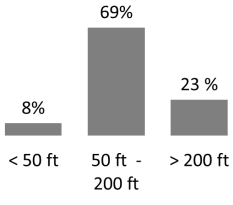
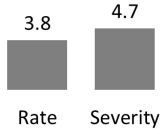
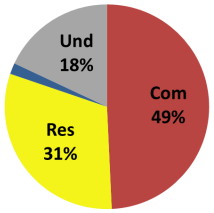
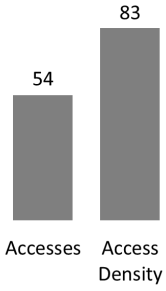
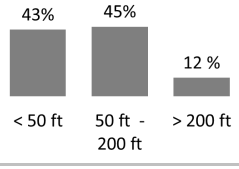
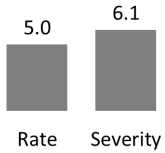
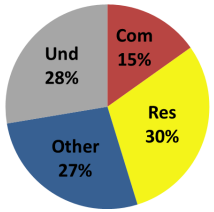
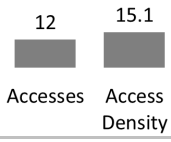
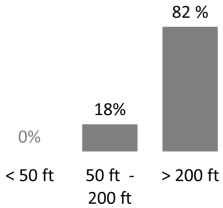
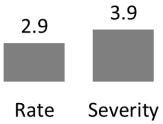


Table 4.1: Segment Comparisons: Existing Conditions

Context Zone	Length (miles)	% Land Use Types within Study Area	Accesses & Access Density (access per mile)	Spacing Between Accesses (percent of accesses in segment)	Centerline Treatment	Crash rates & severity (per mill. Vehicle miles traveled: 2007-2009)
Zone 1: Trinity Rd. to Anderson Rd. This section is a divided four-lane roadway with a median and dedicated turn lanes. The speed limit changes from 40 mph to 30 mph as you move east. Accesses are limited to intersections and some limited right in right out.	0.58				Raised median & Divided highway	
Zone 2: Anderson Rd. to Basswood Ave. This section is a four-lane roadway with turn lanes only at intersections. This area has the most potential for land use change. It is currently a mix of residential, some commercial and a school. Local roads are not connected and accesses are very limited.	0.38				Painted centerline	
Zone 3: Basswood Ave. to Blackman Ave. The roadway converts to a five-lane configuration with a center two way left turn lane (TWLTL). This section also has the highest density of accesses and is the location of many auto-oriented businesses. The land use in this area is more of highway related strip development.	0.65				Two-way left turn lane (TWLTL)	
Zone 4: Blackman Ave. to Mesaba Ave. This section is a four-lane divided cross-section with median and dedicated turn lanes until Blackman Avenue. Commercial uses are offices and service-based with minimal trip attraction. However, this area is where the former Central High School site is located and has some potential for development along the corridor.	0.78				Raised median & TWLTL	

highest rates for crashes and severe crashes. A further discussion of the access densities on Central Entrance and how access density impacts crash rates can be found in Chapter 5.

Access Density:

The access density, as it is found along much of the corridor, represents an area of deficiency, according to density guidelines that MnDOT established in its *Miller Hill Access Management Plan* (2003). Most strikingly, the density of accesses found between Basswood Road and Blackman Road (Zone 3) is more than 2 1/2 times greater than the stated density goal of MnDOT's plan (Table 4.2).

The portion of corridor found in Zone 3 has the most auto-oriented land uses along Central Entrance, with many commercial businesses having more than one access onto the roadway. In efforts to maintain the integrity and capacity of the corridor, significant attention should be paid to the numbers and placement of accesses in this area. In particular, efforts should be made to limit any new accesses and to work with land owners and businesses to consolidate accesses.

Access density should also be a concern in Zone 1 (Trinity Road to Anderson Road) and Zone 2 (Anderson Road to Basswood Avenue), as these sections do not have access densities as high as the segment in Zone 3, but they do have a greater potential for seeing development in the near future. This presents an opportunity to work with potential developers to limit the

Segment of Central Entrance	**MnDOT Density Goal**[1] (Accesses/mile)	**Access Density** (Accesses/mile)
Zone 1: *Trinity Rd to Anderson Rd*	< 17	17.4
Zone 2: *Anderson Rd to Basswood Ave*	< 33	39.5
Zone 3: *Basswood Ave to Blackman Ave*	< 33	83.0
Zone 4: Blackman Ave to Mesaba Ave	< 33	15.1

1. Miller Hill Access Management Plan (2003)

Table 4.2: Comparison of Access Densities with MnDOT's Density Goals for the Corridor.

Of the four areas of the Central Entrance corridor being studied, all but the segment between Blackman Avenue and Mesaba Avenue have access densities that exceed MnDOT's access management goals.

numbers and impacts of accesses in these areas, and possibly incorporate site designs that help consolidate accesses and bring densities more in line with the density goals established by MnDOT.

Advancing Access Management Objectives

The differences in the characteristics of the four zones looked at in this study, along with the anticipated changes in the future land use patterns discussed in Chapter 2, suggest the need for different improvement strategies in each zone. These will be addressed as recommendations in Chapter 7.

In general, the aim of both MnDOT and the city should be to limit new accesses and reduce existing accesses in those areas with the highest access densities. This, of course, is easier said than done; land use changes along the corridor are expected to be slow and incremental.

Opportunities to improve the access density issue on the Central Entrance corridor will need commitment from both MnDOT and the city to improve the access environment with every individual development project moving forward. Such an effort may require strengthening local ordinances in addition to negotiating with businesses and landowners. A detailed access management plan for the corridor would also help to identify, prioritize, and address specific accesses that may have the biggest impact to safety and operations.

5. Crash Assessment

This section provides a basic assessment of traffic safety along the Central Entrance corridor. For this effort, crash records were retrieved from MnDOT's Crash Mapping Analysis Tool (CMAT) for the years 2007-2009 and assessed in relation to the design and land-use context of the roadway. Crash Records from 2007-2009 were used for this assessment because it is MnDOT's standard to use three-year segments, and these years represented the most recent crash data available at the time. By utilizing data like this, it allows for comparisons of the Central Entrance crash data with those of the larger region.

Vehicle Crashes - Considering Numbers vs. Severity

While it's obvious that no crashes are desirable, those that result in serious injuries or fatalities demand the most attention toward prevention. This has led to the distinction between the *crash rate* and *severity rate* of a roadway facility (see info at right).

Due to their heavy traffic volumes, urban arterials like Central Entrance have a lot of crashes merely as matter of exposure: 25,000 vehicles per day offers more opportunities for crashes than 2,500, for instance. But numbers don't necessarily indicate a problem.

Between 2007-2009, the 2.4 mile Central Entrance corridor had more than 70 crashes per year, or a crash rate of 3.7 crashes per million vehicle miles traveled. However, when compared to a regional

Crash Rates and **Severity Rates** are based on the crash history of a location or roadway segment and are used to communicate a certain expectancy of future crashes there. More specifically, they are a measure of the following:

- ***Crash Rate*** *= number of crashes per million vehicle miles traveled.*
- ***Severity Rate*** *= number of property-damage-equivalents per million vehicle miles traveled (more severe crashes are counted as a multiple.*

average for roadways of a similar type throughout NE Minnesota this rate does not seem extraordinary (Figure 5.1).

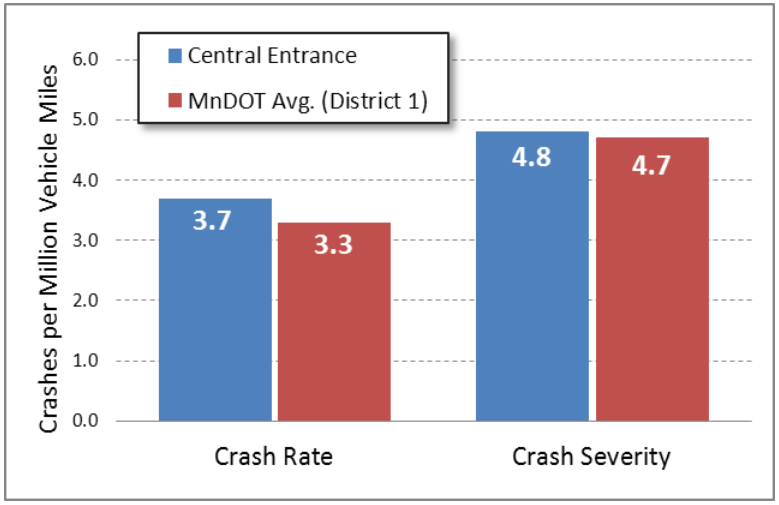
Another way to look at crash data is by the severity of injuries that were reported. Crashes that result in serious injury or fatality lend more weight to the crash rate calculation. In the case of Central Entrance during 2007-2009, such crashes raised the crash rate of 3.7 to a severity rate of 4.8. Yet, this too does not seem atypical when compared to the regional averages.

