Warrensville Center Road and Cedar Road Multimodal Transportation Plan

Prepared By

City of University Heights, Ohio

November 2015

NOACA
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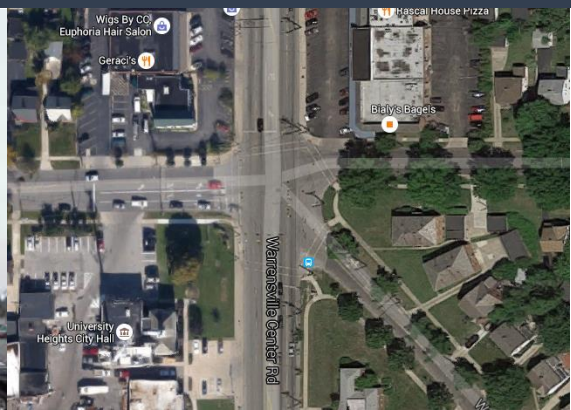

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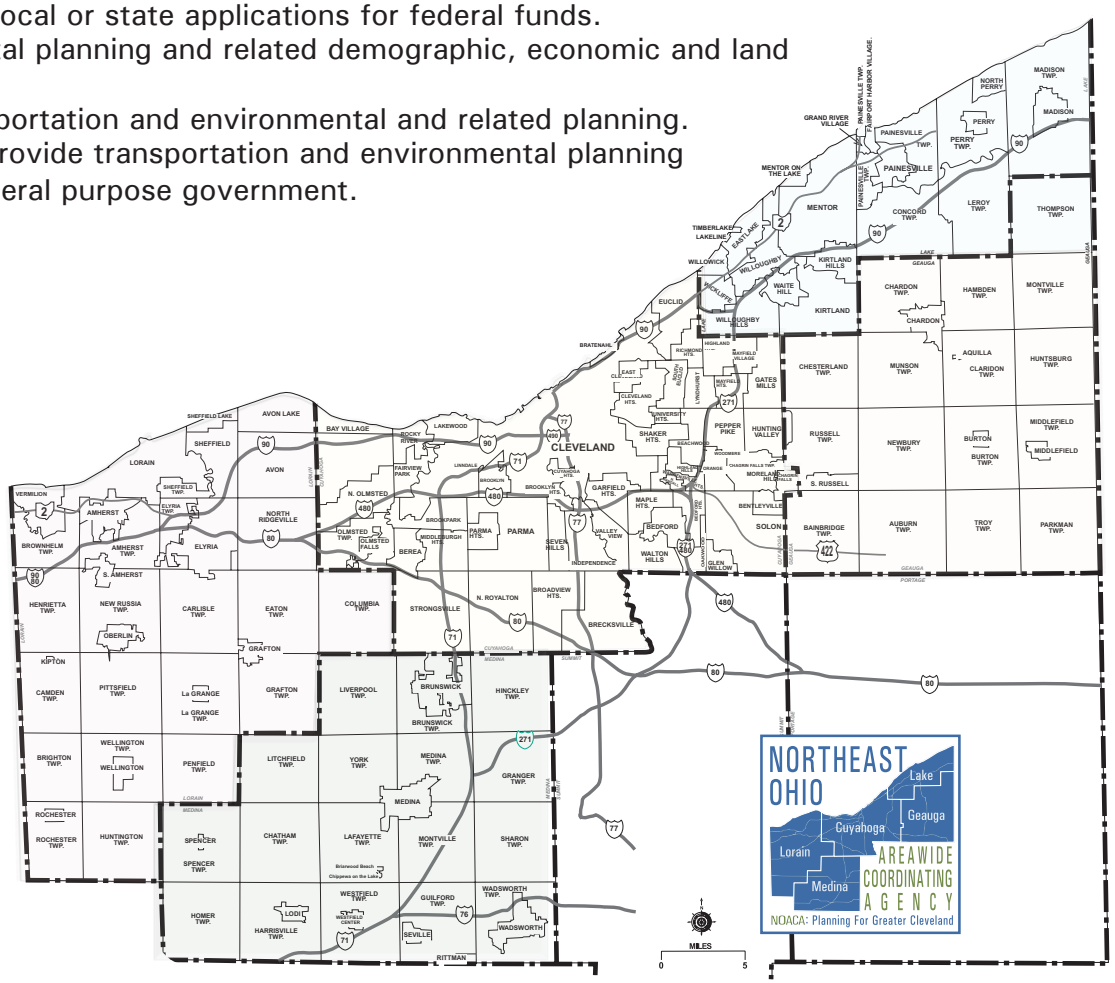

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City of University Heights, Ohio

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NORTHEAST OHIO AREAWIDE COORDINATING AGENCY

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Warrensville Center Road and Cedar Road Multimodal Transportation Plan

EXECUTIVE SUMMARY 1

INTRODUCTION 4

EXISTING CONDITIONS 6

RECOMMENDATIONS. 21
- Bicycle Facilities 24
- Pedestrian Facilities 34
- Revitalize Community Gateway 52
- Access Management 53
- Public Transit 54

IMPLEMENTATION STRATEGIES 56
- Cost Estimate. 56
- Phasing. 57
- Coordination 59
- Funding 60

Executive Summary

Purpose and Need

The Warrensville Center Road and Cedar Road Multimodal Transportation Plan for the City of University Heights stems from a need to improve connectivity for bicyclists, pedestrians and transit riders. The primary goal of this study is to create better multimodal transportation connectivity by improving the existing infrastructure.

Background

The study area consists of the two major roadways within the City of University Heights. Cedar Road is an east-west urban major arterial that runs 2.08 miles along the City's north boundary line. The corridor passes through residential areas as well as the City's main commercial districts. Warrensville Center Road, a north-south urban major arterial, runs 1.04 miles through the center of the city and connects the commercial district north of Silsby Road, the residential area to the south, and the John Carroll University area northeast of Fairmount Circle near the City's southern border.

Existing Assets

Warrensville Center Road within the City of University Heights runs through the commercial district between Cedar Road and Silsby Road and a residential district south of Silsby Road. The roadway is 65 feet wide throughout the corridor with two through lanes in each direction. South of Silsby Road, there is a dedicated on-street parallel parking lane in each direction. Cedar Road is between 52 and 57 feet wide and consists of four lanes (two driving lanes in each direction) and a center-turn lane in some locations.

There are no bicycle facilities along the two major roadways in University Heights. South Belvoir Boulevard is the only existing bike route from Shelburne Road in the City of Shaker Heights to Monticello Boulevard in the cities of Cleveland Heights and South Euclid.

Sidewalks line both major roadways as well as the local roads. There is no separation between Cedar Road sidewalks and the vehicular traffic lanes. This was one of the residents' main concerns based on a public meeting survey. Sidewalk widths at some locations on Cedar Road are choked with utility poles, fire hydrants and sign posts, limiting the sidewalk width available to accommodate pedestrians, especially wheelchair maneuvers near curb ramps. At other locations, sidewalks are obstructed by overgrown vegetation.

Crash History

The crash data for Warrensville Center Road, Cedar Road and Fairmount Circle for a five-year period (2009-2013) was analyzed. The total number of crashes was 1,211, including 302 injury crashes (25% of total crashes) and one fatal crash. Of the 302 injury crashes, 14 were pedestrian and bicycle-related crashes (four on Warrensville Center Road and 10 on Cedar Road).

Recommended Countermeasures and Related Costs

This study includes recommendations for several multimodal improvements along Cedar Road and Warrensville Center Road, the two primary roadways in University Heights. The recommendations aim at improving safety and connectivity for pedestrians, bicyclists and public transit riders. The recommendations focus on low- and medium-cost improvements that use available right-of-way. The study also proposes measures for aesthetic enhancements for all users.

Bicycle Facilities

This study includes a bicycle master plan for University Heights. The plan consists of bike lanes and a signed and marked bike route network that connects residents to the main attractions and to existing and planned bike facilities in neighboring communities.

This study recommends dedicated bicycle lanes on Warrensville Center Road from Fairmount Circle to Cedar Road. These bicycle lanes could continue north through the City of South Euclid and south through the City of Shaker Heights. The bicycle lanes can be accommodated by narrowing the lane width of existing vehicular traffic lanes, reducing the number of travel lanes, or reducing the number of parking lanes. The preferred alternative is reducing the width of the existing vehicular traffic lanes.

Pedestrian Facilities

Sidewalks

Planting the existing vacant and paved tree/lawn pits on Warrensville Center Road will aesthetically improve the roadway and provide better separation between traffic and pedestrians. The plan also recommends the relocation of street furniture, utility poles, and mast-arm poles in a few locations along Cedar Road.

Midblock Crosswalks

The study recommends two types of midblock crossings: midblock curb extensions (bump outs) with crosswalks, and median refuge island crosswalks.

Curb extensions are recommended for Warrensville Center Road between Traymore Road and Meadowbrook Boulevard. A median refuge island is recommended for Warrensville Center Road between Meadowbrook Boulevard and Fairmount Circle. A parking survey was conducted to verify the feasibility of removing on-street parking spots to accommodate midblock crossings.

Intersection Modifications

The study recommends geometry modifications at nine intersections along Cedar Road and Warrensville Center Road to improve the pedestrian environment and safety. The recommendations focus on reducing the length of crosswalks, improving visibility of pedestrians to drivers, providing pedestrian refuge areas, slowing down turning vehicles and simplifying complex intersections.

Revitalize Community Gateway

The community gateway at the intersection of Cedar Road and Warrensville Center Road can be enhanced by creating green space at the southwest corner of the intersection in harmony with the existing green space at the southeast corner. The new green space will replace the exit-only vehicular driveway to Warrensville Center Road and a few parking spaces.

Access Management

To enhance pedestrian safety along Cedar Road, the study recommends reducing driveway curb cuts in the commercial areas close to South Taylor Road, Warrenville Center Road and South Green Road. Property owners must be engaged to consolidate parking lots, eliminate unnecessary curb cuts and reduce excessive driveway widths.

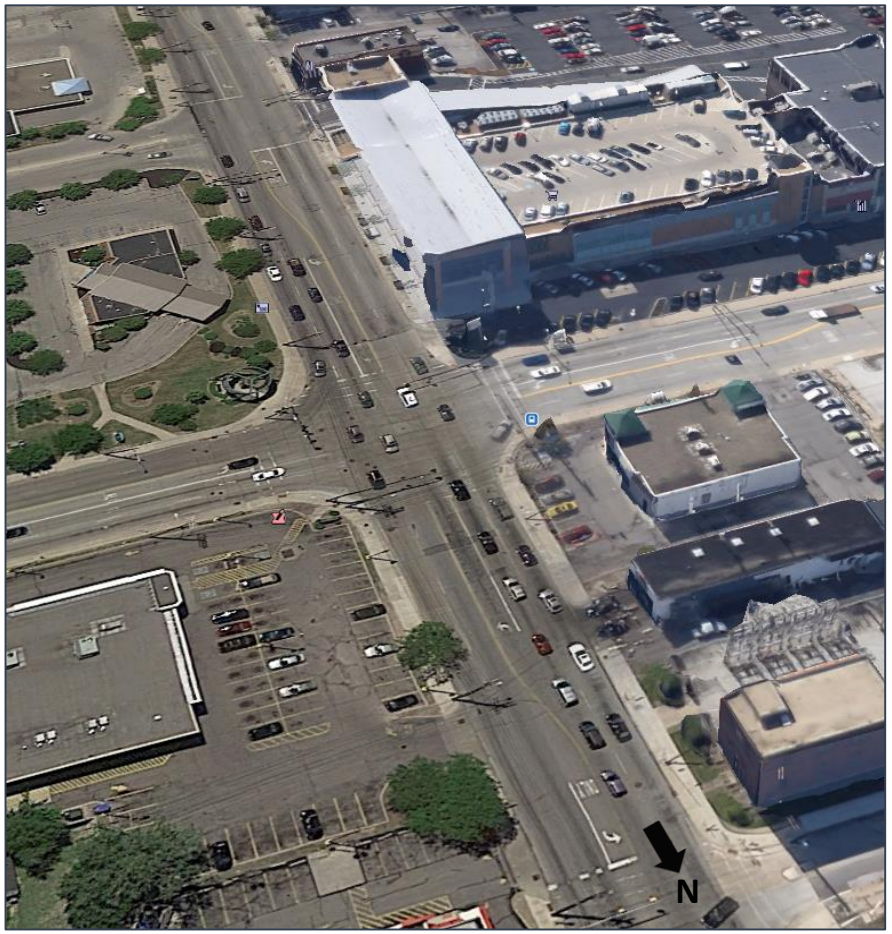
Study Need

University Heights encompasses major commercial facilities, educational institutions and recreation amenities. The City is also part of the Heights Community, where residents live near cultural institutions and business establishments, such as Case Western Reserve University, Cleveland Clinic, University Hospitals, the Cleveland Museum of Art and Severance Hall.

The Warrensville Center Road and Cedar Road Multimodal Transportation Plan for the City of University Heights stems from the need to improve connectivity for bicyclists, pedestrians, and transit riders to activity centers such as Fairmount Circle on Warrensville Center Road, Cedar Center, University Square, and the two commercial areas at the intersections of Cedar Road with South Taylor Road and with South Green Road. The primary goal of this study is to create better multimodal transportation connectivity for city residents to activity centers by improving the existing infrastructure.

In addition to the need for improving connectivity to activity centers within University Heights, connectivity to other attractions outside the City should be improved.

The Intersection of Warrensville Center Road and Cedar Road



Study Area

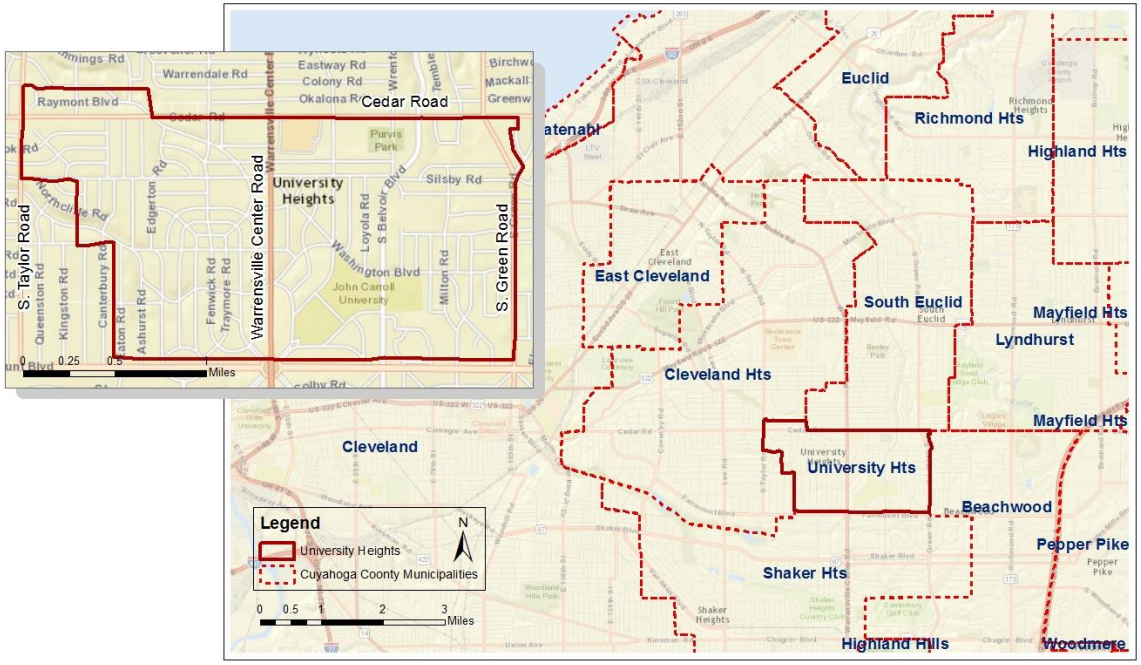
The study area for the Warrensville Center Road and Cedar Road Multimodal Transportation Plan consists of the two roadway segments within University Heights (see Map 1).

Cedar Road is the primary east-west corridor that connects the city of University Heights with neighboring communities. It runs along the City's northern boundary line from the western boundary at South Taylor Road to the eastern boundary east of South Green Road. The corridor passes through residential areas as well as the City's main commercial districts. The primary commercial center is located mid-way near the intersection with Warrensville Center Road. At the eastern boundary of the City it passes through another commercial area near the intersection with South Green Road. Cedar Road is 2.08 miles long between South Taylor Road and Fenway Drive.

Warrensville Center Road is the north-south primary corridor that connects the City of University Heights with different communities. It runs through the center of the City and connects the commercial district in the north near the intersection with Cedar Road, the residential area to the south, and the John Carroll University area northeast of Fairmount Circle near the City's southern border. It is 1.04 miles long from Fairmount Boulevard to Cedar Road.

Based on the Ohio Department of Transportation's (ODOT's) roadway functional classification, both roadways are urban major arterials.

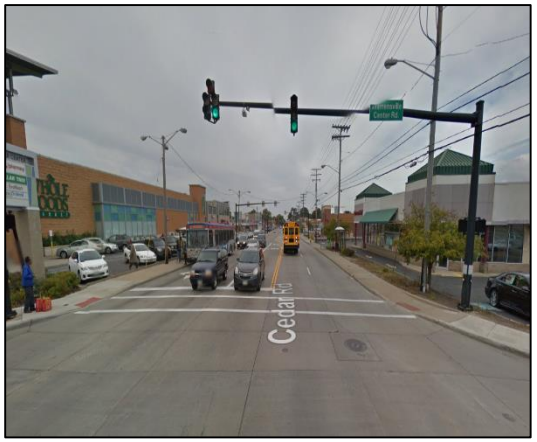
Map 1: Study Location



Existing Conditions

Northeast Ohio Areawide Coordinating Agency (NOACA) staff conducted field visits to evaluate existing facilities and to identify deficiencies and opportunities to improve pedestrian and bicycle access and safety. Past planning efforts were also considered. As the main focus of the plan is to improve multimodal connectivity for City residents, the City's main attraction points were identified as destinations. Existing signals, roadway lane configurations, sidewalks and pedestrian crossings along Warrensville Center Road and Cedar Road were assessed.