It is only when we break up the corridor into its smaller segments that a more nuanced picture emerges about potential deficiencies along the roadway. When looked at in terms of the four different land use context zones described in Chapter 2, one segment stands out as having poorer-than-average crash statistics: the stretch between Basswood Avenue and Blackman Avenue. The crash and severity rates found in this segment suggest it experiences 51% more crashes and 30% more severe crashes than should be expected for most 4-lane roadways throughout northern Minnesota (Figure 5.2).

Types of Crashes

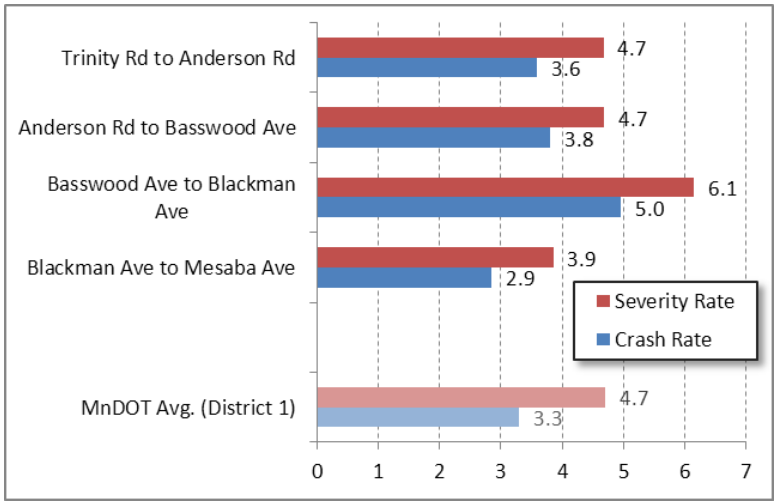
Many factors can contribute to the occurrence of a crash: weather, road surface conditions, and human behavior just to name a few. It is therefore difficult to determine causality based on crash type and location alone. However, a few things are worth noting about the types and makeup of crashes found in each of the four segments of the Central Entrance corridor.

Figure 5.1: Rate Comparisons with Regional Averages for 4-Lane Urban Arterials



Data sources: Minnesota Computer Mapping Application, MnDOT (2011). 2007-2009 Trunk Highway Section Statistics, MnDOT (2011).

Figure 5.2: Comparison of Crash Rates by Roadway Segment

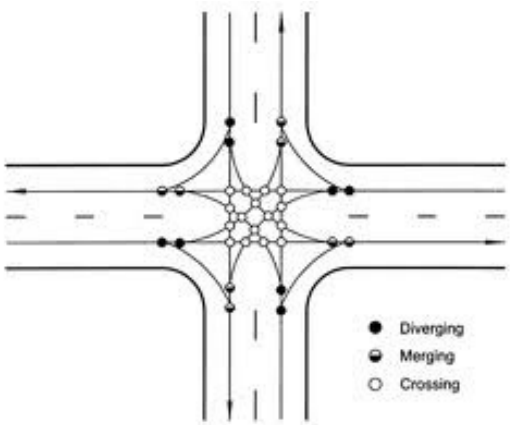


Data source: Minnesota Computer Mapping Application, MnDOT (2011).

Intersection vs. Non-Intersection Related Crashes:

When looking at the corridor as a whole, most crashes are associated with the intersections. This is not surprising since a tradition of traffic safety research tells us that most urban crashes happen at intersections, especially signalized intersections. When looking at the corridor in terms of this study's four different context zones, however, the segment between Basswood Avenue and Blackman Avenue once again stands out as rather unique. More than half of the crashes occurring in that segment were reported to be not associated with an intersection. The segment between Anderson Road and Basswood Avenue, though under 50%, still had roughly 10% more non-intersection crashes than the zones at either end of the corridor (Figure 5.3).

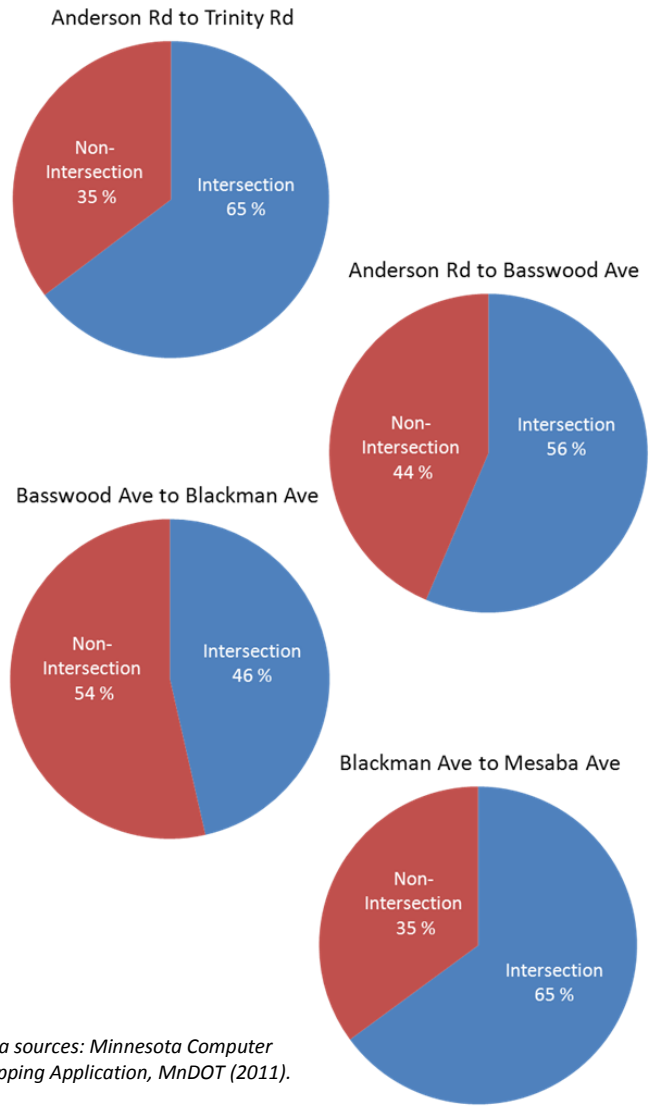
The higher percentages of non-intersection crashes in the middle segments of the corridor correlate with the higher access densities found in those areas. This is because each access represents additional conflict points (Figure 5.4) in those segments.



source: Publication: FHWA-HRT-04-091 , FHWA (2004).

Figure 5.4: Conflict Points of a Traditional Intersection

Every intersection or access contains a set of conflict points. An traditional intersection contains 32 such points, which generally leads to more crashes occurring at intersections rather than non-intersection locations.



Data sources: Minnesota Computer Mapping Application, MnDOT (2011).

Figure 5.3: Junction vs. Non-Junction Crashes by Roadway Segment

The sections of Central Entrance between Anderson Road and Blackman Avenue have more non-intersection related crashes.

Types of Crashes:

Research does not only show that intersection crashes are more prevalent in urban areas than non-intersection crashes, but also that rear-end crashes are overwhelmingly the predominant type of crash in these areas. There is a strong relationship between rear-end crashes and intersections: rear-end crashes are often the consequence of sudden stop-action from vehicles ahead reacting to a situation at a conflict point.

All four segments looked at in this study, show a prevalence of rear-end crashes; however, the stretch between Trinity Road and Anderson Road stands out as having disproportionately more. This is attributed to the combined fact that the roadway is divided by a centerline median, the speed limit is 10mph higher, and each of its three intersections are signalized (Figure 5.5).

The other segments in the corridor have more angled crashes and side-swipe crashes; however, in the segment between Blackman Avenue and Mesaba Avenue, more of those crashes are associated with the signalized intersection at Mesaba. In the other segments, the crashes were associated more with non-intersection crashes.

The segment between Basswood Avenue and Blackman Avenue has a two-way left turn lane (TWLTL) instead of a raised centerline median. This lends itself to more angle, left-turn, and sideswipe crashes and adds even more conflict points to those already associated with the high access density in this area.

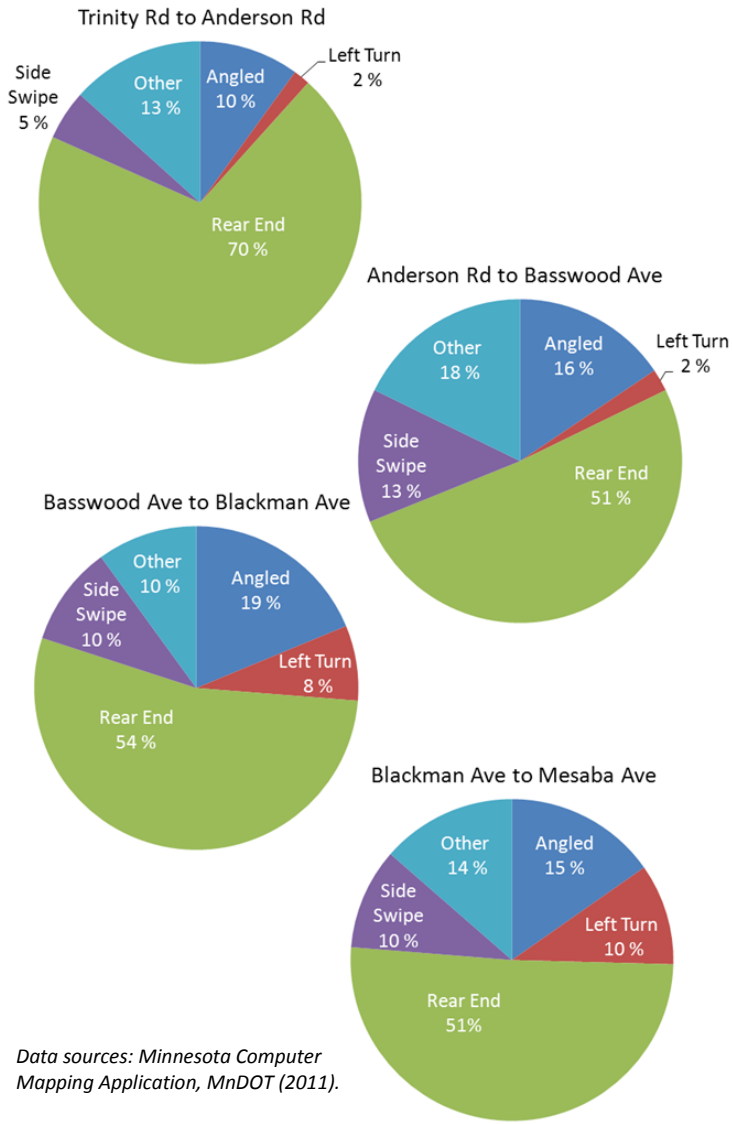


Figure 5.5: Crash Types by Roadway Segment

Segments east of Anderson Road have higher percentages of angled, side-swipe, and left-turn crashes.

Crashes and Access Density

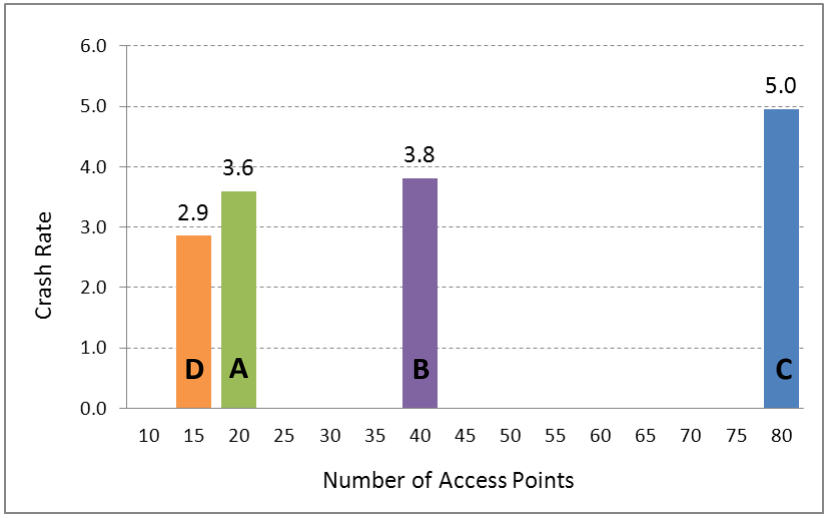
As both Table 5.1 and Figure 5.6 show, there is a correlation between the higher access densities and higher crash rates along the corridor. The highest crash rate is associated with the 0.65-mile section between Basswood Avenue and Blackman Avenue, which has an access density that is more than double that of the other sections' and an expectation that, over time, the segment will see 30% more crashes than the others. Various access management strategies, such as a centerline median and access consolidation (as recommended in Chapter 7) can be employed to improve the effect of uncontrolled access points on traffic safety in this segment.

Table 5.1: Crash Rates & Access Densities by Roadway Segment

Segment	Length (miles)	Access Density (Accesses/mile)	Crash Rate[1]
A. Trinity Rd to Anderson Rd	0.58	17.4	3.6
B. Anderson Rd to Basswood Ave	0.38	39.5	3.8
C. Basswood Ave to Blackman Ave	0.65	83.0	5.0
D. Blackman Ave to Mesaba Ave	0.79	15.1	2.9

Data source: Minnesota Computer Mapping Application, MnDOT (2011).

Figure 5.6: Segment Comparisons-Crash Rates and Access Points



Data source: Minnesota Computer Mapping Application, MnDOT (2011).

Trinity Rd. to Anderson Rd.
Anderson Rd. to Basswood Ave.
Basswood Ave. to Blackman Ave.
Blackman Ave. to Mesaba Ave.

Crashes at Intersections

The corridor contains a total of 17 intersections, and seven of these intersections are controlled by traffic signals. These seven intersections handle the greatest amount of traffic on the corridor and subsequently experience many more (and more severe) crashes than the non-signalized intersections. Two of the signalized intersections stand out as having either crash or severity rates that exceed regional averages (Figure 5.7 on the following page).

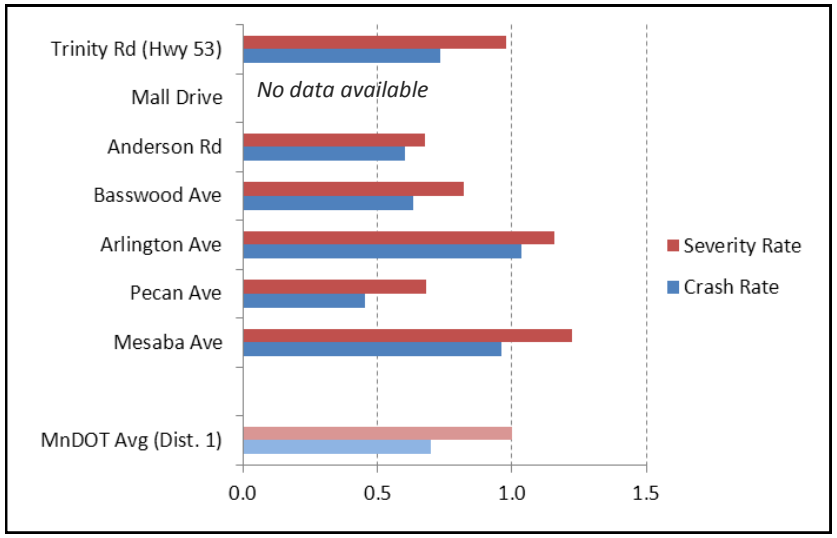
While Arlington Avenue is the only signalized intersection along the corridor with a higher-than-average crash rate (It had 35 crashes between 2007 and 2009, of which approximately half were rear-end crashes), Mesaba Avenue has a higher-than-average

severity rate. Forty crashes occurred there between 2007-2009, and the crash records show that 20% of those crashes were reported as resulting in "possible injury" - one crash resulted in an incapacitating injury.