Cedar Road Facing West



Past Planning Studies & Projects

The City of University Heights' 2003 Master Plan was written to guide the growth and development of the City for the next 10 years. The master plan and other more recent projects listed below are used to highlight the recommendations:

- **Community Park Plan:** 2014 Braun & Steidl Architects plan for a community park at former Fuchs Mizrachi school site.
- **Warrensville Center Road Tree Planting:** A plan to plant trees on private property along Warrensville Center Road from Silsby Road to the City's southern corporation limit. This plan has not yet been implemented.

Southeast Corner of the South Taylor Road and Cedar Road Intersection

- **Belvoir Boulevard reconstruction and traffic calming at the John Carroll University entrance area:** The project is in the construction stage. The section adjacent to John Carroll University has been completed with traffic calming countermeasures and improved pedestrian crossings.
- **Bicycle Plans:** The NOACA Regional Bicycle Plan and Heights Bicycle Coalition Route Map show the existing and planned bike facilities in the region and rate the roadway network based on the cycling experience.

Cedar Road and University Square Entrance

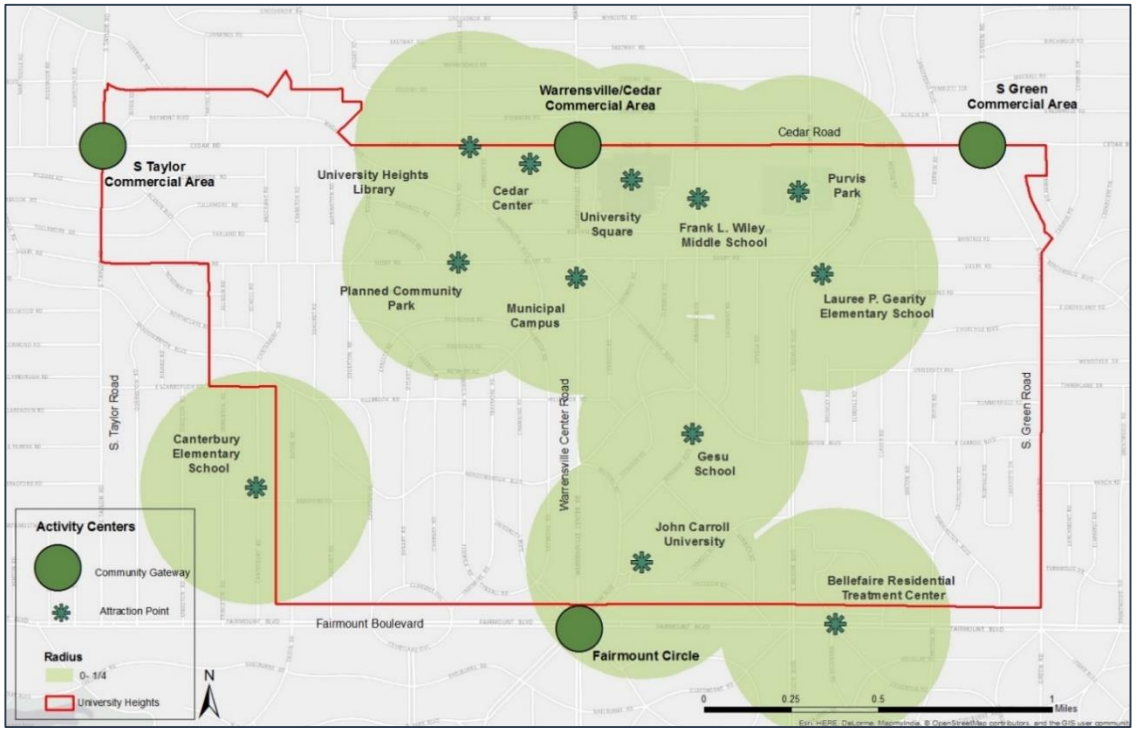
Activity Centers

The University Heights Master Plan identified four community gateways. Three are on Cedar Road along the City's north boundary. The first is at South Taylor Road, the second is at Warrensville Center Road and the third is at South Green Road. The fourth gateway is at Warrenville Center Road at Fairmount Circle. Fairmount Circle (the intersection of Warrensville Center Road and Fairmount Boulevard) is located in the City of Shaker Heights. The residential area around the circle generates high pedestrian traffic, mostly students and senior residents. All four gateways are commercial. Map 2 shows the University Heights community gateways and main activity centers.

One of University Heights' major assets is John Carroll University, which has a student population of more than 3,500 students. The university generates non-motorized traffic consisting of trips to and from students' residences and the commercial districts on Fairmount Circle and along Cedar Road.

Pedestrian activities are expected to increase around Frank L. Wiley Middle School. Starting in fall 2015, the middle school will host high-school students and staff for the next 10 to 12 years until a new high school is constructed outside University Heights.

Map 2: Study Area and Activity Centers



Roadway Cross Section

Warrensville Center Road

Warrensville Center Road within the City of University Heights runs through two areas with different land uses. The first area is a commercial district between Cedar Road and Silsby Road, and the second area is a residential district south of Silsby Road. The roadway is 65 feet wide throughout the corridor, but is configured differently within those two sections. South of Silsby Road, the roadway consists of six lanes. The two inner lanes are through lanes in each direction, and the outer lanes are dedicated for on-street parallel parking. No parking is permitted near intersections and at signalized intersections; the extra width is used as a left-turn lane. Figures 1-a and 1-b show the Warrensville Center Road existing cross sections. The low parking space occupancy rate and the width of traffic lanes encourage higher driving speeds.

Figure 1-a: Warrensville Center Road existing midblock cross section

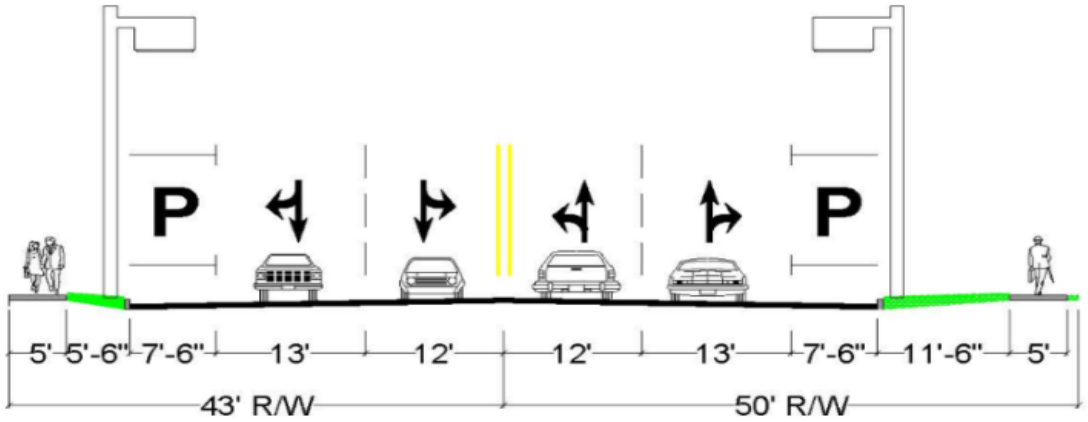
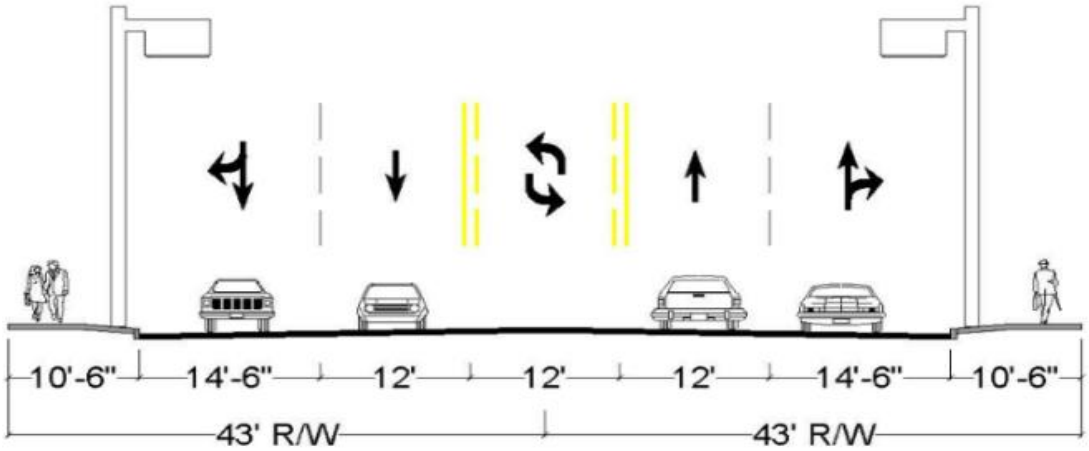


Figure 1-b: Warrensville Center Road existing cross section at signalized intersections

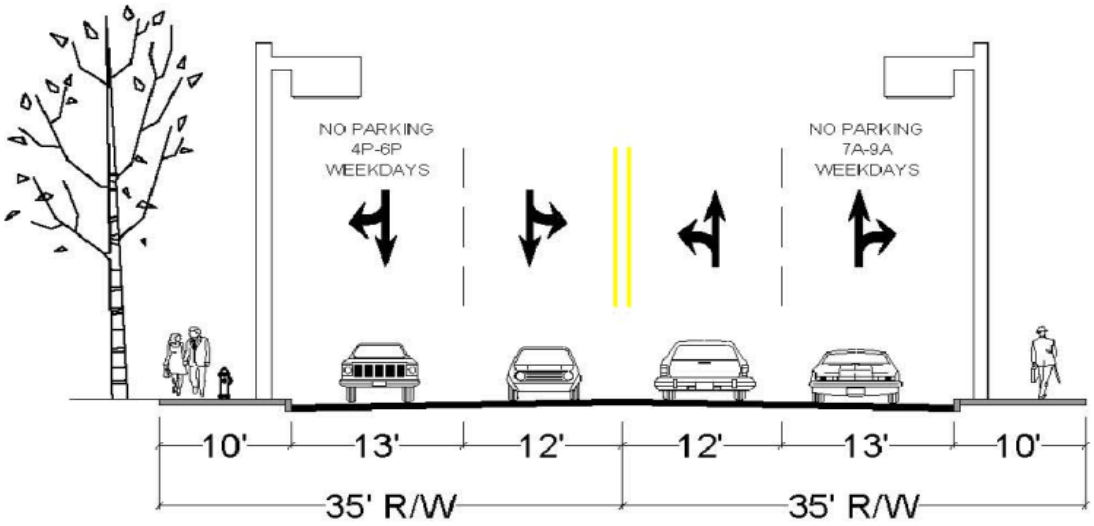


Cedar Road

Throughout the study area, Cedar Road is between 52 and 57 feet wide and consists of four lanes (two driving lanes in each direction) and a center turn lane in some locations. On-street parking is allowed on the outer lanes during limited off-peak hours in the residential area west of Warrensville Center Road. Figure 2 shows the existing cross section.

Typical cross sections at different locations on Warrensville Center Road and Cedar Road are shown in Appendix A.

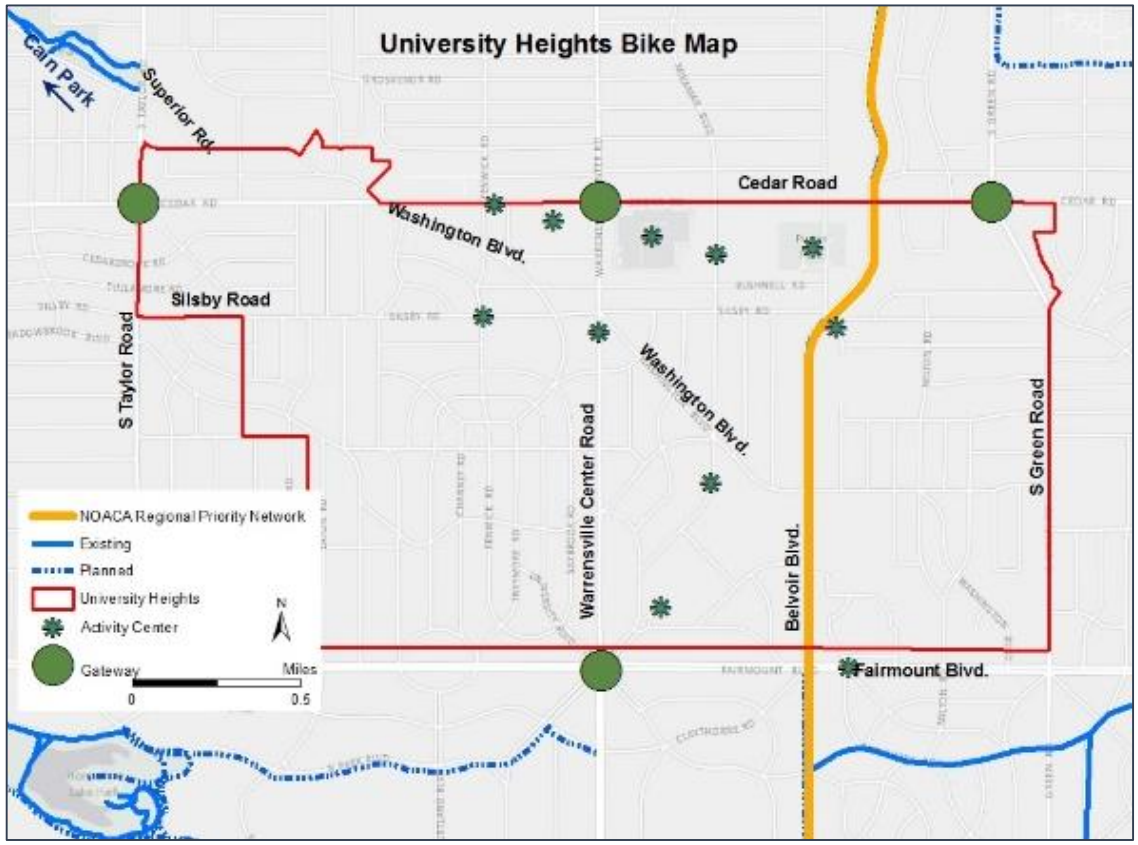
Figure 2: Cedar Road existing cross section



Bicycle Facilities

South Belvoir Boulevard (low speed, residential, wide planted median and two lanes in each direction) is an existing bike route from Shelburne Road in the City of Shaker Heights to Monticello Boulevard in the cities of Cleveland Heights and South Euclid. It is the only existing bicycle facility in University Heights. Map 3 shows South Belvoir Boulevard on the NOACA Regional Priority Bikeway Network and the existing and planned bike facilities in the cities of Shaker Heights, South Euclid and Cleveland Heights.

Map 3: Existing bicycle facilities



Sidewalks

Pedestrian activities vary greatly between the various sections of the study area. Pedestrian activities are generally heavier around the community gateways and where commercial activities are concentrated compared to other areas along Cedar and Warrensville Center Roads.

Map 4 shows the variation in width and type of sidewalks on Cedar Road and Warrensville Center Road. Sidewalk descriptions for both roadways follow.

Warrensville Center Road

The study area features different sidewalk treatments along each side of Warrensville Center Road. The variations are summarized below:

- From Fairmount Boulevard to north of Silsby Road, the typical sidewalk is five feet wide and has an 11-foot buffer that is reduced in some locations to five feet.
- From Silsby Road to Bushnell Road, the sidewalk buffers are paved and occupied by utility poles, mast-arm poles, and fire hydrants. The width is seven feet on the east side and 10 feet on the west side.
- From Bushnell Road to Cedar Road, the west-side sidewalk varies in width from 8.5 feet along Whole Foods Market to 5 feet south of Lansdale Road. The buffer is 5.5 feet wide with a widely spaced planter, where some planters are empty and some are paved with brick.

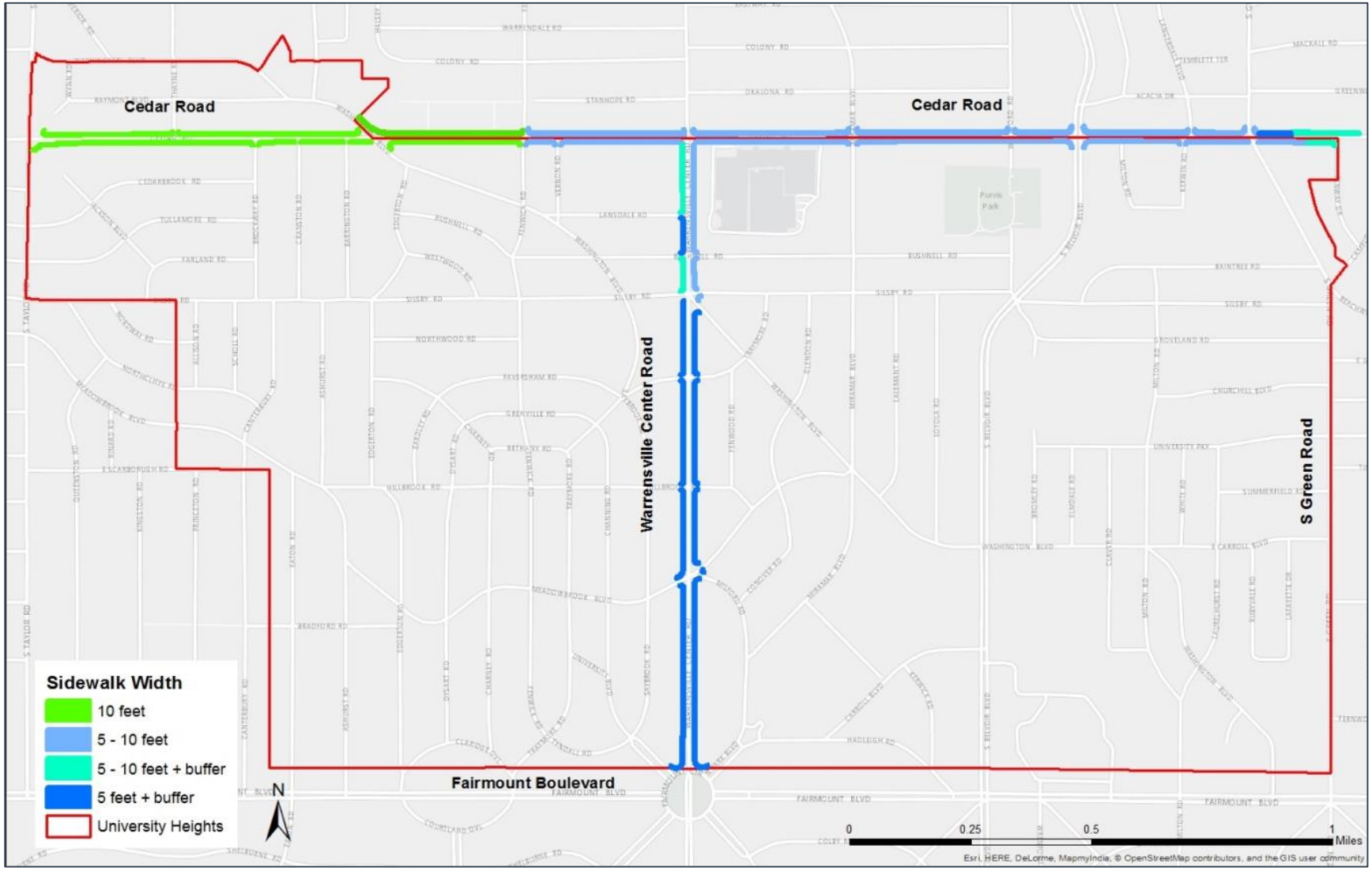
Empty buffer on the west-side sidewalk next to Boston Market on Warrensville Center Road south of Cedar Road

Cedar Road

The width of the sidewalks along the north and south sides of Cedar Road varies between eight and 10 feet. They do not have a clear buffer, trees or any pedestrian amenities. At the time of the fieldwork, the sidewalks along the eastbound side east of Miramar Boulevard were demolished for utility work and were scheduled to be reconstructed. There is a 6-foot buffer east of South Green Road on the westbound side of Cedar Road.