Determining the crash and severity rates for Central Entrance's non-signalized intersections is more of a challenge than it is for signalized intersections. Traffic volume data is not collected for many of these minor streets. To generate some rates for the purpose of comparison, an assumption of 500 vehicles entering/ exiting per day was applied to those streets with unknown volumes. The results, therefore, are uncertain and cannot be fairly compared with any regional average. Nevertheless, it is worth noting that the 3-way intersection at Harding Avenue stands out as having significantly higher rates than the others. Looking at individual crash records suggests that this may be related more to the number of accesses adjacent to the intersection (10 of the 14 crashes counted within 50ft of the intersection were identified as non-junction crashes, the vast majority of which reported drivers' "failure to yield" or "distraction" as the cause for the crash).

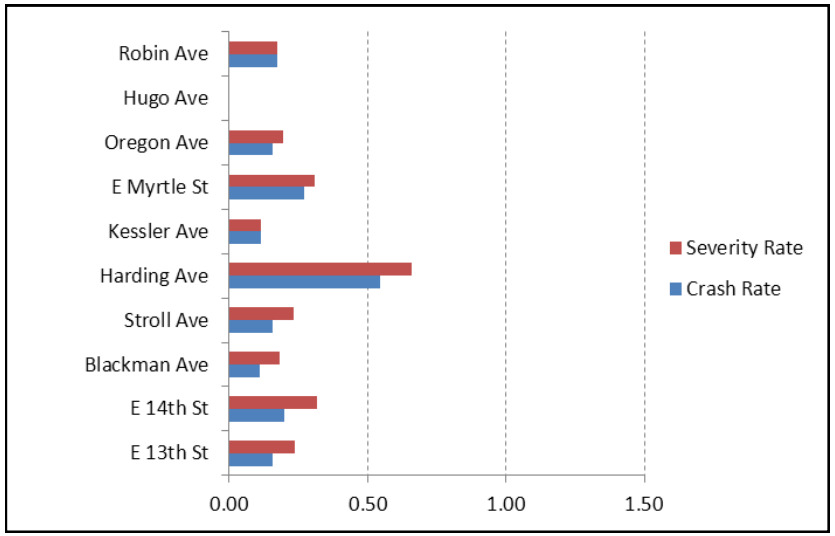
Opportunities to reduce crashes at the Arlington Avenue and Mesaba Avenue intersections will be a matter of adjusting signal phasing, which will require a more in-depth, technical investigation of the chain of signals up and down the Central Entrance corridor. Crash reductions at Harding Avenue, however, may be achieved through access management treatments.

Figure 5.7: Intersection Crash Rate Comparisons with MnDOT District 1 Averages Signalized Intersections on High Volume (>15K ADT), Low Speed (<45mph) Urban Roadways.



Data sources: Minnesota Computer Mapping Application, MnDOT (2011). 2007-2009 Trunk Highway Section Statistics, MnDOT (2011).

Figure 5.8: Rate Comparisons of Non-Signalized Intersections[1]



1. An assumption of 500 ADT were assumed for cross streets.
Data source: Minnesota Computer Mapping Application, MnDOT (2011).

6. Public Involvement

Public involvement is important in the planning process. For this planning study, a project website, survey, social media tools, such as Facebook and blogging, meetings with the public and business owners, were all used to distribute information and gather input. This chapter provides a brief description of those public input strategies.

Online Tools & Social Media

The MIC has begun to utilize more electronic communication and social media into its planning processes over the past few years; the MIC's website, blog, Facebook, and online surveying were all used for the Central Entrance study. The MIC website (www.dsmic.org) was used to post background information and data that had been collected during the course of the study. This information allowed residents to have a better understanding of what we were doing and allowed the general public to view detailed information about Central Entrance. Facebook was used to provide updates on our progress and to announce upcoming meetings and project milestones. The MIC's blog (www.duluthsuperioropenmic.org) was used to post more in-depth discussions about the project and issues experienced along the corridor, and to invite the public to think about Central Entrance and respond with their comments.

Duluth - Superior Metropolitan Interstate Council
Guiding the Future of Transportation for the Twin Ports Area

OpenMIC
Conversations About Transportation Planning in the Duluth-Superior Area

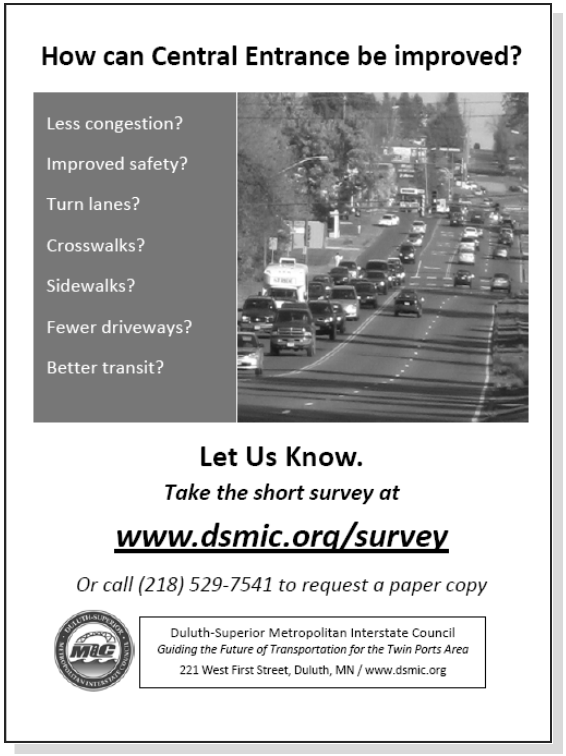
Figure 6.1: Electronic media tools used for this study

The MIC relied heavily on its website, blog, and Facebook to expand its outreach to the Duluth public during its study of the Central Entrance corridor.

Area Survey

The purpose of the survey was to determine the public's attitudes about the Central Entrance corridor. Postcards were mailed to 3,000 residents living within or at either end of the study area. The postcards directed recipients to go the MIC website and link to an online survey.

A little over 100 people took the survey. They were asked if they travel the corridor, how they travel the corridor, and what their perceptions of the corridor were.



Use of the corridor:

The majority of survey respondents (95%) said they travel Central Entrance primarily by automobile, 55% of them make at least six trips per week and 28% make ten or more trips per week. Responses also showed that most of these travelers rely on Central Entrance for a variety of trip purposes, and often chain these purposes together in the same trip.

"Shopping/Services" was selected by 85% of the respondents as their reason for traveling the corridor on a weekday, while just over half of the respondents also selected "Work" and "Social Activities". Those traveling the corridor on the weekends indicated that shopping, social activities and recreation were destinations for their trips.

Travel times during the week were heavily weighted toward morning (6-9am) and afternoon (4-6pm) for work destinations, evening hours (4-10pm) for social activities, and weekday

shopping travel was spread evenly throughout the day. Travel times on the weekend were mostly during the daytime hours of 9am – 6pm.

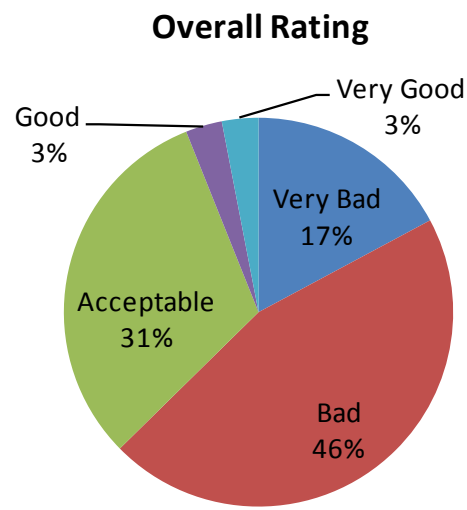
Perceptions of the corridor:

We asked if people ever avoided traveling on Central Entrance and over 80% of respondents replied that they did. When asked why, almost all listed congestion and excessive travel time as the primary reasons. Respondents rated the corridor as "poor" with respects to pedestrian safety, passing and making turns onto and off of the roadway, and vehicle speeds. When asked to grade the quality of the corridor overall, 63% rated it as either "bad" or "very bad".

For those who reported avoiding Central Entrance at times, the most popular alternative routes were Arrowhead Road, Rice Lake Road, and I-35 to Piedmont Avenue to Trinity Road. Other routes identified included Orange Street, Blackman Avenue and Swan Lake Road/Eklund Avenue/Maple Grove Road.