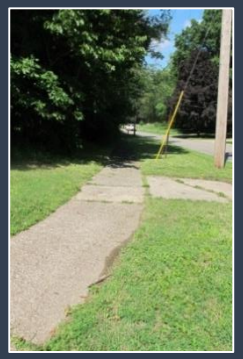
Sidewalk on Cedar Road along the Cedar Center shopping strip

Map 4: Sidewalk Variations on Cedar Road and Warrensville Center Road



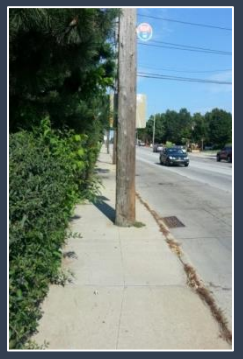
Walkability and Connectivity

The sidewalks in the study area are mostly in good condition, but are uneven or cracked in some locations. Some sidewalks are obstructed by overgrown vegetation (Pictures 1 through 4). Sidewalk widths at some locations on Cedar Road are choked with utility poles, fire hydrants, and sign posts (Pictures 5 through 7), limiting the sidewalk width available to accommodate pedestrians, especially wheelchair or stroller maneuvers near curb ramps (Picture 7).



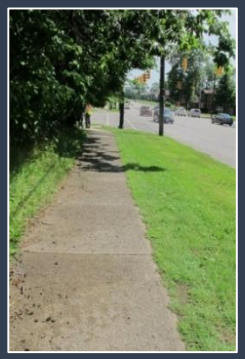
Picture 1

Meadowbrook Blvd. north-side sidewalk east of Warrensville Center Road



Picture 2

Cedar Road north-side sidewalk east of South Belvoir Blvd.



Picture 3

Warrensville Center Road east-side sidewalk north of Meadowbrook Blvd.

Picture 4

Warrensville Center Road east-side sidewalk south of Silsby Road

Picture 5

Cedar Road south-side sidewalk next to University Square

Picture 6

Warrensville Center Road at Washington Blvd. sidewalk continuity at the southeast corner

Picture 7

Cedar Road north-side sidewalk west of Warrensville Center Road

Crosswalk Conditions

Marked crosswalks along Cedar Road and Warrensville Center Road are located only at signal-controlled intersections. There are no midblock crossings along either roadway. All pedestrian crossings are furnished with pedestrian-actuated pedestrian-crossing signal heads. While there are many examples of good, accessible and ADA-compliant crosswalks in the study area, existing crosswalks lack consistency with respect to pavement markings and signage. Commonly existing crosswalk conditions along Cedar Road and Warrensville Center Road follow.

- In several locations, the crosswalks are excessively long and do not include a pedestrian refuge.
- Some intersections do not have crosswalks on all approaches.
- Some crosswalk markings are faded or missing.
- Curb-cut ramps are ADA-compliant with brick-style truncated domes.

Picture 8: East-leg crosswalk at Warrensville Center Road and Traymore Road Intersection

Picture 9: Typical ADA-compliant curb-cut ramp with brick-style truncated domes

Safety Analysis

The crash data for Warrensville Center Road, Cedar Road and Fairmount Circle for a five-year period (2009-2013) was analyzed. The total number of crashes was 1,211, including 302 injury crashes (25% of total crashes) and one fatal crash. The rest of the crashes were property damage crashes. Of the 302 injury crashes, 14 were pedestrian and bicycle-related crashes (four on Warrensville Center Road and 10 on Cedar Road). Map 5 shows the concentrations of fatal and injury crashes during the analysis period.

Map 5: 2009-2013 Distribution of fatal and injury crashes and location of pedestrian and bicycle crashes

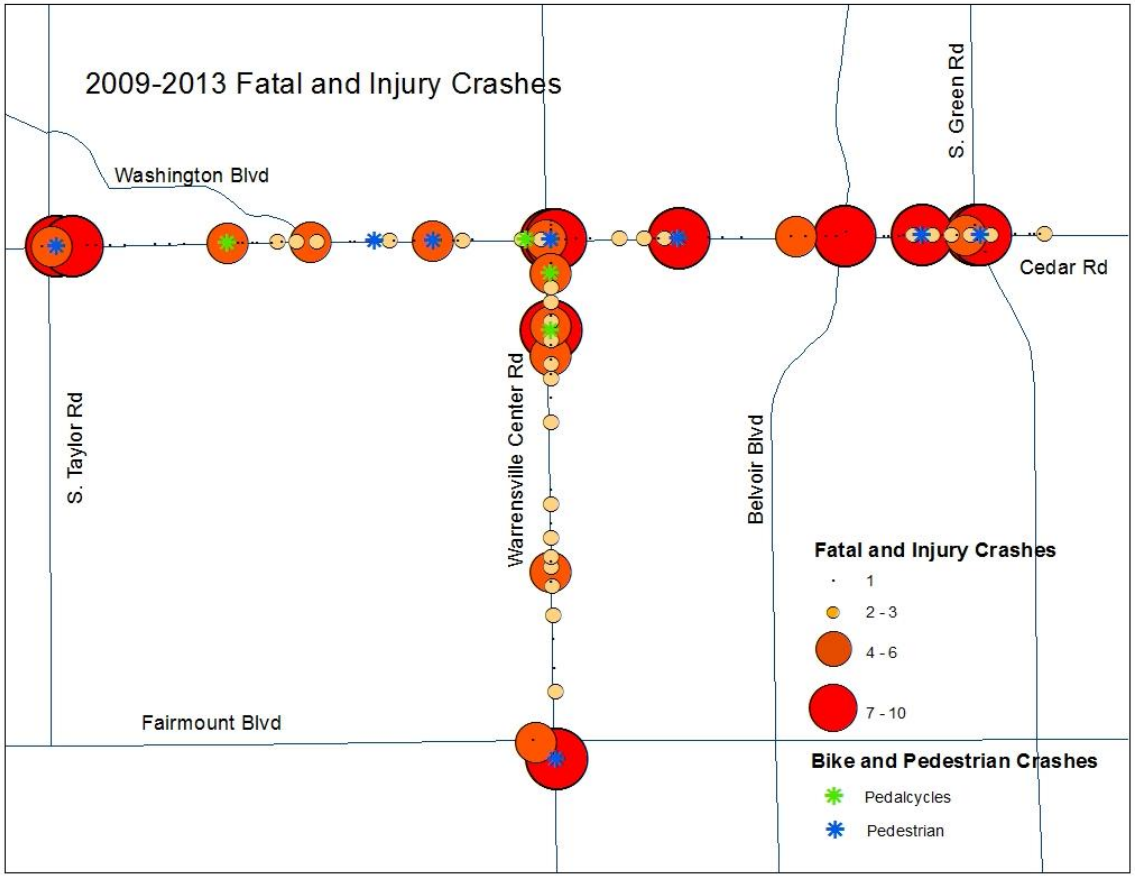


Chart 1 shows crash frequency and severity by year. Chart 2 shows crash frequency and crash types. There is no significant variation in the number and severity of crashes between 2009 and 2013. Rear-end crashes are the most predominant type of crash, 68% of which occurred on Cedar Road.

Chart 1: Frequency of Crashes by Year and Severity

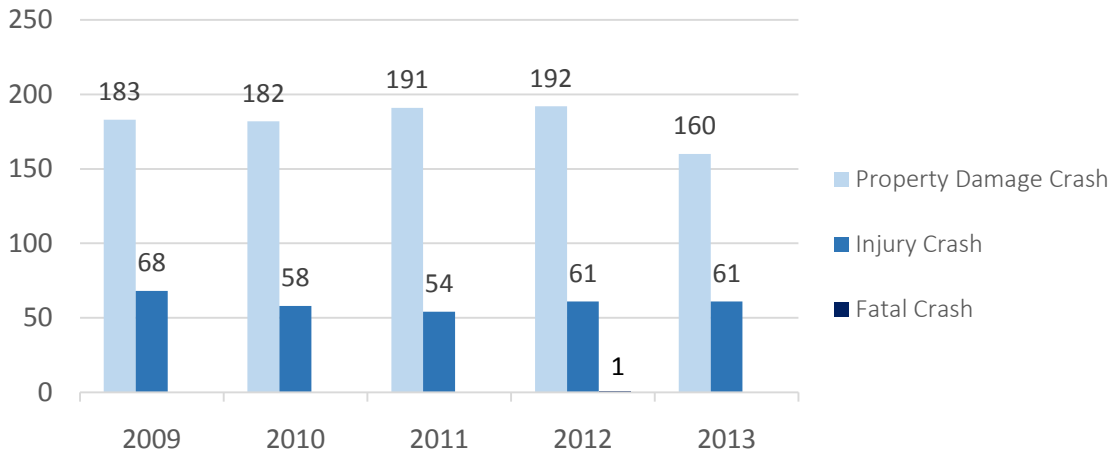
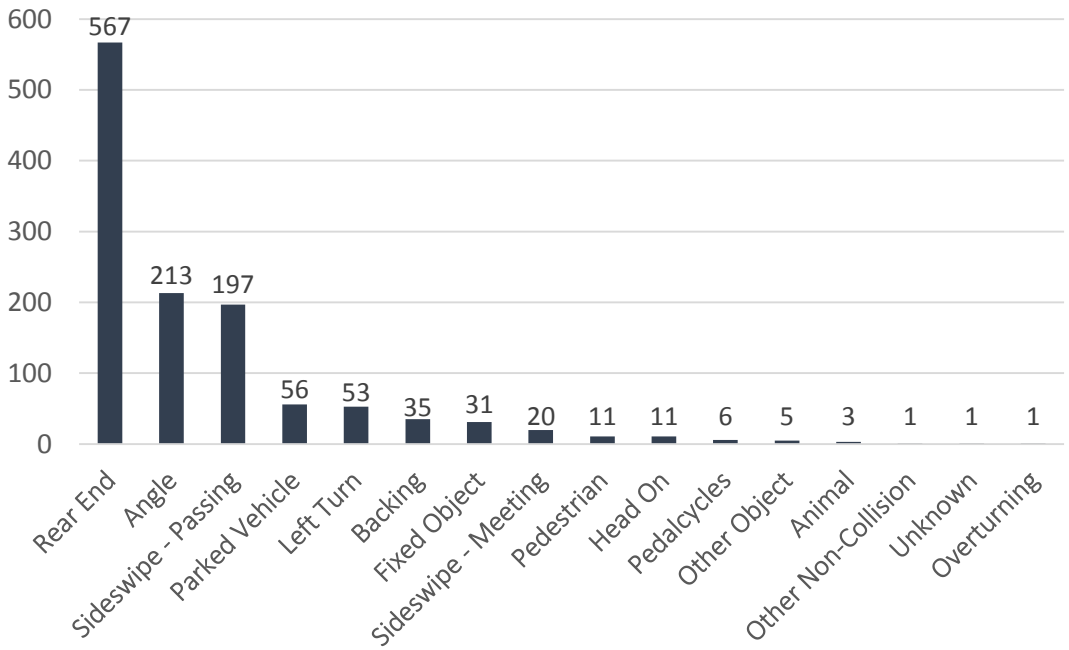


Chart 2: Frequency of Crashes by Type of Crash



Public Transit

Cedar Road and Warrensville Center Road are two vital links within the area. Greater Cleveland Regional Transit Authority (GCRTA) has four fixed-route buses that run through University Heights along Cedar Road (a bus priority route), Warrensville Center Road, South Taylor Road and South Green Road. These bus routes are listed below and shown on Map 6. The GCRTA Rapid Green and Blue lines run south of the City along Shaker Boulevard and Van Aken Boulevard. RTA sheltered bus stops are in good condition but lack way-finding and route information. The location and type of bus stops are shown in Map 7.

1. Routes 41 and 41F on Warrensville Center Road

Travels from Louis Stokes/Windermere Rapid Station to Warrensville/Shaker Green Line Rapid Station, Warrensville/ Van-Aken Blue Line Rapid Station, and Southgate Transit Center, and ends at Solon Commercial and Industrial Districts.

The frequency of the buses on this route is two buses every hour from 3:00 a.m. to midnight and one every hour from midnight to 3:00 a.m.

2. Route 32 on Cedar Road

Starts at the Cleveland Clinic at Euclid Avenue and East 89th Street and runs to the Cedar-University Rapid Station and continues along Cedar Road through Cleveland, Cleveland Heights, University Heights, South Euclid and Beachwood. Some trips continue to Ursuline College in Pepper Pike.

The frequency of the buses on this route is two buses per hour during peak hours. During off-peak hours the frequency is one bus every 0.75 hour during the day and one bus per hour during the evening hours until midnight.

3. Route 37 on South Taylor Road

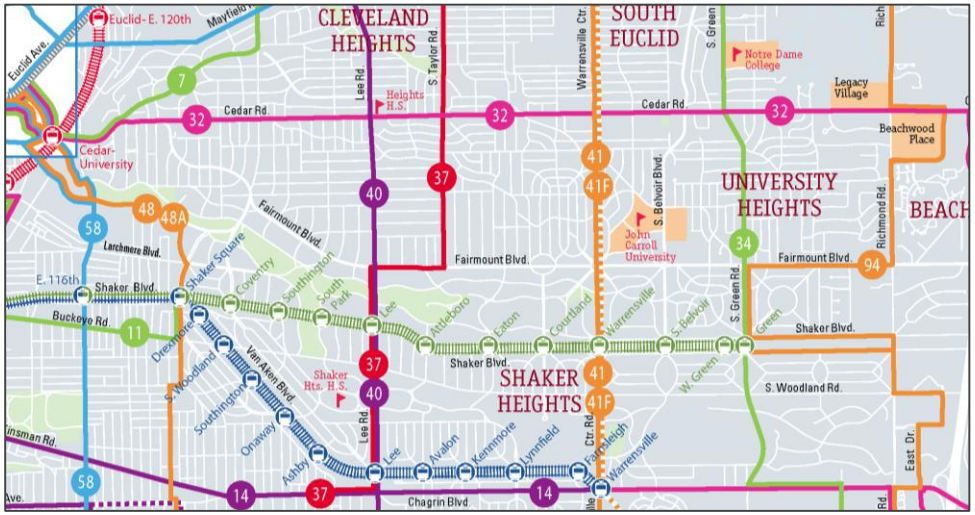
Starts at Euclid Hospital at East 189th Street and Lakeshore Boulevard in Euclid, and runs to the Louis Stokes Rapid Station at Windermere on Euclid Avenue in East Cleveland, continues on Taylor Road to Severance Town Center in Cleveland Heights and ends at Lee Road and Chagrin Boulevard in Shaker Heights. The frequency of the buses on this route is two buses per hour during peak periods and one bus per hour from 9 a.m. to 2 p.m. There are no buses on this route in the study area after 7 p.m.

4. Route 34 on South Green Road

Starts at Euclid Hospital and continues on Euclid Avenue and Green Road through Euclid, South Euclid, University Heights, Shaker Heights, Beachwood, Highland Hills and Warrensville Heights. The route ends in North Randall.

The frequency of the buses on this route is one bus every hour from 5 a.m. to 7 p.m.

Map 6: RTA Bus and Rapid Routes



Map 7: RTA Bus Stops

On-Street Parking

Marked, 7.5-foot-wide on-street parallel parking is provided on both sides of Warrensville Center Road between Fairmount Boulevard and Silsby Road. There are 35 spaces on the northbound side, and 40 spaces on the southbound side.

On Cedar Road, on-street parking west of Warrensville Center Road is restricted during peak hours and is prohibited at all times between Warrensville Center Road and South Green Road.