Figure 6.2: General Perceptions of Central Entrance

Of the people who responded to the MIC's online survey, the majority (63%) rated Central Entrance as either "Bad" or "Very Bad".



Public Meeting - June 19, 2012

A public meeting was held at the Duluth Heights Community Club. The purpose of the meeting was to provide information and get input on recommended strategies for improving the Central Entrance corridor. City of Duluth staff attended and presented information about the Central Entrance—Miller Hill Small Area Plan. MIC staff followed with information collected in the earlier stages of this study and concluded with draft recommendations.

Questions & Comments Received at the June 19th Public Meeting:

The June 19th meeting was used to take comments and get feedback on the proposed recommendations of this study. The meeting concluded with questions and comments from the audience. The following is a summary of the comments and questions, along with the responses given by MIC staff.

Q: Are there plans to somehow reduce speeds?

A: *A number of the recommendations from the study, such as center-line medians and streetscaping elements, will have the effect of calming speeds and bringing them closer to the posted speed of 30 mph.*

Q: I see a lot of people biking on the sidewalks on Central Entrance. How will the plan address cyclists?

A: *Though we don't encourage it, it's understandable that cyclists on Central Entrance aren't comfortable riding on the roadway. Legally, bikes are only prohibited from using the sidewalks in downtown commercial districts. Recommendations of this plan are to make Palm Street more bike-friendly and to repair an existing bike path in that area.*

Q: Why would you want to even keep sidewalks on Central Entrance? It's so busy and uncomfortable.

A: *Even though there is a lot of traffic, sidewalks are necessary for area residents and customers from the business to be able to quickly get to their destinations. Transit riders also need a complete system of sidewalks to safely access the buses on Central Entrance. Sidewalk design on busy Roadways, like Central Entrance, with high amounts of traffic should have boulevards to provide pedestrians that sense of safety and comfort.*

Q: The two-way left turn lane down Central Entrance is confusing. Are you going to do anything with that?

A: *The plan calls for installing a median with dedicated turn lanes in many segments. This should improve safety and provide pedestrians with a safe refuge when crossing the street.*

Q: How much additional right of way is needed to carry out this plan?

A: *The recommendations are proposed to take place within the existing right of way.*

Q: Can Myrtle Street be extended to the east to connect with Blackman Avenue?

A: *We can look at adding this segment to the system of future backage roads that the plan recommends.*

Q: What is the proposed timeline for all these improvements?

A: *Many of the proposed changes will be dependent on when redevelopment occurs, or when the road is due for reconstruction, which MnDOT has indicated will be more than a decade away.*

7. Recommendations

The recommendations for this plan are designed to create a transportation system in the Central Entrance corridor that will accommodate the land uses changes envisioned in the City of Duluth's Central Entrance / Miller Hill Small Area Plan (SAP), encouraging the area to become more walkable and to be the center of the Duluth Heights neighborhood. We also want to make sure that the capacity of the roadway is preserved while comfort and safety for all users is improved.

The recommendations in this chapter are organized into the following three categories:

Roadway System Design

B. Non-motorized Transportation Improvements

C. Corridor-wide Recommendations

A. Roadway System Design

The recommendations contained in this section are focused on the physical road network. They are designed to accomplish the goals listed to the right and involve the completing and enhancing a backage road system, installing raised median in some areas, and strategically restricting certain left-turn movements.

Goals of the "Roadway" Recommendations

- Reduce vehicle conflict points and ensure efficient traffic flow by controlling specific left turn movements.
- Provide safer access to local businesses and preserve vehicle capacity in the corridor.
- Enhance the local street system.

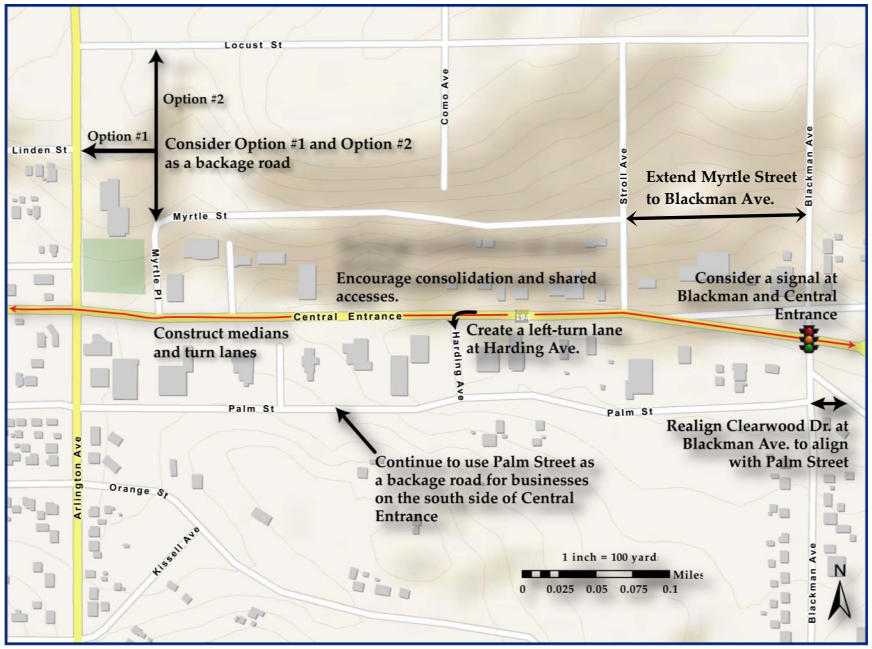
Backage Road System

In order to increase commercial and residential densities in the Central Entrance corridor, while ensuring good mobility, it should be the cooperative goal of the City of Duluth and MnDOT to reduce the number of direct accesses along Central Entrance as land use changes occur in the corridor over time. Yet, in order to reduce accesses without creating traffic issues elsewhere, an improved system of backage roads will also need to be developed.

The City of Duluth, therefore, should make plans to develop a backage road system based on existing streets in the area. In particular, Myrtle Street and Palm Street should be promoted as the main backage roads paralleling the highway on the north and south. The city should plan out and design such a system in advance, and then upgrade and build upon these facilities as either redevelopment or road reconstruction occurs. These facilities should be designed with the goal of eventually relocating much the area's business accesses to them as redevelopment occurs over time.

Map 7.1 provides some options for developing a backage road system in the area between Arlington Road and Blackman Avenue. These include extending Myrtle Street eastward to Blackman Avenue and realigning Clearwater Drive to line up with Palm Street at the intersection with Blackman Avenue. The city should also consider pursuing one of the two options in Map 7.1 to extend Myrtle Street westward to Arlington Avenue: 1) connect Myrtle Place to Linden Street, or 2) extend Myrtle Place north to Locust Street.

Map 7.2 shows recommendations for the segment of the corridor be-

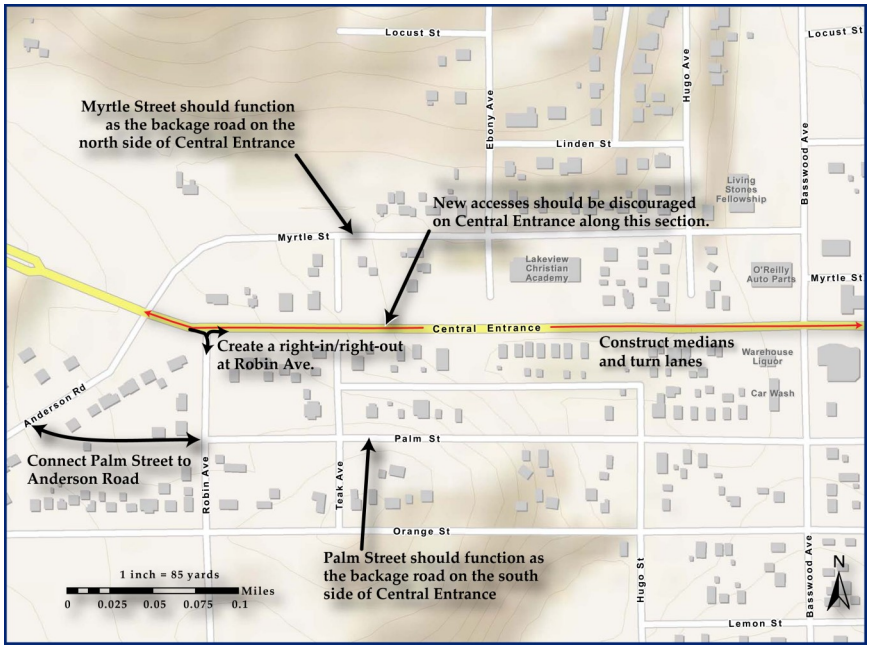


Map 7.1: Backage Road Improvements East of Arlington Avenue

Myrtle Street and Palm Street should be promoted as the main backage roads north and south of Central Entrance (STH 194) in the area between Arlington and Blackman Avenue. Plans should be made to extend Myrtle Street to the east and west as future redevelopment occurs.