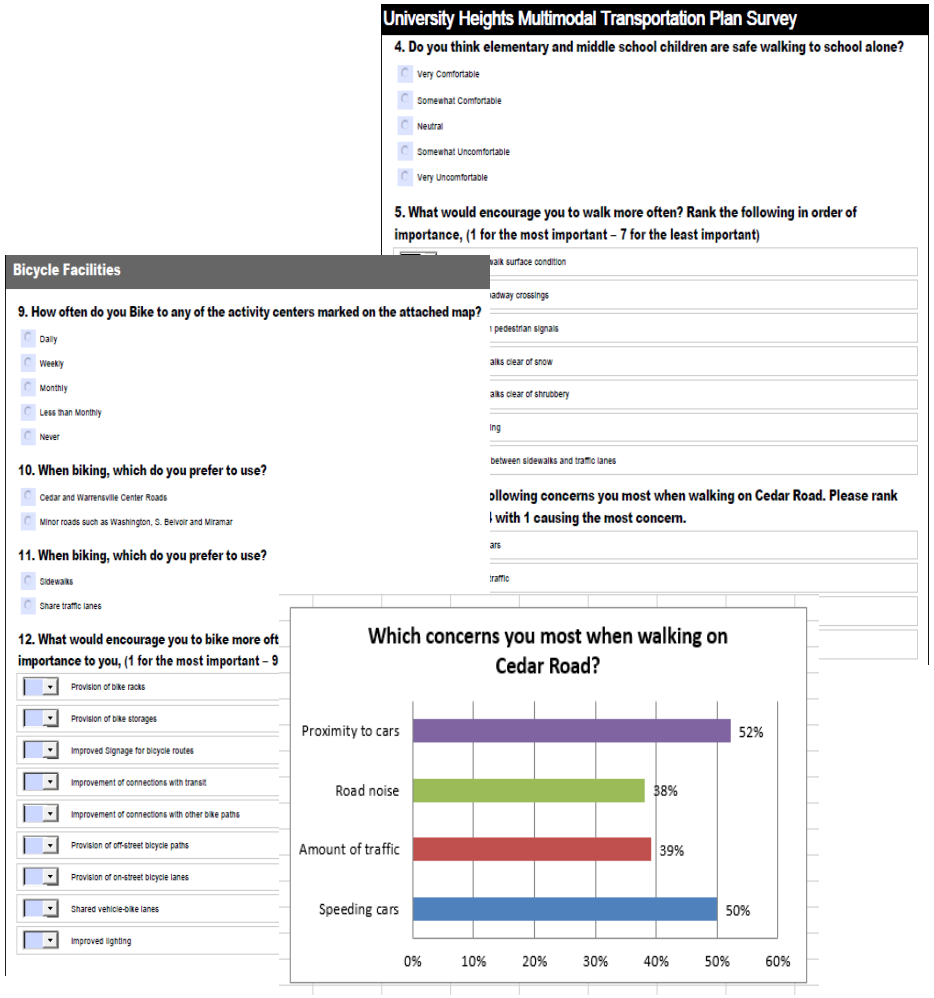
Marked on-street parking on Warrensville Center Road

Public Outreach

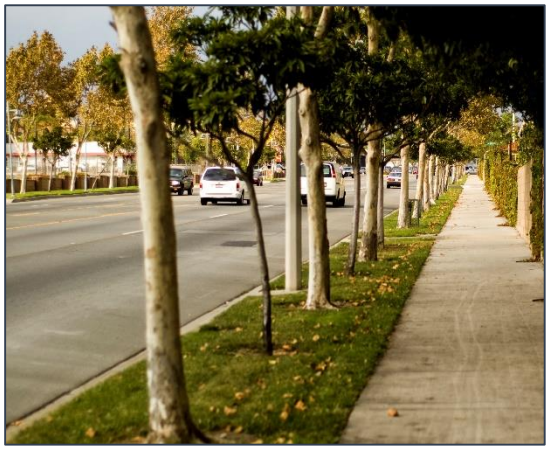
To accomplish a successful and well-received plan, the study team organized two steering committee meetings and two public meetings. The existing conditions report was presented in the first steering committee meeting on September 15, 2014, and in the first public meeting on November 5, 2014, to discuss existing conditions related to the goal of achieving an integrated multimodal transportation network. Participants in the public meetings were asked to complete a survey. They identified their safety concerns and ranked the changes that might encourage them to bike and walk more often. The survey was also conducted online via NOACA's website.

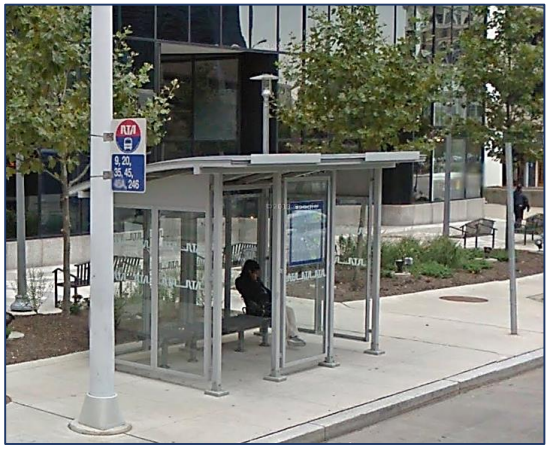
The study recommendations were presented to the steering committee on January 21, 2015, and to the public on April 21, 2015.

A list of the steering committee members, public meetings attendance sheets and the public on-line survey are shown in Appendix I.



The study recommends several multimodal improvements along Cedar Road and Warrensville Center Road, the two primary roadways in the City of University Heights. The recommendations are intended to improve safety for pedestrians, bicyclists and public transit riders, and to provide connectivity and accessibility. The recommendations focus on low-cost and medium-cost improvements that use available right-of-way. The study also proposes measures for aesthetic enhancements in the general environment for all users. In addition to the recommendations in this study, the City of University Heights should consider the recommendations from the Eastside Greenway Transportation for Livable Communities Initiative (TLCI) plan. The recommendations from that study are included in Appendix G.



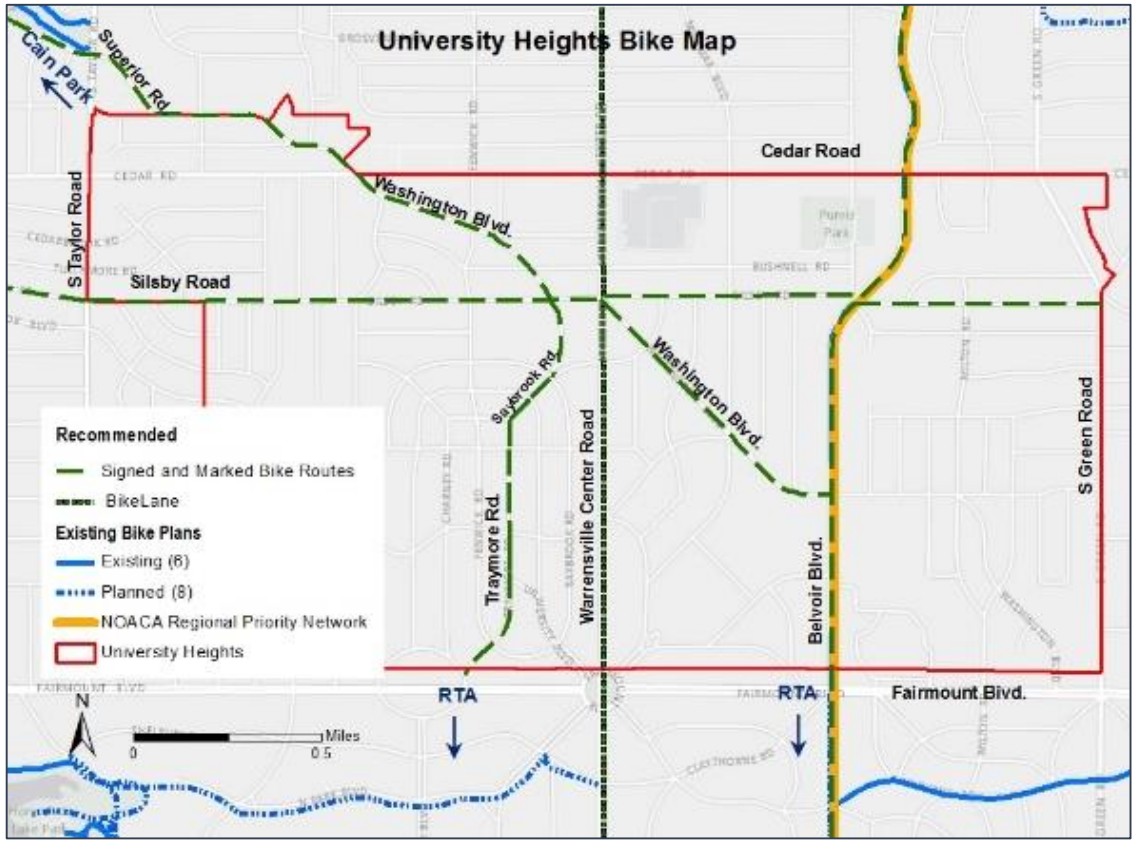


Bicycle Facilities

A bicycle master plan for University Heights was developed as part of this study. It consists of bike lanes, a signed and marked bike route network that connects residents to the main points of attraction and to existing and planned bike facilities in neighboring communities, and bicycle wayfinding signage. These recommendations are consistent with the Eastside Greenway TLCI Plan (Appendix G), which made recommendations for priority bicycle corridors for eastern Cuyahoga County.

Map 8 shows the recommended bicycle facilites for University Heights.

Map 8: University Heights Proposed Bike Map



Signed and Marked Bike Route Network

This study recommends an eight-mile signed and marked bike network that consists of a new series of lane markings and signs that will safely integrate bicycle travel into the neighborhood roadway network. The plan recommends the following roadways to be signed and marked as bike routes:

- Silsby Road (2 miles) as an east-west bike route. It is less than a quarter of a mile south of Cedar Road and connects South Taylor Road and South Green Road at the eastern and western corporation limits of University Heights. This route is expected to continue east into Cleveland Heights, per the draft Cleveland Heights Bicycle Wayfinding Plan. Coordination with Cleveland Heights is needed to ensure a continuous route.
- South Belvoir Boulevard (1 mile) as a north-south bike route that connects to the RTA Rapid Green Line Belvoir Station in Shaker Heights. Coordination with Shaker Heights is needed to ensure a continuous route to the RTA station.
- Washington Boulevard (2 miles), a northwest-southeast route that connects to Cleveland Heights' existing Cain Park Trail and proposed bicycle wayfinding route. This route is recommended as a secondary connector in the Eastside Greenway TLCI Plan. Coordination with Cleveland Heights is needed to ensure a continuous route.
- Traymore Road is another north-south bike route (1 mile) that connects points of attraction and residential areas to the RTA Rapid Green Line Courtland Station in Shaker Heights. The bike route along Traymore Road can be connected to the Washington Boulevard route by a short segment along Saybrook Road. Coordination with Shaker Heights is needed to ensure a continuous route to the RTA station.

The roadways chosen for the signed and marked bike network are all low-speed, low-volume residential streets where bicyclists can safely share the road with motor vehicles. The routes should be marked with shared-lane markings that are accompanied by bike route wayfinding signage. Coordination with neighboring cities (Cleveland Heights, South Euclid and Shaker Heights) will ensure safe bicycle connections to destinations outside the University Heights city limits. In some cases, curb ramps, bike/pedestrian pushbuttons, or other low-cost items should be considered at intersections along the bike route corridors. Detailed recommendations were not developed as part of this study.

Shared-lane markings, or "Sharrows," as in Figure 3 (Ohio Manual of Uniform Traffic Control Devices [OMUTCD] Section 9C.07), remind motorists that they are sharing the road with other types of transportation, but its placement within the width of the roadway indicates the preferred location for bicyclists to ride for safety purposes.

Bicycle guide signs (OMUTCD Section 9B.20) should accompany the sharrows. Signage helps to identify the roadways that are part of the signed and marked bike network and can be used to guide bicyclists to their destinations. Figure 4 shows various OMUTCD options for bicycle guide signs. While it is permitted to develop custom signage for bicycle wayfinding, this study recommends using standard signage to reduce costs and allow for simpler coordination of wayfinding signage among neighboring cities.

Figure 4: Bicycle Guide Signs, OMUTCD Figure 9B-4

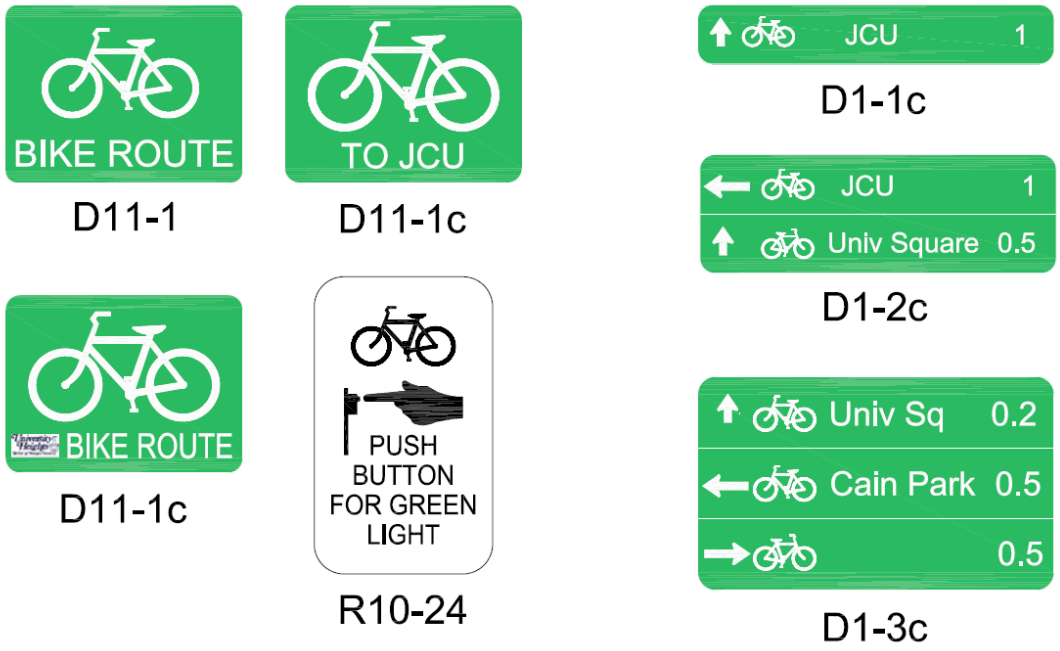
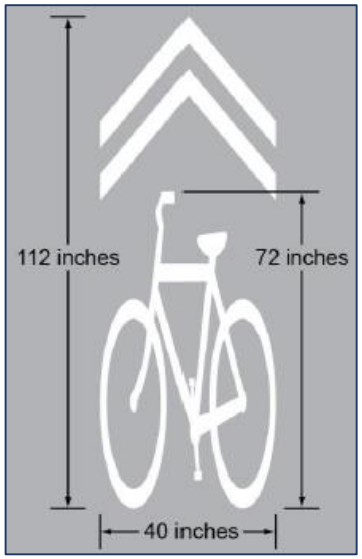


Figure 3: Shared-Lane Marking (OMUTCD Figure 9C-9, Section 9C.07)



Bicycle Lanes

This study recommends dedicated bicycle lanes on Warrensville Center Road from Fairmount Circle to Cedar Road. These bicycle lanes could continue north through South Euclid and south through Shaker Heights. The draft Eastside Greenway TLCI Study also recommends accommodating bikes on this corridor. Coordination with both cities is needed as this recommendation moves forward to implementation.

Bicycle lanes on Warrensville Center Road can be accommodated by either Alternative I, narrowing the lane width of existing travel lanes (a lane diet), Alternative II reducing the number of travel lanes (a road diet), or reducing the number of parking lanes. Alternative II consists of Alternative II-A and Alternative II-B. Alternative II-A is a road diet and Alternative II-B is road diet with the realignment of Washington Boulevard at Warrensville Center Road. University Heights does not consider removing on-street parking lanes desirable. The lane diet and road diet alternatives were determined to be feasible, per applicable design standards and guidelines. The alternatives are described in the following sections.

The stakeholders' preferred alternative is Alternative I because it provides for bicycle lanes while maintaining the existing number of traffic lanes.

Methodology

To compare the alternatives with existing conditions, multimodal level-of-service (LOS) analysis was conducted. Turning movement counts were collected at the three signal-controlled intersections (Warrensville Center Road intersections with Silsby Road, Meadowbrook Boulevard and westbound Fairmount Boulevard). The existing turning movement traffic volumes are included in Appendix B. In addition, according to NOACA's Regional Transportation model for forecast year 2035, the area shows a negative growth rate. Future traffic is assumed to be the same as existing traffic. The design-year traffic volumes are assumed to be the same as the existing volumes for all alternatives.

The Highway Capacity Manual (HCM) methodology uses motor vehicle LOS to measure how well an intersection operates under given conditions. The LOS is defined by delays drivers experience while traveling through the intersection.

The capacity analysis procedures provide the calculated average vehicle delay. This is based on traffic volumes, number of lanes, type of traffic control, grade, channelization and percentage of heavy vehicles at each intersection. The average vehicle delay is assigned a level of service ranging from LOS A to LOS F. In the NOACA region, LOS A-D is considered an acceptable level of operation. The LOS for signal-controlled intersections is defined by the Transportation Research Board and is shown in Table 1.

Table 1: Level of Service at Signalized Intersections

Level of Service (LOS)	Avg. Delay Seconds/Vehicle
A	< = 10
B	10.1-20
C	20.1-35
D	35.1-55
E	55.1-80
F	>80

In addition to evaluating the alternatives based on vehicular capacity, changes to bicycle and pedestrian level of service (BLOS and PLOS) were also considered. BLOS and PLOS are evaluations of corridors for walkability and bikeability based on roadway geometries, speed limits and traffic counts. The existing BLOS for Cedar Road and Warrensville Center Road is E, which indicates that the roadways are insufficient for comfortable and safe bicycling. A BLOS ranking of A or B is desirable and provides adequate facilities for bicyclists to feel comfortable riding and to encourage new riders. See Table 2 for a more detailed description of roadway characteristics that are used to determine BLOS and PLOS.

Table 2: Roadway Characteristics and PLOS and BLOS

Pedestrian LOS	Bicycle LOS

• Roadway cross section
  ○ Width of outside lane, bicycle lane and shoulder
  ○ Width between the sidewalk and roadway
  ○ Width of sidewalk
  ○ On-street parking use
  ○ Presence of vertical barrier
• Motor vehicle volumes
• Motor vehicle speed
	• Roadway cross section
	  ○ Width of outside lane, bicycle lane and shoulder
	  ○ On-street parking use
	  ○ Presence of curb
	• Motor vehicle volumes
	• Motor vehicle speed
	• Pavement condition

Alternative I: Lane Diet between Fairmount Circle and Cedar Road

This alternative proposes reducing the existing lane widths, while maintaining the same number of vehicular lanes. This allows adding a 5-foot bike lane in each direction. Narrower lanes for motorized vehicles will also contribute to accomplishing one of the community's important goals: traffic calming and creating a safe multimodal facility.

In each direction, the typical midblock lane configuration would consist of two 10-foot driving lanes, a 7.5-foot parking lane and a 5-foot bike lane (see Figure 5-a). If the project is funded with federal or state funds, the city may need to pursue a design exception to allow for 10-foot travel lanes.

Many design references support 10-foot lanes on lower-speed roads (35 mph or less) in an urban environment.[1] It has been shown that narrow lanes encourage compliance with the speed limit and do not reduce capacity relative to 12-foot lanes.

At intersections, the typical lane configuration would consist of two 11-foot lanes and a 5-foot bike lane in each direction, with a 10-foot left-turning lane (see Figure 5-b).

Figure 5-a: Warrensville Center Road, Alternative I (Lane Diet), between Silsby Road and Fairmount Boulevard

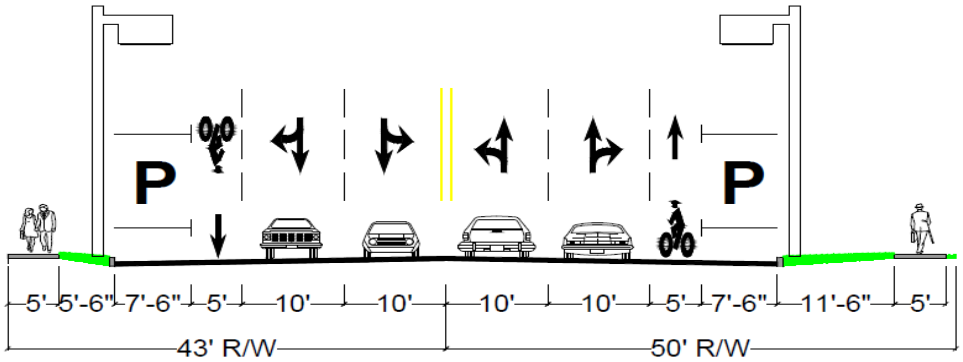
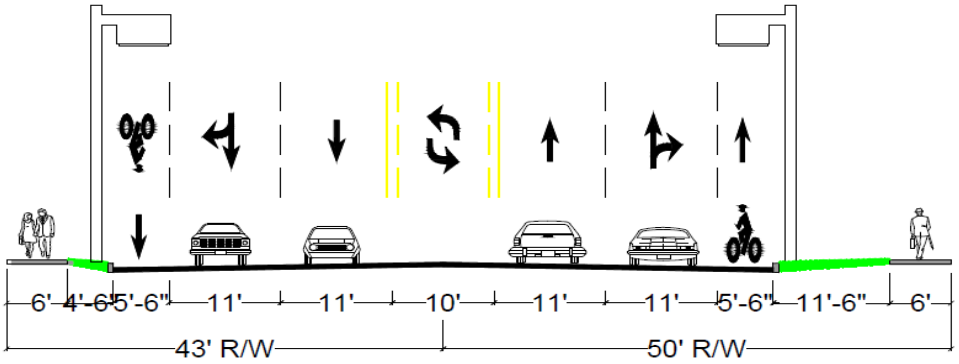


Figure 5-b: Warrensville Center Road, Alternative I (Lane Diet), between Cedar Road and Silsby Road, and at signalized Intersections



[1] ITE Designing for Urban Thoroughfares: A Context Sensitive Approach, FHWA Road Diet Informational Guide, AASHTO Guide for the Development of Bicycle Facilities, NACTO Urban Street Design, and Highway Capacity Manual.

Alternative I Multimodal Traffic Analysis

Multimodal traffic analyses were performed to provide a basis for comparing different proposed alternatives. The analyses are based on 2010 Highway Capacity Manual (HCM) methodology and performed using VISTRO and ARTPLAN software.

The capacity analysis results for the evening peak hour under Alternative I are presented in Table 1 of Appendix C. All three signalized intersections operate at acceptable level of service C. According to the 2010 HCM, an average lane width for a lane group of between 10 feet and 12.9 feet has no negative impact on intersection capacity. Accordingly, the capacity and LOS under Alternative I are estimated to be similar to the capacity and LOS under the existing conditions. For bicycles, the BLOS will improve from E to C.

Alternative II-A: Road Diet between Fairmount Boulevard and Silsby Road

This alternative proposes converting Warrensville Center Road's four-lane configuration between Fairmount Boulevard and Silsby Road to three lanes. Reducing the number of lanes is commonly known as a road diet. Figure 6 shows a typical cross section for this alternative, which includes:

- One 11-foot lane in each direction
- 11-foot center turning lane
- 6-foot bicycle lane in each direction with a 2.5-foot buffer
- 7.5-foot on-street parking

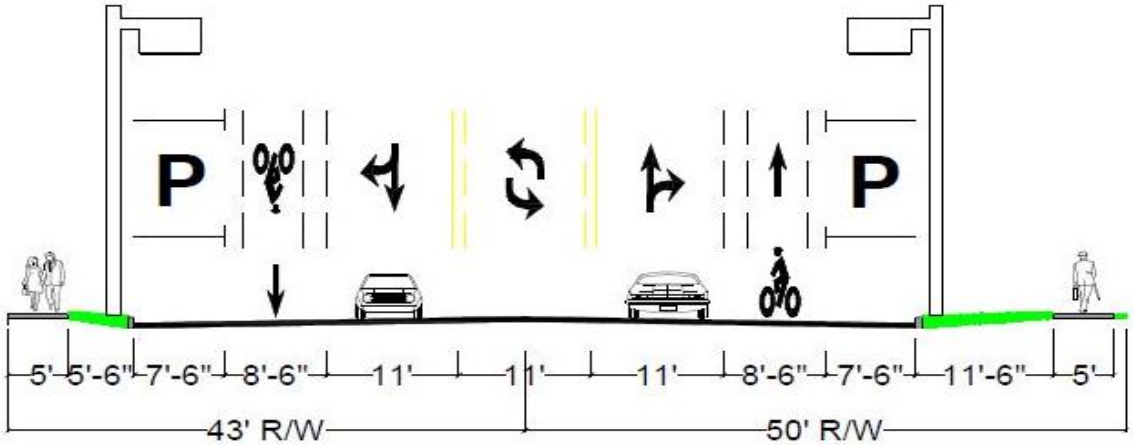
Road diet conversions have been implemented all around the country for the past 20 years and studied extensively. Their reliable performance as a safety countermeasure, combined with the low cost of implementation, has earned them a spot as one of nine Federal Highway Administration (FHWA) Proven Safety Countermeasures. Studies show that crashes are expected to be reduced by 29%. Because there is only one through travel lane in each direction, vehicle speeds are lower and more uniform, and dangerous weaving is eliminated. Such a configuration also simplifies pedestrian crossings and accommodation of pedestrian median refuges.

Converting the lane configuration from four to three lanes can have an impact on traffic flow. Typically, studies have shown that three-lane configurations can easily provide adequate capacity for roadways with 15,000 vehicles or fewer per day. Roadways with daily traffic volumes between 15,000 and 20,000 vehicles per day (vpd) are also likely to perform adequately with a three-lane section.

Some cities have even had success with road-diet conversions on corridors with greater than 20,000 vpd. A 2011 Kentucky study showed that road diets can work for average daily traffic volume up to 23,000 vpd. The City of Seattle uses an average daily traffic of 25,000 vpd as the maximum volume threshold for road diet implementation. For more information, see FHWA Road Diet Informational Guide.

Factors such as side street traffic volumes, intersection spacing, percent of vehicles turning left, percent of daily traffic volumes occurring during peak periods, and speed limit have an impact on the operational feasibility of a road diet on corridors with higher traffic volumes. A traffic analysis is required to verify feasibility for roads with more than 15,000 vehicles per day.

Figure 6: Warrensville Center Road, Alternative II (Road Diet)



Alternative II-A Multimodal Traffic Analysis

The traffic volume on Warrensville Center Road in University Heights ranges between 17,000 and 19,000 vehicles per day. A traffic analysis was performed to determine the feasibility of this alternative. Traffic operations were found to be adequate due to low side street volumes and excessive roadway width, which allows for right-turn lanes at intersections. See Appendix C for more detailed discussion of the traffic analysis. The motor vehicle LOS at the three intersections for the evening peak hour is shown in Table 2 in Appendix C. The three intersections operate at an acceptable level of service (B-D). For bicycles, the BLOS will improve from the existing BLOS E to B.

The highest expected delays and queue lengths are at the five-legged intersection with Silsby Road and Washington Boulevard. The highest expected delays are for the northbound through and right and eastbound left movements. The average queue length for northbound through movement would increase from nine vehicles for Alternative I to 28 vehicles for Alternative II-A. The highest expected delays and queue lengths are at the five-legged intersection with Silsby Road and Washington Boulevard. The highest expected delays are for the northbound through and right and eastbound left movements. The average queue length for northbound through movement would increase from nine vehicles for Alternative I to 28 vehicles for Alternative II-A. The southbound through movement queue length would increase from nine to 20 vehicles.

Alternative II-B: Road Diet with Washington Boulevard Realignment

The five-legged intersection of Warrensville Center Road with Silsby Road and Washington Boulevard is signal controlled with a split phase allocating the right of way to Washington Boulevard traffic. This signal phasing increases the required cycle time and the total vehicle delay at the intersection.

The realignment of Washington Boulevard would modify the Silsby Road intersection from a five-legged to a simple four-legged intersection. Washington Boulevard intersects Warrensville Center Road at a point south of Silsby Road and would be reconfigured to stop controlled with a prohibition of the left-turn movement in and out of Washington Boulevard.

The exclusive right-turn lane on the eastbound approach can be eliminated by adding green space to the sidewalk buffer.

Alternative II-B Multimodal Traffic Analysis

A traffic analysis was performed using 2010 Highway Capacity Manual methodology and VISTRO and ARTPLAN software. The LOS at the three intersections for the evening peak hour is shown in Table 3 in Appendix C. The three intersections operate at an acceptable level of service of D or better. The LOS at this intersection will improve from LOS D (for Alternative II-A) to LOS C (similar to the LOS under the existing lane configuration). Bicycle LOS improves from E to B with this alternative.

Figure 7: The Realignment of Washington Boulevard

Pedestrian Facilities

The Existing Conditions section (pages 6-19) highlights the existing pedestrian facility issues along the Cedar Road and Warrensville Center Road corridors, including the length of crosswalks, absence of crosswalks at some intersections and between intersections, and the restricted sidewalk walkability at some locations due to arbitrary placement of street furnishings within the limited right-of-way.

The study recommends improvements that will increase pedestrian comfort, safety and connectivity and enhance the environment for all users. The principal recommendations are to provide midblock crossings and curb extensions, modify nine intersections along Cedar Road and Warrensville Center Road, relocate street furnishings and plant empty tree-lawn pits.

Sidewalks

Use Existing, Vacant Tree Pits

Planting the existing vacant tree-lawn pits and the brick-paved tree-lawn pits on Warrensville Center Road will aesthetically improve the roadway. It will also provide better separation between traffic and pedestrians, thereby improving safety and comfort.

To make aesthetic improvements, the community stated a desire to increase green space and trees. On Cedar Road, providing trees or planting tree-lawn pits and other amenities to soften the streetscape environment cannot be achieved within the available width of the sidewalk. Due to the limited existing right-of-way, the alternative is to plant trees on private properties to improve the roadway aesthetically and enhance the environment for all users.

On the University Heights side of Cedar Road west of Fenwick Road, the lots have front yards that are about 40 feet wide and 30 feet deep. Only a few of these front yards have trees. It is suggested that the

Figure 8: Warrensville Center Road existing and proposed tree-lawn pit landscaping

City work with private property owners to plant trees outside the right-of-way along Cedar Road similar to the 2012 plan for Warrensville Center Road. Figure 9 shows a potential improvement on commercial private property.

Figure 9: Cedar Center Driveway on Cedar Road (existing and proposed improvement)

Relocate Street Furnishings on Cedar Road

Relocate poles, fire hydrants, and other sidewalk furnishings to the outer edge of the sidewalk to accommodate pedestrians and wheelchairs better. The recommended relocation includes utilities in both University Heights and South Euclid. Due to the limited right-of-way along Cedar Road, fire hydrants and poles should be relocated to adjacent private properties. The cities are required to obtain the right to use private properties by easement agreements with property owners.

Midblock Crosswalks

The distances between pedestrian crossings on Warrensville Center Road are 1,500 feet between Meadowbrook Boulevard and Fairmount Boulevard and 900 feet between Traymore Road and Hillbrook Road (see Figure 10). This study recommends adding midblock crossings within these two sections of Warrensville Center Road. These two blocks are in a residential area where rental homes are primarily occupied by John Carroll University students.

Alternative 1: Midblock Curb Extensions (Bump Outs)

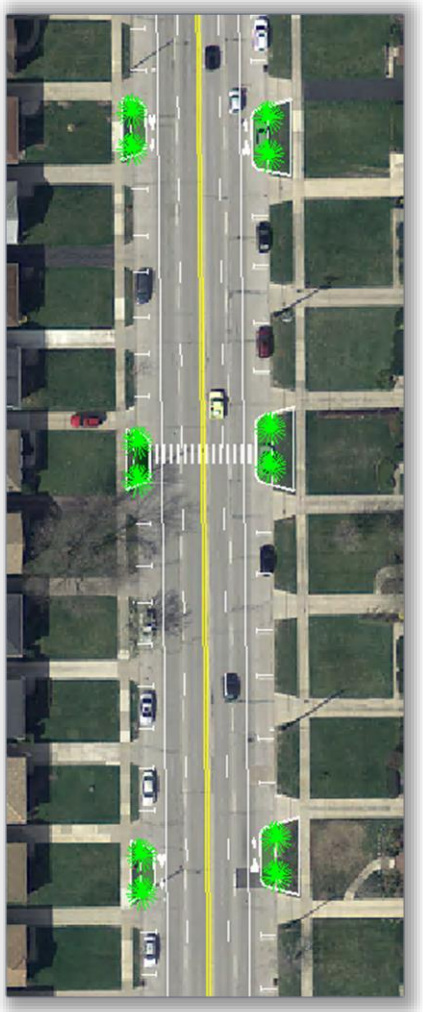
In addition to providing midblock crossings, this alternative would:

- Soften the environment by adding green space
- Calm traffic
- Shorten the crossing distance by 14 feet

This alternative, shown in Figure 11, would eliminate six on-street parking spaces in each block. Curb extensions could be added or removed as desired to repurpose more or fewer on-street parking spaces.

Figure 10: The locations of the proposed midblock crossings

Figure 11: Proposed curb extensions and midblock crossing

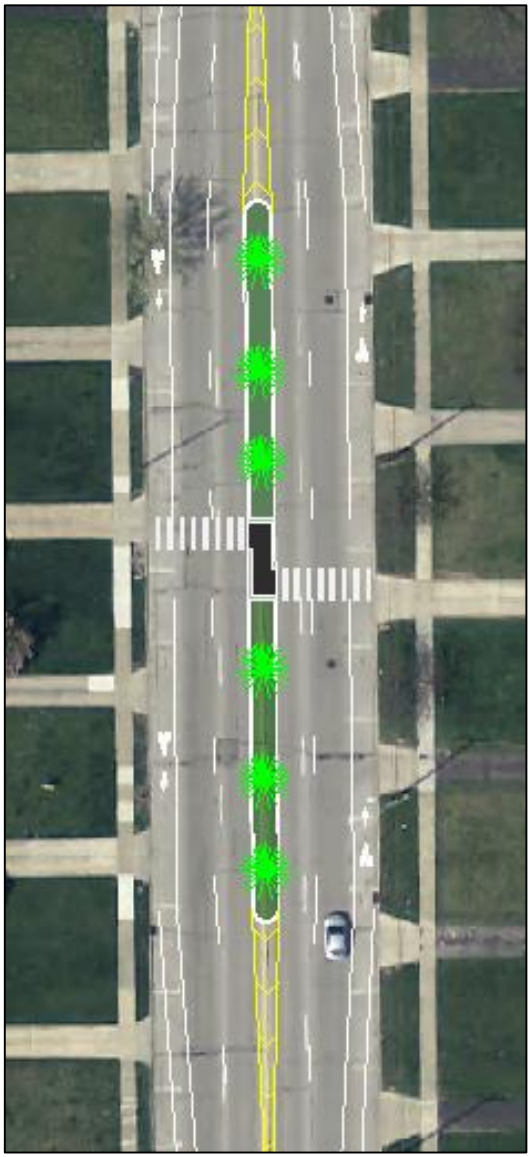


Alternative 2: Median Crossing

This alternative would provide a median refuge island so that the pedestrian could complete the crossing in two stages. As shown in Figure 12, 16 on-street parking spaces would be eliminated to provide the median and the required lane tapering. This alternative would:

- Add new green space
- Shorten the crossing distance by eight feet
- Provide a refuge, making it easier to find safe gaps

Figure 12: Median Crossing



Both midblock crossing alternatives involve altering space currently used for on-street parking to add green space and midblock pedestrian crosswalks. A parking study was completed to assess the need and sufficiency for on-street parking on Warrensville Center Road. On-street parking data was collected and analyzed for the three periods:

- 7:00 to 8:00 a.m., during trash collection time. Residents are required to clear their driveways and use the on-street parking if necessary to allow the small trash trucks to reach the trash containers left up the driveways
- Noon to 1:00 p.m.
- 6:00 to 7:00 p.m.

A summary of the data is shown in Appendix D.

There are 28 marked parking spaces between Traymore Road and Hillbrook Boulevard and 31 marked parking spaces between Meadowbrook Boulevard and Fairmount Boulevard. Based on the parking survey results, on-street parking usage peaked in the evening for the block between Traymore Road and Hillbrook Road (see Table 2). For the southern block between Meadowbrook Boulevard and Fairmount Boulevard, the peak was during the midday period.

For the northern block, the preferred alternative is Alternative 1, the bump outs. Reducing six of the available on-street parking spaces would increase the expected parking usage during the evening parking peak to 50%. The on-street parking would therefore be sufficient.

For the southern block, the preferred alternative is Alternative 2, the median crossing. Reducing 16 of the existing on-street parking spaces would increase the parking usage during the midday period to 100%. The remaining on-street parking would be fully used.