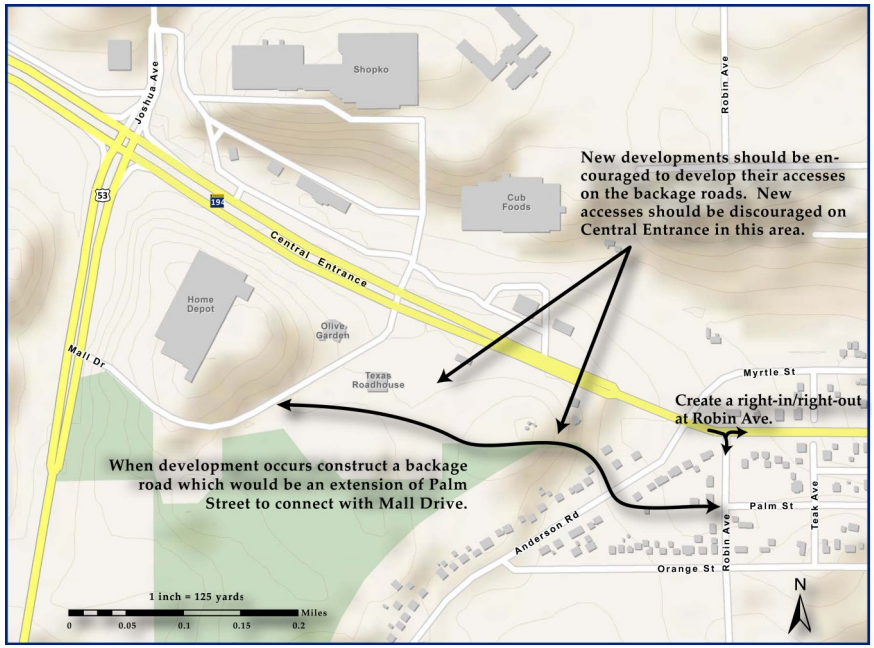
tween Anderson Road and Basswood Avenue. In this area, the city should continue to promote Myrtle Street and Palm Street as the main backage roads and should also plan to extend Palm Street westward to Anderson Road when land in that area undergoes redevelopment.

Map 7.3 illustrates the recommendation that the City of Duluth should also make plans to create a future backage road along the Palm Street alignment, connecting Anderson westward to the Miller Hill Mall Area. Even in the absence of such a backage road, the creation of new accesses on Central Entrance should be limited and discouraged in this area.



▲ **Map 7.2: Backage Road Improvements East of Anderson Road**

Myrtle Street and Palm Street should be promoted as the main backage roads north and south of Central Entrance in the area between Anderson Road and Basswood Avenue. Opportunities should be sought to extend Palm Street from Robin Avenue to Anderson in the event of future redevelopment .



◀ **Map 7.3: Future Extension of Palm Street to Mall Drive**

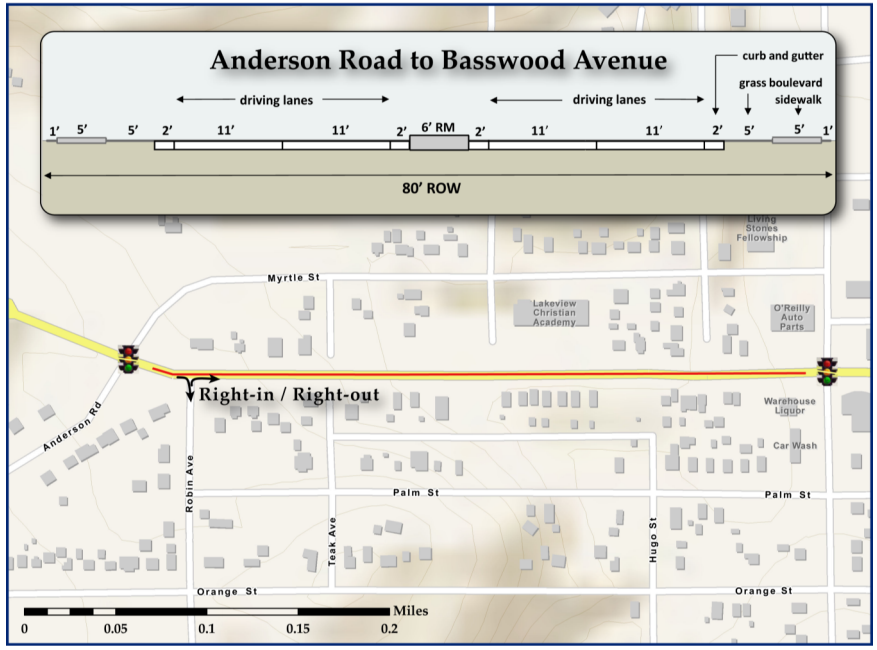
The creation of road between Palm Street to Mall Drive would serve new development in this area and avoid additional access points on Central Entrance.

Medians & Left-Turn Restrictions

Currently the Central Entrance corridor has medians in the west and east sections of the study area: from Trinity Road to Anderson Road, and from Blackman Avenue to 1,000 feet east of Pecan Avenue. These medians limit left-turning vehicles to those areas where dedicated turn lanes are provided. It is recommended that a similar approach be used in the segment between Anderson Road and Blackman Avenue. But it is important to note that these recommended treatments will be most effective if paired with the backage road recommendations above.

Map 7.4 provides both an overview and a roadway cross-section of the recommended median treatment in the segment of Central Entrance between Anderson Road and Basswood Avenue. It is recommended that left turns be limited to only the signalized intersections at Anderson Road and Basswood Avenue.

From Basswood Avenue east to Blackman Avenue, Central Entrance has a two-way left turn lane (TWLTL). Research has shown that these turn lanes can lose their effectiveness when daily traffic counts reach between 25,000 and 28,000 vehicles, and this segment of Central Entrance has volumes approaching 25,000 vehicles a day. Therefore, it is recommended that the TWLTL in this area be converted to a raised median. This will help to mitigate the negative effects of the high access density in this area. However, due to the large presence of commercial uses and accesses already present there, left turn lanes are being recommended for the three non-signalized intersections shown in Map 7.5.



Map 7.4: Median Improvements East of Anderson Road

Raised median on Central Entrance is recommended between Anderson Road and Basswood Avenue to limit left turns to those signalized intersections.

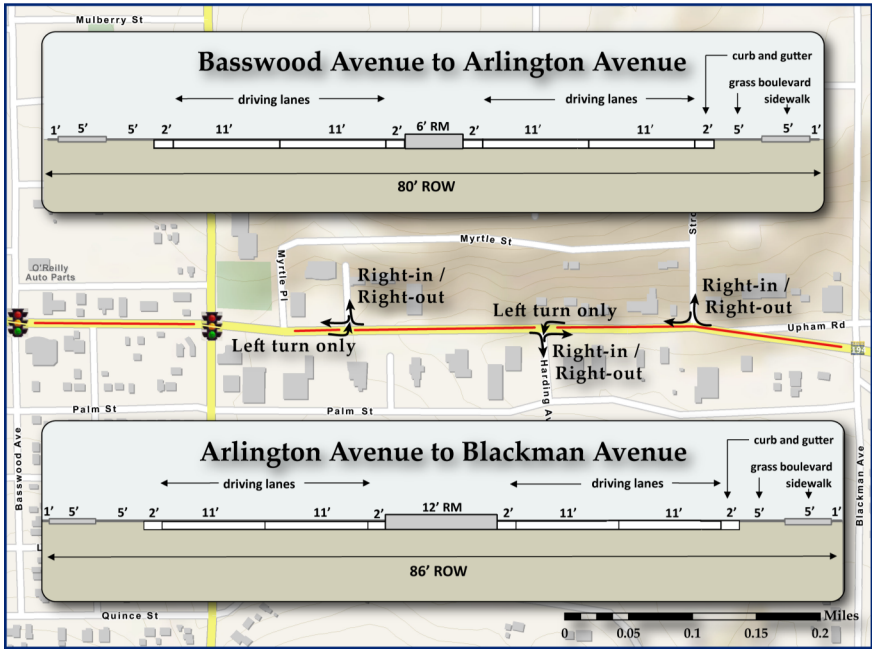
Raised median is *not* recommended for the short segment of Central Entrance between Arlington Avenue and Myrtle Place. This is to ensure added capacity for the high volume of traffic that the intersection already receives, as well as to prevent a situation where drivers wanting to turn left onto Central Entrance from Myrtle Place would be forced to both navigate through those volumes and drive significantly long distances out of the way just to access certain businesses on the south side of the corridor.

B. Non-Motorized Transportation

The recommendations contained in this section are designed to accomplish the following goals as they relate to improving the corridor for pedestrians, cyclists, and transit riders:

> **Goals of the "Non-motorized" Recommendations:**
>
> - Improve access and mobility for non-motorized users along and across the Central Entrance corridor.
> - Make the corridor safer and more comfortable for non-motorized users.
> - Eliminate gaps in the sidewalk and bikeways networks.

Despite the width and high traffic volumes of the roadway, Central Entrance is a commercial corridor and an important transit route. Making the corridor more supportive and comfortable for non-motorized users will help the city achieve the objectives of the SAP and provide better connection to businesses in the corridor.



Map 7.5: Median Improvements East of Arlington Avenue

It is recommended that the existing center turn lane between Basswood Avenue and Blackman Avenue be converted to a raised median with select breaks at the non signalized intersections.

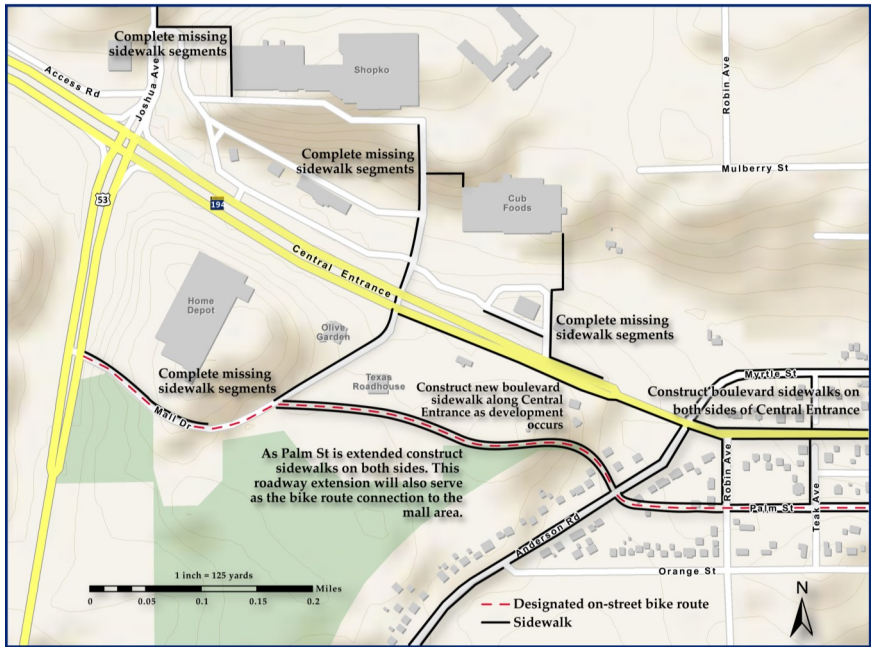
Central Entrance itself is missing a number of critical sidewalk segments. MnDOT and the City of Duluth should make it a priority to eliminate these gaps. It is recommended that the sidewalk along Central Entrance be redesigned as boulevard-style sidewalk where the right-of-way will allow. This will make the sidewalk safer and more comfortable for pedestrians traveling along the corridor.

The width and volumes of Central Entrance also pose challenges for pedestrian crossings. It is therefore recommended that each signalized intersection in the corridor provide for pedestrian crossings, and that each signal be equipped with count-down pedestrian timers. In addition, two designated pedestrian crossings should be developed at the non-signalized intersections of Ebony Avenue and either Kissell Avenue or Harding Avenue. These crossings should be supported with advanced warning systems such as flashing LED lights on high-visibility pedestrian crossing signs, or even high-intensity, activated crosswalk (HAWK) devices.

Lastly, Palm Street should be enhanced and promoted as the area's primary bike corridor. The off-street path between Arlington Avenue and 13th Street is currently in poor condition and should be improved. The segment between Robin Avenue and Blackman Avenue should be striped with a designated bike lane.

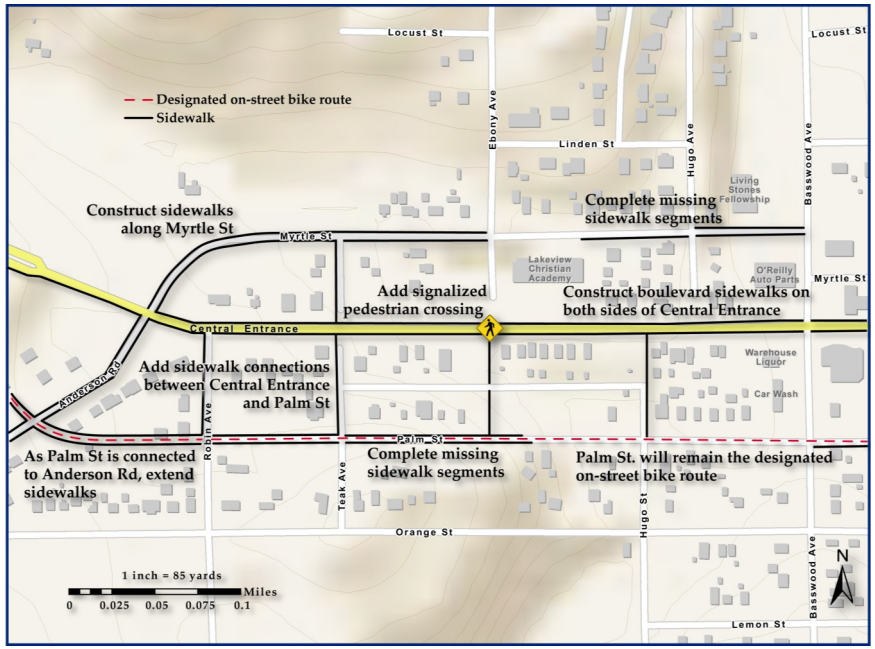
The specific non-motorized improvements being recommended for the Central Entrance corridor are shown in Map 7.6 through 7.9 on the following pages.

Map 7.6: "Non-motorized" Improvements West of Anderson Road



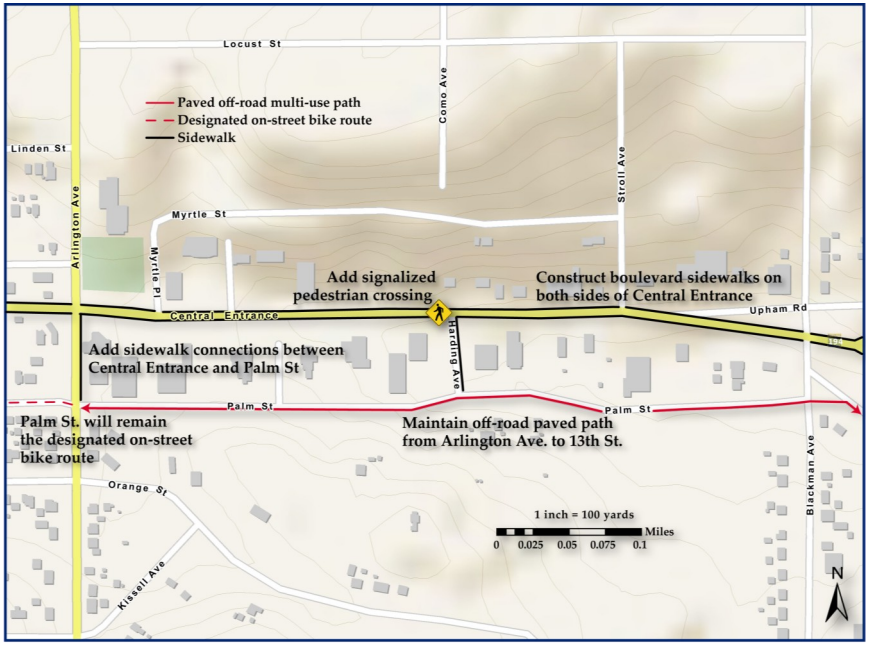
- Develop a sidewalk on the south side of Central Entrance from Mall Drive to Anderson Road.
- Develop a sidewalk along Mall Drive from Central Entrance to Home Depot and Olive Garden.
- Connect sidewalk from Maple Grove Road along Joshua Avenue to Shopko.
- Connect Shopko to Caribou Coffee near Cub Foods. Also connect to the intersection of Central Entrance and Mall Drive.
- Connect sidewalk from Cub Foods to the existing sidewalk near Muffler Clinic.
- Incorporate an on-street bike route as part of a new frontage road to be constructed between Mall Drive and Robin Avenue.