Table 2: On-street parking use

Time	Traymore to Hillbrook		Meadowbrook to Fairmount	
	Maximum Number of Parked Vehicles	Parking Usage	Maximum Number of Parked Vehicles	Parking Usage
7 a.m.	3	9%	4	13%
Noon	8	27%	15	48%
6 p.m.	11	39%	9	27%

Intersection Modifications

Improving safety for pedestrians at crosswalks can be achieved by reducing the length of the crosswalk, improving the visibility of pedestrians to drivers, providing a refuge area and slowing down turning vehicles. Most of the corner radii improvements would require relocating the sidewalks, curb cuts and ramps. Reducing the corner radii would:

- Reduce the speed of right-turning traffic
- Provide shorter crosswalks
- Enhance the visibility of pedestrian crossing
- Reduce the expanse of the intersection

The capability of the modified corners to accommodate buses and single-unit trucks was tested using the CAD software AutoTURN. Appendix E shows the paths for American Association of State Highway and Transportation Officials (AASHTO) 2011 single-unit truck (SU-30) and bus (S-BUS-40).

Recommendations to improve the pedestrian environment and safety at nine intersections along Cedar Road and Warrensville Center Road follow on the next pages.

Countdown Pedestrian Signal Heads

Pedestrian Push Buttons

1. Cedar Road and Washington Boulevard Intersection

- Reduce the corner radii at the northeast, northwest and southeast corners of the intersection
- Relocate the crosswalks farther into the intersection
- Provide new curb ramps
- Upgrade to countdown pedestrian signal heads

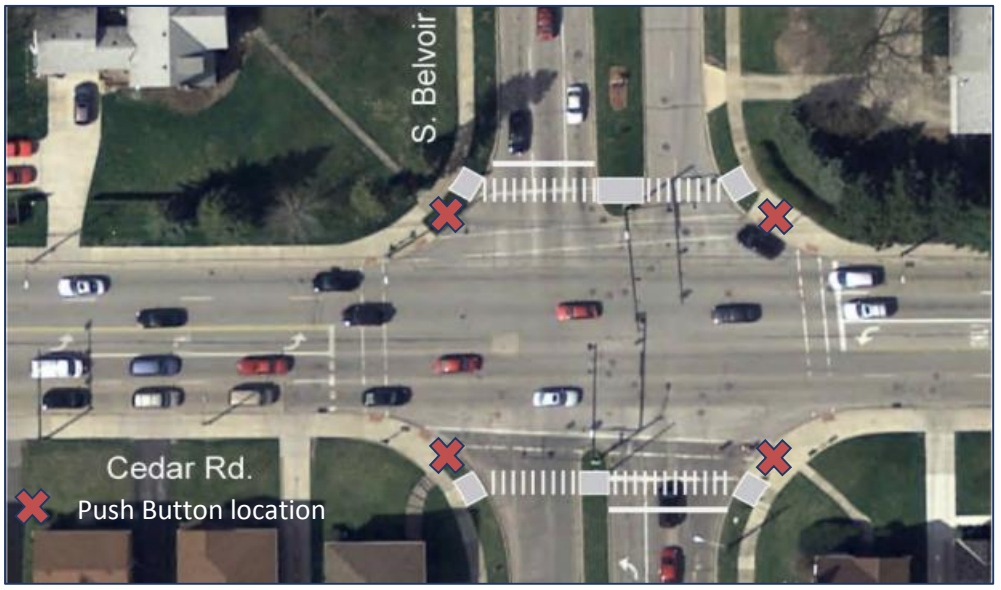
Relocating the northbound stop bar would also improve the restricted sight distance for the northbound approach, caused by the intersection's skewed alignment and the south leg upgrade climb toward the intersection.

Cedar Road and Washington Boulevard Intersection

2. Cedar Road and South Belvoir Boulevard Intersection

- Relocate the South Belvoir crosswalks to use the median as a pedestrian refuge
- Provide new curb ramps on the four corners and a refuge area on both the south and north legs of the intersection
- Adjust the pedestrian signal heads to maximize their visibility at the new crosswalk locations
- Install new pedestrian push buttons for the relocated crosswalks
- Upgrade to countdown pedestrian signals

Cedar Road and South Belvoir Boulevard existing and proposed



3. Cedar Road at University Square West Entrance

- Eliminate the eastbound exclusive right-turn lane and create a new green space
- Consolidate parking lots on the north side of the intersection and close the office building driveway or convert it to right-in/right-out only
- Provide new curb ramps on the northwest and southwest corners
- Upgrade to countdown pedestrian signals

Cedar Road and University Square west entrance intersection

The new green space on Cedar Road, looking west

4. Cedar Road at University Square East Entrance

- Reduce the southwest corner curb radius
- Relocate the eastbound approach stop line and crosswalk
- Add a new crosswalk on the east side of the intersection
- Provide new curb ramps on both the east and west sides of the intersection

Cedar Road and University Square east entrance intersection

5. Warrensville Center Road and Traymore Road and Hillbrook Road Intersections

The lack of mid-block pedestrian crossings is evident along Warrensville Center Road. The distance between the two closest crosswalks between Silsby Road and Meadowbrook Blvd. is 0.42 miles (2,240 feet) (see Figure 13). There are no east-west crosswalks at the stop-controlled intersections of Warrensville Center Road with Hillbrook Road and Traymore Road. In addition to the midblock crossing recommended between Traymore Road and Hillbrook Road, this study recommends:

- Adding two new crosswalks at the Hillbrook Road intersection and two at the Traymore Road intersection
- Installing curb extensions (bump outs) to shorten the crossing distance, enhance pedestrian visibility and add new green space (see Figure 14)

Figure 15 shows a view of the existing south corners of the Hillbrook Road intersection and the proposed curb extensions and pedestrian crossings.

Figure 13: Warrensville Center Road

Figure 14: Bump outs and crosswalks at Hillbrook Road intersection

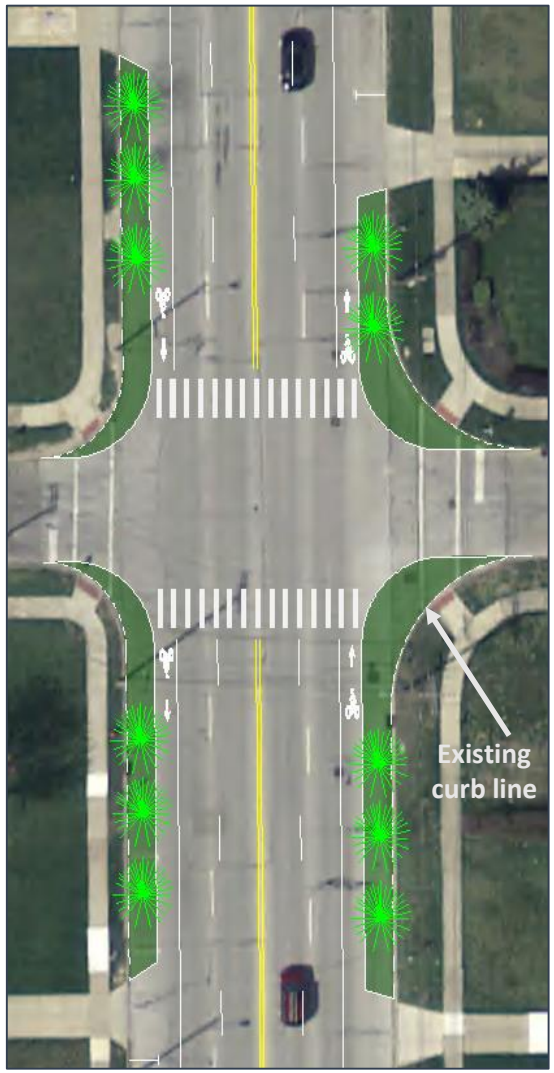


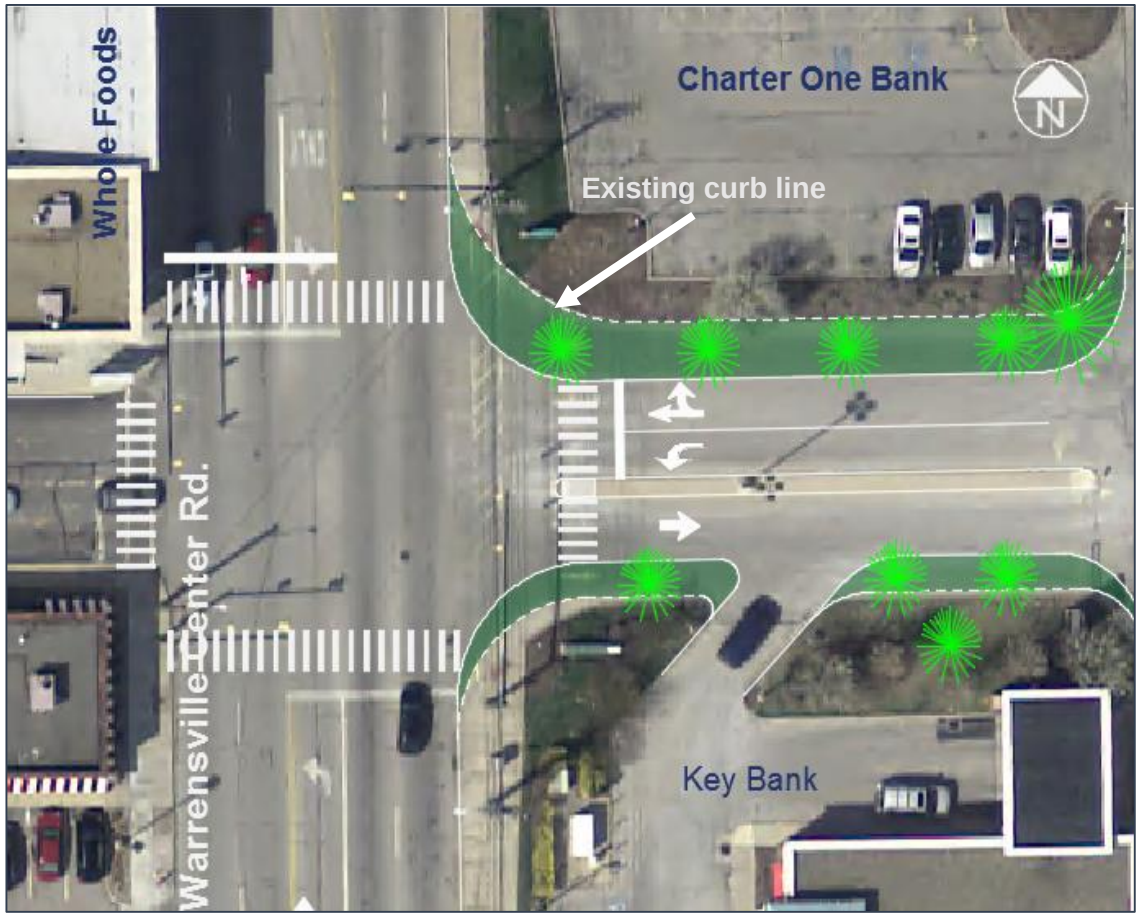
Figure 15: Existing and proposed Hillbrook Road intersection

6. Warrensville Center Road and University Square Driveway Intersection

- Modify the corner radii on the east side of Warrensville Center Road
- Modify the alignment of the east and west legs and reduce the number of lanes on the east leg to:
  - Two lanes on the intersection approach side (one shared through and right lane and one left-turn lane)
  - One lane on the intersection eastbound departure side of the east leg
- Install crosswalks on the north and south sides of the intersection, providing new:
  - curb ramps
  - pedestrian signals
- Upgrade to countdown pedestrian signals

The recommended improvements are shown in the accompanying diagram. The dashed lines show the existing curb line.

Warrensville Center Road and University Square entrance intersection



7. Warrensville Center Road, Silsby Road, and Washington Boulevard Intersection

The intersection of Warrensville Center Road, Silsby Road and Washington Boulevard marks the transition from the commercial district north of Silsby Road to the residential district to the south. Silsby Road is a main east-west route; it traverses University Heights from South Taylor Road to South Green Road at the western and eastern corporation limits.

This study examined the two alternatives listed below.

Alternative 1

- Reduce Washington Boulevard corner radii to shorten the crossing distance and reduce the turning vehicles' speed
- Provide new curb ramps
- Upgrade to countdown pedestrian signal heads

Alternative 1: Warrensville Center Road, Silsby Road, and Washington Boulevard intersection

Alternative 2

This study recommends modifying the intersection to a simple cross intersection.

- Realign Washington Boulevard and create a stop-controlled T-intersection south of Silsby Road
- Restrict the turning movement at Washington Boulevard to right-in/right-out only
- Eliminate the eastbound exclusive right-turn lane
- Relocate the northbound approach stop line
- Relocate the northbound approach signal heads
- Add new curb ramps
- Upgrade to countdown pedestrian signals
- Add new green spaces using the eliminated right-turn lane and area created between Silsby Road and Washington Boulevard

The preferred alternative is Alternative 2 which simplifies the traffic operation, reduces delay and adds green space to the intersection area.

Alternative 2: Warrensville Center Road, Silsby Road and Washington Boulevard intersection

8. Warrensville Center Road, Meadowbrook Boulevard and Milford Road Intersection

- Reduce the corner radii at the northeast, east and southeast corners of the intersection
- Add a crosswalk north of the intersection
- Provide new curb ramps
- Upgrade to countdown pedestrian signal heads
- Restrict the right turns from Milford Road into Meadowbrook Boulevard

Warrensville Center Road, Meadowbrook Boulevard and Milford Road intersection

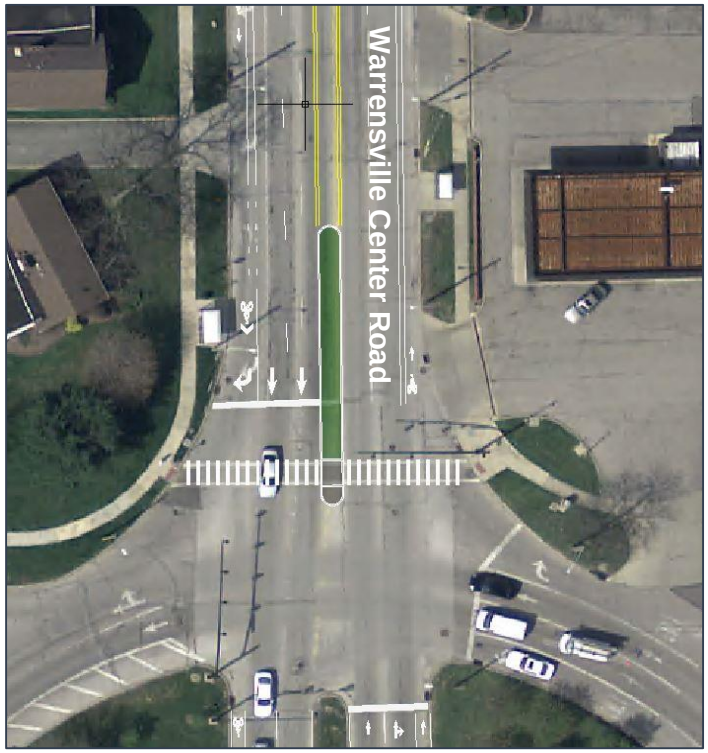
9. Warrensville Center Road and Fairmount Boulevard Westbound Intersection

The Warrensville Center Road southbound approach at this intersection has three lanes: two through lanes and one exclusive right-turn lane. Although this intersection is close to John Carroll University, an area of relatively high pedestrian activity, the intersection is not pedestrian friendly. The crosswalk is 104 feet long with no refuge, and the pedestrian WALK phase conflicts with westbound traffic turning right onto Warrensville Center Road heading north. The study recommends:

- Providing a center pedestrian crossing island (refuge area) on Warrensville Center Road
- Modifying the signal timing to enhance pedestrian safety
- Upgrading to pedestrian countdown signals
- Marking and signing the southbound right-turn lane as a shared-use lane to encourage through cyclists to use the left side of the right-turn lane. The bicycle lane is to be continued in the receiving side of Warrensville Center Road south of westbound Fairmount Boulevard.

Traffic Analysis

The lane configuration would be the same as the existing and Alternative I configurations, and the intersection LOS for the evening peak hour would not change. The intersection would operate at an acceptable level of service C.



Revitalize Community Gateway

Enhance the community gateway at the intersection of Cedar Road and Warrensville Center Road by creating green space at the southwest corner of the intersection in harmony with the existing green space at the southeast corner. The new green space would replace the exit-only vehicular driveway at Warrensville Center Road and 10 parking spaces in front of Whole Foods Market east of the exit-only driveway on Cedar Road.

The effect of the proposed reduction in the number of available parking spaces was studied. The occupancy of the off-street parking available around Whole Foods Market was surveyed during one of the peak shopping periods. A summary of the parking data collected on Saturday, April 11, 2015, between 1:00 and 3:00 p.m. is shown in Appendix D. The total number of available parking spaces is 235, which includes the surface parking around the Whole Foods building and the roof parking. The parking study showed that the amount of parking used during the analysis period was 81% and the average parking duration was 45 minutes.

Existing and proposed

Access Management

Pedestrian safety along Cedar Road can be enhanced by reducing driveway curb cuts in the commercial areas close to South Taylor Road, Warrenville Center Road and South Green Road.

Property owners must be engaged to consolidate parking lots, eliminate unnecessary curb cuts and reduce excessive driveway widths. The following are some potential improvements:

1. Consolidate the driveways on the north side of Cedar Road at the intersection of Cedar Road and the University Square west driveway, shown with the recommended intersection modifications on page 43.
2. Close the unused drive-through driveway for Family Dollar at the southeast corner of the intersection of Cedar and Taylor Roads (see Picture 10).
3. Reduce the width of the Midas driveway located 150 feet east of South Taylor Road on the north side of Cedar Road (see Picture 11).
4. Reduce the width of Burger King's driveway, which is the north leg of the intersection of Cedar Road and the University Square east entrance. Consolidate the driveways at the South Green Road intersection area.
5. Eliminate the BP Gas Station driveway on the northeast corner of the Warrensville Center Road and Fairmount Boulevard westbound intersection (see Picture 12).