Map 7.7: "Non-motorized" Improvements East of Anderson Road



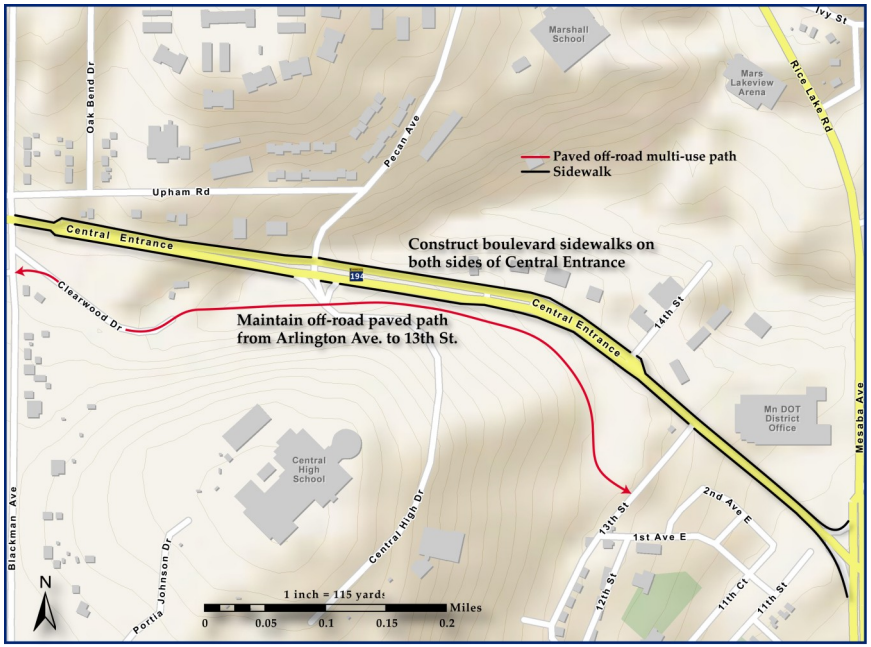
- Construct missing sidewalk segments along both sides of Anderson Road, Myrtle Street, and Palm Street
- Construct boulevard-style sidewalks on both sides of Central Entrance.
- Add North/South side walk connections along streets between Palm Street and Central Entrance.
- Develop a pedestrian crossing on Central Entrance at Ebony Avenue; support with advanced warning technology.
- Develop an on-street bike route on Palm Street from Arlington Avenue to Robin Avenue.

Map 7.8: "Non-motorized" Improvements East of Arlington Avenue



- Add boulevard-style sidewalks to the north side of Central Entrance from Blackman Avenue to Arlington Avenue.
- Add North/South sidewalk connections along Arlington Avenue between Palm Street and Central Entrance.
- Develop a pedestrian crossing on Central Entrance at either Kissell Avenue or Harding Avenue; support with advanced warning technology.
- Add North/South side walk connections along Harding Avenue between Palm Street and Central Entrance.
- Maintain the off-road paved bike path on the south side of Palm Street from Arlington Avenue to Blackman Avenue.

Map 7.9: "Non-motorized" Improvements East of Blackman Avenue



- Construct boulevard sidewalks on both sides of Central Entrance between Blackman Avenue and Mesaba Avenue.
- Maintain the off-road paved bike path on the south side of Palm Street from Blackman Avenue to 13th Street.

C. Corridor Wide Recommendations

The recommendations contained in this section are applicable throughout the Central Entrance corridor. They are intended to support the following goals as they relate to improving the corridor for pedestrians, cyclists, and transit riders:

> **Goals of the "Corridor-wide" Recommendations:**
>
> - Maintain safe and efficient mobility along the corridor.
> - Create a comfortable, more attractive corridor.
> - Improve the attractiveness of the corridor for local businesses.
> - Help identify Duluth Heights as a distinct neighborhood.

Coordinate Traffic Signals

All traffic signals in the Central Entrance corridor should be coordinated to allow for more of an uninterrupted flow of vehicle traffic. Traffic signal coordination is a method of timing groups of traffic signals along an arterial to provide for the smooth movement of traffic with minimal stops. This signal coordination could also be used to control speeds as platoons of vehicles move through the corridor, as well as help to create sufficient gaps for pedestrians to safely cross Central Entrance.

Develop a Streetscape Plan

Aesthetics along the corridor should be considered when implementing improvements or when redevelopment occurs. In fact,

what one sees plays an important role in safety and in moving traffic. The current visual clutter created by overhead utilities and confusing signage (both private and public) make it difficult to find your desired destination and visually distract the driver pulling attention away from the primary task of driving. While it is understood that physical improvements to the roadway and access itself should take priority, aesthetics should not be overlooked. Many communities find that insisting on high quality development/redevelopment creates a more pleasing setting and a more successful and sustainable business climate. Developing a streetscape plan for Central Entrance will help realize the goals set out in the Small Area Plan.

Create Corridor "Gateways"

Develop gateways to the Central Entrance shopping district with signage at Anderson Road and Blackman Avenue. Using gateway signage will let the traveling public know they are entering the Duluth Heights neighborhood and commercial district and help to create a sense of place. A signage theme should be developed for consistent aesthetics at both ends of the corridor.

Develop an Access Management Policy

The background information used to develop this policy recommendation is found in Chapter 4. In addition to the development of a backage road system and centerline medians, an access management policy should be developed by the City of Duluth that will help to incrementally improve access spacing and reduce access densities on Central Entrance.

The findings of the small area modeling done for this study show that reducing accesses along with developing the backage road system will allow Central Entrance to better handle increased capacities associated with redevelopment of the corridor.

Without continued attention, access-related problems tend to become apparent only after the most appropriate design solutions are no longer available. An access management policy is therefore critical for maintaining commitment to access management objectives, as redevelopment along the Central Entrance corridor is likely to occur as a number of small, uncoordinated land use decision over time.

An access management policy for Central Entrance should incorporate MnDOT guidelines for access spacing, such as those found in the Miller Hill Access Management Plan (2003) and should encourage the relocation of accesses to backage roads. Policy should be tailored to address unique access challenges in the different segments along the corridor (see recommendations at right).

Create a Highway Overlay Zone District

The City of Duluth should consider the creation of a unique Central Entrance highway overlay zoning district that has additional design standards for streets, sidewalks, driveways and site layout which are not found in the underlying base zoning. This tool would help to implement elements of the access management policy and streetscape plan that are recommended above.

Recommended Access Management Policies:

Different segments of the Central Entrance corridor have different characteristics. The following policy statements are meant to address access management issues unique to these segments.

Mesaba Avenue to Blackman Avenue

Promote sharing of accesses as development occurs in this area.

Basswood Avenue to Blackman Avenue

This segment currently has the highest density of accesses onto Central Entrance. Crash rates are also highest in this area. To improve safety and preserve roadway capacity, no more direct accesses should be allowed along this stretch of the corridor. When development takes place, accesses should be shared with neighboring properties or connected to the backage road system where possible.

Basswood Avenue to Anderson Road

New developments should be encouraged to develop their accesses on the backage roads. New accesses should be discouraged on Central Entrance in this area.

Anderson Road to Trinity Road

Any new access in this area should utilize backage roads when possible.