Picture 10: Family Dollar Driveway

Picture 11: Midas Driveway

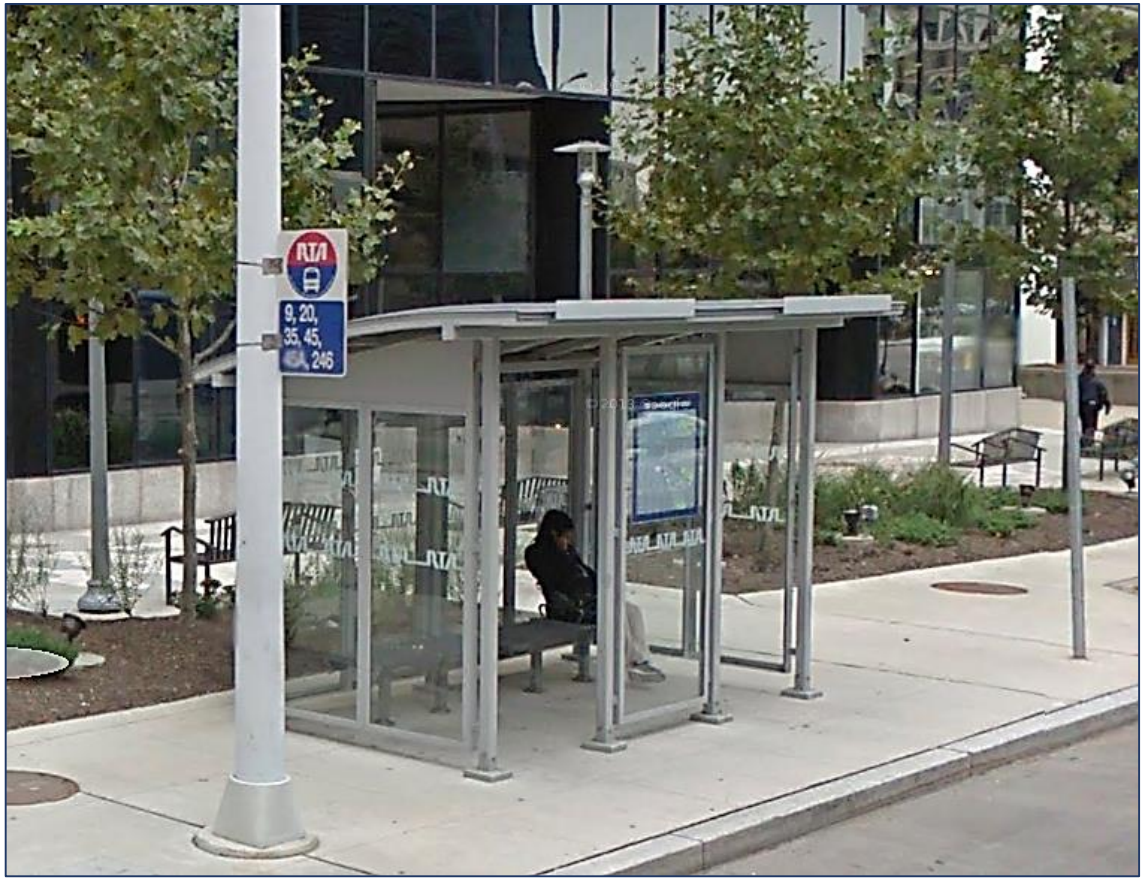
Picture 12: PB Gas Station at the northeast corner of Warrensville Center Road and Fairmount Boulevard westbound intersection

Public Transit

The GCRTA fixed bus routes running through the City of University Heights connect it and the neighboring communities to vital destinations. This plan proposes to furnish the bus stops with route schedules and the sheltered bus stops with maps and waste receptacles.

This study also recommends providing directional signs to RTA rapid stations on the proposed signed and marked bike routes.

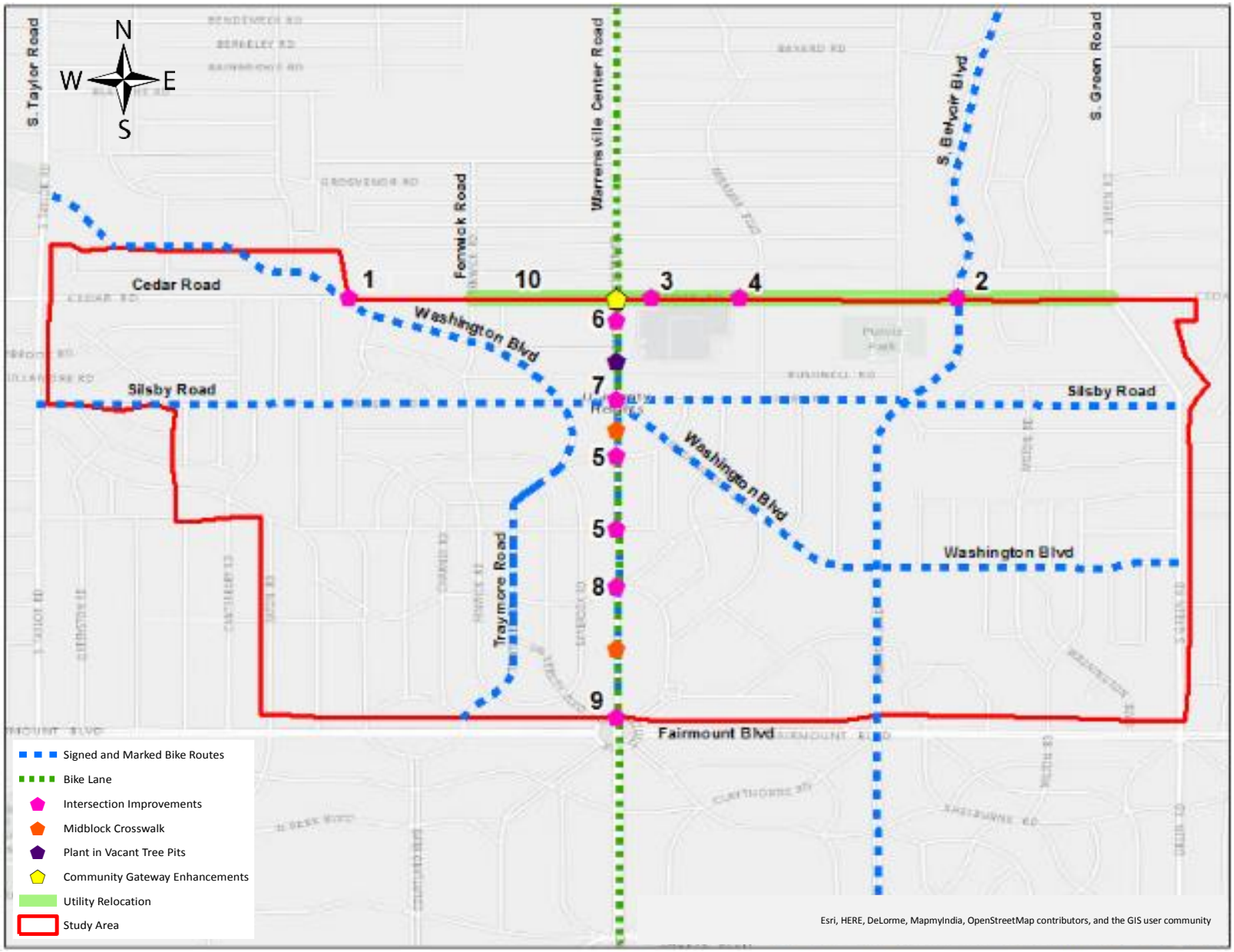
Figure 15: RTA Bus Stop Shelter on East 12th Street in Cleveland



Recommendations Summary

BICYCLE	• Develop a signed and marked bike route network • Add bicycle lanes: Lane diet
PEDESTRIAN	• Sidewalks: Use vacant tree pits, relocate street furnishing • Add a midblock crosswalk • Modify Intersections: Relocate sidewalks, curb cuts, crosswalks and ramps. Add new curb ramps, crosswalks, pedestrian crossing islands and curb extensions. Upgrade pedestrian signals, modify signal timing, reconfigure lanes on Warrensville Center Road and add new green spaces.
COMMUNITY GATEWAY	• Add green space
ACCESS MANAGEMENT	• Reduce excess driveway widths • Close unused driveways • Consolidate driveways
PUBLIC TRANSIT	• Furnish bus stops with route schedules • Furnish sheltered bus stops with maps and waste receptacles • Provide wayfinding signs to RTA rapid stations on proposed signed and marked bike routes

Map 9: All Recommendations



Map 8 shows the location of the study recommendations.

Intersection Improvements

1. Cedar Road at Washington Boulevard

Reduce corner radii, relocate crosswalks, new curb ramps, upgrade to countdown pedestrian signal heads, relocate stop bar.

2. Cedar Road at South Belvoir Boulevard

Relocate crosswalks, add new curb ramps and refuge areas, adjust pedestrian signal heads, add new pedestrian push buttons, upgrade to countdown pedestrian signals.

3. Cedar Road at University Square West

Reconfigure lanes, create new green space, add new curb ramps, upgrade to countdown pedestrian signals.

4. Cedar Road at University Square East Entrance

Adjust curb radius, relocate stop line and crosswalk, add new crosswalk and curb ramps.

5. Warrensville Center Road at Traymore Road and Hillbrook Road

Add new crosswalks and curb extensions.

6. Warrensville Center Road at University Square Driveway

Modify corner radii; realign lanes and reduce number of lanes; install crosswalks, curb ramps and pedestrian signals; upgrade to countdown pedestrian signals

7. Warrensville Center Road, Silsby Road and Washington Boulevard

Reconfigure the five-way intersection, modify curb radii, add new curb ramps, upgrade to countdown pedestrian signal heads, add new green spaces.

8. Warrensville Center Road, Meadowbrook Boulevard and Milford Road

Add a crosswalk and new curb ramps, upgrade to countdown pedestrian signal heads, restrict right-turn movements.

9. Warrensville Center Road at Fairmount Boulevard Westbound

Add a pedestrian crossing island, reconfigure lanes, modify signal timing, upgrade to pedestrian countdown signals.

Utility Relocation

10. Relocate:

- Hydrants
- Mast Arms
- Overhead Signs
- Utility Poles
- Control Boxes
- Pedestrian Signals

Cost Estimate

The conceptual cost estimate for all recommendations, excluding the gateway landscaping on the Whole Foods property, ranges between $1.3 and $1.9 million. This estimate includes a 30% contingency to account for any uncertainties that would be resolved as more detailed planning and engineering are completed. The range in estimated cost accounts for flexibility in size, materials and landscaping of curb extensions and median islands. In addition, if the proposed curb extensions impact drainage infrastructure, costs may increase. Alternatively, curb extensions can usually be designed cost effectively to accommodate drainage without relocating drainage inlets. Construction costs are representative of 2015 construction and should be inflated to reflect the expected construction year, once this is known.

Table 3 shows a summary of the cost estimate. A more detailed cost estimate is included in Appendix F.

Table 3: Cost Estimates for All Recommendations

Recommendations	Low	High
Intersection Improvements		
1. Cedar Road at Washington Boulevard	$62,000	$152,000
2. Cedar Road at South Belvoir Boulevard	$35,000	
3. Cedar Road at University Square West	$109,000	
4. Cedar Road at University Square East	$39,000	$69,000
5. Warrensville Center Road at Traymore/Hillbrook Rds.	$92,000	$166,000
6. Warrensville Center Road at University Square	$95,000	$155,000
7. Warrensville Center Road at Silsby/Washington	$125,000	
8. Warrensville Center Road at Meadowbrook/Milford	$69,500	$159,500
9. Warrensville Center Road at Fairmount Circle	$16,000	$56,000
Midblock Crosswalk	$16,000	$63,000
Cedar Road Utility Relocation	$50,000	
Warrensville Center Road Restriping	$32,000	
Signed & Marked Bike Routes	$78,000	
Replant Vacant Tree Pits	$7,500	
SUBTOTAL	$889,000	$1,313,000
30% Contingency	$266,700	$393,900
10% Design Engineering Cost	$115,570	$170,690
TOTAL	$1,271,270	$1,877,590

Next Steps

Most elements proposed in this plan can be implemented alone or in combination with other elements, with a couple exceptions. The pedestrian refuge median islands, proposed on Warrensville Center Road at Fairmount Circle and midblock between Fairmount Boulevard and Meadowbrook Boulevard should be implemented with (or after) the restriping of Warrensville Center Road. If implemented before the corridor restriping, spot restriping should be adjusted near the refuge islands. Similarly, upgrading the pedestrian signals to the countdown variety could be done one intersection at a time or all at once. Upgrading all at once may reduce the cost per intersection. Upgrading the pedestrian signals could be done separately from the geometric improvements proposed at various intersections, except at Cedar Road and University Square entrances (Intersections 3 & 4), Warrensville Center Road and University Square entrance (Intersection 6), and Warrensville Center Road and Meadowbrook Boulevard (Intersection 8). The geometric improvements at these four intersections require the installation of additional pedestrian signals, necessitating upgrades for the existing pedestrian signals at these intersections.

The most cost-effective way to implement recommendations within the right-of-way along Cedar Road and Warrensville Center Road is to incorporate them into a future road resurfacing or reconstruction project. The pavement condition rating for both of these roads, within University Heights, is above 80. Based on this score, road resurfacing or reconstruction is not likely to occur in the near term, and it may be desirable to pursue other ways to implement the recommendations of this plan sooner. The city should coordinate with Cuyahoga County and NOACA to determine when the next large roadway project is likely to occur.

It would be beneficial to implement the Warrensville Center Road preferred restriping alternative (lane diet) using local funding. It could be included as part of the pavement marking maintenance annual program before incorporating it into a larger resurfacing project. This would help speed up the implementation process and establish history with 10'-wide lanes. This is expected to help during future state- or federal-funded projects along the corridor, which may require a design exception for this lane width.

NOACA suggests implementing the plan recommendations in phases so that plan elements that are lower in cost and easier to coordinate could be implemented in the short term, and elements that are higher cost or require complex coordination would have several years to be planned, designed and constructed.

Short Term

- Replant vacant tree pits
- Relocate utilities
  - Hydrants
  - Post-mounted signs
- Implement the signed and Marked Bike Routes

Medium Term

- Restripe Warrensville Center Road
- Add bump outs and midblock crosswalks on Warrensville Center Road
- Make the low-cost intersection improvements
- Upgrade pedestrian signals to countdown

Long Term

- Make higher-cost intersection improvements
- Relocate utilities
  - Mast arms
  - Overhead signs
  - Utility poles
  - Control boxes
  - Pedestrian Signals

Coordination

Some recommendations will require coordination with neighboring cities, businesses and property owners.

- The bicycle recommendations can be implemented only in University Heights, but would have a much bigger impact on the regional network if implemented in coordination with the neighboring cities of Cleveland Heights, Shaker Heights and South Euclid. In addition, Cleveland Heights is also planning to implement a signed and marked bike route network, and has the capacity to produce signs and install pavement markings in-house. Working with the City of Cleveland Heights may allow the bike routes to be implemented at a reduced cost, relative to hiring a contractor.

- The driveway closure recommended for the Whole Foods parking lot near the intersection of Warrensville Center Road and Cedar Road needs to be implemented in coordination with Whole Foods. Closing the driveway will necessitate eliminating a few parking spaces and changing the traffic flow of the parking lot.

- Utility relocations along Cedar Road will require coordination with utility companies and property owners. In some cases, it may be desirable to pursue an easement for relocating the utility outside the right-of-way. Similarly, it will be necessary to work with property owners along Cedar Road to plant street trees near the roadway in places where the right-of-way lacks sufficient room.

- Intersection improvements along Cedar Road will require coordination with the City of South Euclid, and the intersection improvement on Warrensville Center Road at Fairmount Boulevard may require coordination with the City of Shaker Heights.

Funding

The cost of these recommendations can vary depending on the quality and quantity of what is installed. For example, a crosswalk can be painted for a relatively low cost or constructed of brick pavers for a significantly higher cost. For the purposes of this study, NOACA staff believes it makes more sense to focus on lower-cost improvements first, particularly where facilities do not currently exist. In the longer term it may make sense to upgrade infrastructure, but in the shorter term it is more important to implement recommendations without delay. The benefit of doing so can then be assessed, and longer-term plans can be developed.

Funding sources may be available through NOACA and Cuyahoga County. The NOACA TLCI Implementation Grant program can help fund up to 80% of lower-cost pedestrian and bicycle infrastructure items, such as crosswalks and pedestrian islands. The intent of the program is to help implement lower-cost projects from completed studies and plans in order to help communities improve safety and build a multimodal transportation system. Many of the recommendations in this plan are appropriate and recommeded for the program.

For higher-cost projects such as full streetscapes, lighting, or signalization projects, NOACA funding is available through the Surface Transportation, Congestion Mitigation and Air Quality, and Transportation Alternatives programs. Funding availability through these programs is extremely competitive, however, and the implementation of recommendations with these sources is best achieved through larger-scale road improvement projects. For example, the cost of funding a stand-alone lighting project with federal-aid funding will be much higher due to the costs of compliance with federal and state regulations than it would as a component of a road rehabilitation or streetscape project, because efficiencies in the project development process can consolidate tasks and project costs. Therefore, for higher-cost projects University Heights should strive to package improvements as part of larger-scale projects or find alternative funding so that costs are not inflated.

University Heights is an eligible community for the Cuyahoga County Competitive Municipal Grant Program. This program can be used to fund projects that meet one of three U.S. Department of Housing and Urban Development (HUD) national objectives, which include streetscape and roadway infrastructure elements. For more information, visit http://development.cuyahogacounty.us/en-US/municipal-grants.aspx

Additional information on funding sources is available in Cuyahoga County's Complete Streets Toolkit, which is available on the web at www.planning.co.cuyahoga.oh.us/complete/toolkit.html

Appendices

Appendix A: Existing Typical Cross-sections

Appendix B: Traffic Turning Movement Count

Appendix C: Multimodal Traffic Analysis

Appendix D: Parking Occupancy Analyses

Appendix E: Truck/Bus Turning Movement Paths

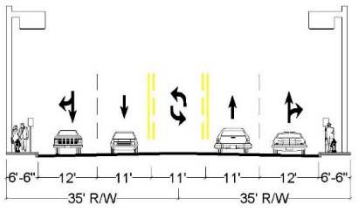
Appendix F: Cost Opinion

Appendix G: Eastside Greenway TLCI Study Draft Recommendations

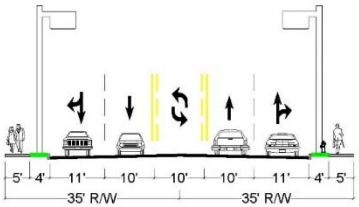
Appendix H: Striping Plan

Appendix I: Public Outreach

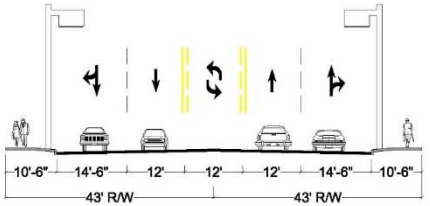
Appendix A: Existing Typical Cross-sections



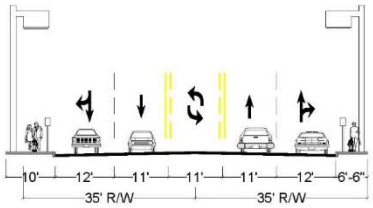
Cedar @ Warrensville Center to Marimar
1,300' (Looking East)



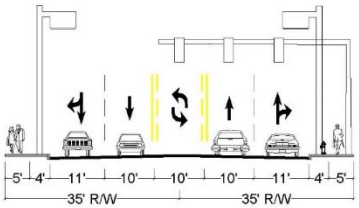
Cedar @ South Green to Fenway
700' (Looking East)



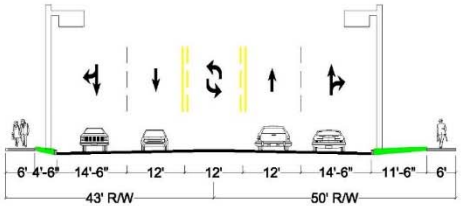
Warrensville Center @ Silsby to Cedar
1,300' (Looking North)



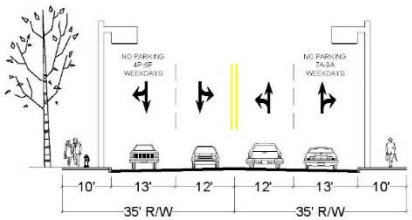
Cedar @ Fenwick to Warrensville Center
1,300' (Looking East)



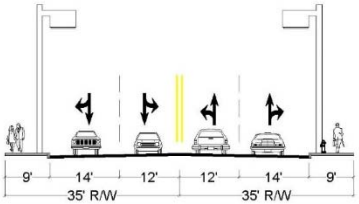
Cedar @ Wrenford to South Green
2,000' (Looking East)



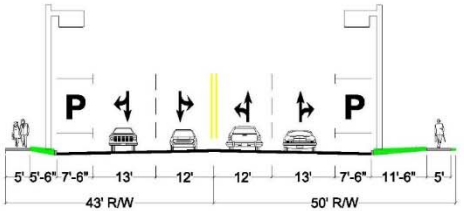
Warrensville Center @ Meadowbrook Intersection
(Looking North)



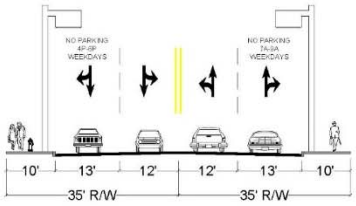
Cedar @ Washington to Fenwick
1,200' (Looking East)



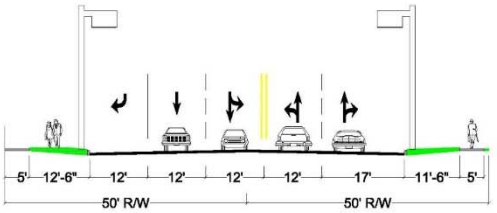
Midblock Cedar @ Marimar to Wrenford
700' (Looking East)



Warrensville Center @ 200' North of Fairmount to Silsby
3,700' (Looking North)



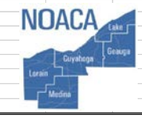
Cedar @ Taylor to Washington
2,800' (Looking East)



Warrensville Center @ Fairmount to 200' North
200' (Looking North)

Appendix B: Traffic Turning Movement Count

LOCATION	Warrensville Center Road and Silsby Road
CITY :	University Heights
DATE	Tuesday, November 18, 2014
COUNTED BY :	
# OF HOURS COUNTED :	4.0
SEASONAL ADJUSTMENT FACTOR : 1.00	ADT ADJUSTMENT FACTOR : 3.50



TIME PERIOD	Warrensville Center Road															Silsby Road															Washington Blvd.							TOTAL VEHICLES		
	SOUTHBOUND							NORTHBOUND								WESTBOUND							EASTBOUND							NORTHWESTBOUND							TOTAL HOURLY		
	LEFT	B LEFT	THRU	RIGHT	COML.	TOTAL	HOURLY VOLUME	LEFT	THRU	B RIGHT	H RIGHT	COML.	TOTAL	HOURLY VOLUME	H LEFT	LEFT	THRU	RIGHT	COML.	TOTAL	HOURLY VOLUME	LEFT	THRU	B RIGHT	RIGHT	COML.	TOTAL	HOURLY VOLUME	H LEFT	B LEFT	B RIGHT	RIGHT	COML.	TOTAL	HOURLY TOOTAL	TOTAL	%COML.	VOLUME
7:00-7:15	1	4	109	14	0	128		8	59	1	0	2	68		0	1	11	6	1	18		4	14	5	13	0	36		0	3	3	0	0	6		256		
7:15-7:30	0	6	115	9	4	130		13	99	3	0	2	115		0	0	14	5	1	19		5	13	7	25	2	50		0	11	2	0	1	13		327		
7:30-7:45	3	4	134	8	1	149		19	100	11	1	7	131		0	0	22	5	0	27		5	12	13	38	3	68		0	9	6	0	0	15		390		
7:45-8:00	0	3	115	7	0	125	532	12	127	11	0	8	150	464	0	0	17	3	0	20	84	9	25	24	28	2	86	240	0	15	8	0	0	23	57	404	2.5	1,377
8:00-8:15	3	5	114	7	1	129	533	26	145	5	0	7	176	572	0	3	24	4	1	31	97	11	22	25	37	3	95	299	0	20	10	0	3	30	81	461	2.9	1,582
8:15-8:30	2	3	114	2	4	121	524	20	146	6	0	4	172	629	0	5	21	4	0	30	108	10	32	32	23	3	97	346	0	26	7	0	0	33	101	453	2.8	1,708
8:30-8:45	4	6	141	6	2	157	532	14	123	6	1	4	144	642	0	5	26	7	1	38	119	8	26	18	38	3	90	368	0	28	6	0	1	34	120	463	2.6	1,781
8:45-9:00	1	9	141	9	2	160	567	14	112	5	0	6	131	623	0	0	26	12	1	38	137	20	31	23	37	4	111	393	0	25	8	1	0	34	131	474	2.7	**1,851**
9:00-9:15	0	0	0	0	0	0	438	0	0	0	0	0	0	447	0	0	0	0	0	0	106	0	0	0	0	0	0	298	0	0	0	0	0	0	101	0	2.5	1,390
9:15-9:30	0	0	0	0	0	0	317	0	0	0	0	0	0	275	0	0	0	0	0	0	76	0	0	0	0	0	0	201	0	0	0	0	0	0	68	0	2.6	937
9:30-9:45	0	0	0	0	0	0	160	0	0	0	0	0	0	131	0	0	0	0	0	0	38	0	0	0	0	0	0	111	0	0	0	0	0	0	34	0	2.7	474
9:45-10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:00-10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:15-10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:30-10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:45-11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:00-11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:15-11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:30-11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:45-12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:00-12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:15-12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:30-12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:45-1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:00-1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:15-1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:30-1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:45-2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:00-2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:15-2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:30-2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:45-3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:00-3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:15-3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:30-3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:45-4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4:00-4:15	3	8	169	9	4	189	189	28	140	5	0	3	173	173	0	3	13	4	0	20	20	12	20	14	26	2	72	72	0	15	9	0	1	24	24	478	2.1	478
4:15-4:30	0	10	147	19	3	176	365	27	159	5	1	2	192	365	0	8	23	5	1	36	56	20	16	19	26	1	81	153	0	15	1	0	1	16	40	501	1.8	979
4:30-4:45	1	7	165	15	3	188	553	25	156	7	0	3	188	553	0	6	27	3	0	36	92	18	29	26	27	2	100	253	0	11	10	1	0	22	62	534	1.7	1,513
4:45-5:00	2	13	192	11	5	218	771	21	147	3	0	1	171	724	0	10	22	5	0	37	129	18	22	21	25	3	86	339	0	15	10	0	1	25	87	537	1.8	2,050
5:00-5:15	1	16	161	16	2	194	776	28	194	7	2	3	231	782	0	3	22	7	0	32	141	18	18	14	22	0	72	339	1	19	11	0	1	31	94	560	1.5	2,132
5:15-5:30	7	10	167	14	1	198	798	23	165	4	3	2	195	785	0	4	34	7	0	45	150	10	24	22	29	1	85	343	0	15	11	0	0	26	104	549	1.3	2,180
5:30-5:45	4	8	169	17	1	198	808	40	219	8	1	2	268	865	0	4	24	5	0	33	147	10	20	12	20	1	62	305	1	15	12	0	1	28	110	589	1.1	2,235
5:45-6:00	2	7	169	19	1	197	787	33	180	2	0	1	215	909	1	1	17	8	0	27	137	17	28	21	20	1	86	305	0	17	8	0	0	25	110	550	0.8	**2,248**
6:00-6:15	0	0	0	0	0	0	593	0	0	0	0	0	0	678	0	0	0	0	0	0	105	0	0	0	0	0	0	233	0	0	0	0	0	0	79	0	0.7	1,688
6:15-6:30	0	0	0	0	0	0	395	0	0	0	0	0	0	483	0	0	0	0	0	0	60	0	0	0	0	0	0	148	0	0	0	0	0	0	53	0	0.7	1,139
6:30-6:45	0	0	0	0	0	0	197	0	0	0	0	0	0	215	0	0	0	0	0	0	27	0	0	0	0	0	0	86	0	0	0	0	0	0	25	0	0.5	550
6:45-7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4.0	34		2,322		34			351		89		57			1		343		6			195		296		31			2		122		10					
Hour Total		119		182		2,657			2,271		9		2,720			53		90		487			352		434		1,277			259		2		385		7,526		
ADT	**119**	**417**	**8,127**	**637**	**119**	**9,300**		**1,229**	**7,949**	**312**	**32**	**200**	**9,520**		**4**	**186**	**1,201**	**315**	**21**	**1,705**		**683**	**1,232**	**1,036**	**1,519**	**109**	**4,470**		**7**	**907**	**427**	**7**	**35**	**1,348**		**26,341**		
Maximum Period 5:00-6:00	14	41	666	66	5	787		124	758	21	6	8	909		1	12	97	27	0	137		55	90	69	91	3	305		2	66	42	0	2	110				2,248

to be changed based on the peak hour

	FROM NORTH							FROM SOUTH							FROM EAST							FROM WEST														
	LEFT	B LEFT	THRU	RIGHT	COML.	TOTAL	%comm.	LEFT	THRU	B RIGHT	H RIGHT	COML.	TOTAL	%comm.	H LEFT	LEFT	THRU	RIGHT	COML.	TOTAL	%comm.	LEFT	THRU	B RIGHT	RIGHT	COML.	TOTAL	%comm.	H LEFT	B LEFT	B RIGHT	RIGHT	COML.	TOTAL	%comm.	Total	%comm.
AM PEAK 8:00-9:00	**10**	**23**	**510**	**24**	**9**	**567**	**2%**	**74**	**526**	**22**	**1**	**21**	**623**	**3%**	**0**	**13**	**97**	**27**	**3**	**137**	**2%**	**49**	**111**	**98**	**135**	**13**	**393**	**3%**	**0**	**99**	**31**	**1**	**4**	**131**	**3%**	**1,851**	**3**
PM PEAK 5:00-6:00	**14**	**41**	**666**	**66**	**5**	**787**	**1%**	**124**	**758**	**21**	**6**	**8**	**909**	**1%**	**1**	**12**	**97**	**27**	**0**	**137**	**0%**	**55**	**90**	**69**	**91**	**3**	**305**	**1%**	**2**	**66**	**42**	**0**	**2**	**110**	**2%**	**2,248**	**1**

LOCATION	Warrensville Center Road and Meadowbrook Road
CITY :	University Heights
DATE	Tuesday, November 18, 2014
COUNTED BY :	
# OF HOURS COUNTED :	4.0
SEASONAL ADJUSTMENT FACTOR :	1.00
ADT ADJUSTMENT FACTOR :	3.50

NOACA

	Warrensville Center Road														Meadowbrook Road														Milford Road							TOTAL VEHICLES		
	SOUTHBOUND							NORTHBOUND							SOUTHWESTBOUND							NORTHEASTBOUND							WESTBOUND							TOTAL HOURLY		
TIME PERIOD	LEFT	B LEFT	THRU	RIGHT	COML.	TOTAL	HOURLY VOLUME	LEFT	THRU	B RIGHT	H RIGHT	COML.	TOTAL	HOURLY VOLUME	LEFT	B LEFT	THRU	RIGHT	COML.	TOTAL	HOURLY VOLUME	LEFT	THRU	B RIGHT	RIGHT	COML.	TOTAL	HOURLY VOLUME	LEFT	B LEFT	B RIGHT	RIGHT	COML.	TOTAL	HOURLY TOOTAL	TOTAL	%COML.	VOLUME
7:00-7:15	0	2	118	0	4	120		9	66	2	2	0	79		0	4	6	0	1	10		3	1	1	2	0	7		3	0	1	0	0	4		220		
7:15-7:30	0	6	162	1	3	169		3	115	1	1	4	120		0	9	5	1	0	15		2	1	9	5	0	17		2	0	0	0	0	2		323		
7:30-7:45	0	22	170	0	1	192		4	117	5	6	4	132		0	17	18	0	0	35		4	8	27	2	0	41		0	0	0	0	0	0		400		
7:45-8:00	1	22	157	2	2	182	663	7	130	1	1	3	139	470	0	18	28	2	0	48	108	5	3	32	3	0	43	108	0	0	0	0	0	0	6	412	1.6	1,355
8:00-8:15	0	6	121	3	1	130	673	9	165	0	0	7	174	565	0	9	14	3	0	26	124	3	4	5	2	0	14	115	1	2	1	0	0	4	6	348	1.7	1,483
8:15-8:30	0	4	157	1	1	162	666	4	145	0	2	6	151	596	0	8	8	3	0	19	128	1	2	6	10	0	19	117	0	1	2	0	0	3	7	354	1.7	**1,514**
8:30-8:45	0	8	161	6	1	175	649	4	135	0	2	6	141	605	0	2	3	0	0	5	98	3	3	1	6	0	13	89	0	0	0	0	0	0	7	334	1.9	1,448
8:45-9:00	0	15	164	8	2	187	654	9	124	1	3	5	137	603	0	5	2	1	0	8	58	0	5	2	3	0	10	56	0	1	4	0	0	5	12	347	2.1	1,383
9:00-9:15	0	0	0	0	0	0	524	0	0	0	0	0	0	429	0	0	0	0	0	0	32	0	0	0	0	0	0	42	0	0	0	0	0	0	8	0	2.0	1,035
9:15-9:30	0	0	0	0	0	0	362	0	0	0	0	0	0	278	0	0	0	0	0	0	13	0	0	0	0	0	0	23	0	0	0	0	0	0	5	0	2.1	681
9:30-9:45	0	0	0	0	0	0	187	0	0	0	0	0	0	137	0	0	0	0	0	0	8	0	0	0	0	0	0	10	0	0	0	0	0	0	5	0	2.0	347
9:45-10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:00-10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:15-10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:30-10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10:45-11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:00-11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:15-11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:30-11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11:45-12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:00-12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:15-12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:30-12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12:45-1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:00-1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:15-1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:30-1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
1:45-2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:00-2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:15-2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:30-2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:45-3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:00-3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:15-3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:30-3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:45-4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4:00-4:15	1	1	184	3	4	189	189	7	171	3	1	1	182	182	0	2	4	1	0	7	7	9	7	0	4	0	20	20	4	2	3	0	0	9	9	407	1.2	407
4:15-4:30	0	5	174	2	2	181	370	15	215	4	0	0	234	416	0	2	4	1	0	7	14	3	6	5	5	0	19	39	0	1	4	0	0	5	14	446	0.8	853
4:30-4:45	2	5	189	4	2	200	570	10	172	6	2	0	190	606	0	3	6	0	0	9	23	2	2	0	2	0	6	45	2	2	2	0	0	6	20	411	0.7	1,264
4:45-5:00	0	12	192	5	3	209	779	10	184	3	2	0	199	805	0	11	8	1	0	20	43	4	9	1	3	1	17	62	4	4	2	0	0	10	30	455	0.8	1,719
5:00-5:15	0	4	180	9	1	193	783	15	222	3	3	1	243	866	0	2	8	0	0	10	46	4	4	3	3	0	14	56	3	3	7	1	0	14	35	474	0.6	1,786
5:15-5:30	0	5	175	9	1	189	791	11	215	3	2	1	231	863	0	2	12	0	0	14	53	3	2	1	2	0	8	45	0	2	2	0	0	4	34	446	0.6	1,786
5:30-5:45	1	7	182	6	1	196	787	18	236	6	2	1	262	935	1	7	6	0	0	14	58	3	6	2	4	0	15	54	1	0	4	1	0	6	34	493	0.5	**1,868**
5:45-6:00	0	8	171	4	2	183	761	10	223	3	2	0	238	974	0	3	5	0	0	8	46	2	4	6	6	1	18	55	0	3	1	0	0	4	28	451	0.5	1,864
6:00-6:15	0	0	0	0	0	0	568	0	0	0	0	0	0	731	0	0	0	0	0	0	36	0	0	0	0	0	0	41	0	0	0	0	0	0	14	0	0.5	1,390
6:15-6:30	0	0	0	0	0	0	379	0	0	0	0	0	0	500	0	0	0	0	0	0	22	0	0	0	0	0	0	33	0	0	0	0	0	0	10	0	0.5	944
6:30-6:45	0	0	0	0	0	0	183	0	0	0	0	0	0	238	0	0	0	0	0	0	8	0	0	0	0	0	0	18	0	0	0	0	0	0	4	0	0.7	451
6:45-7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4.0	5		2,657		31			145		41		39			1		137		1			51		101		2			20		33		0					
Hour Total		132		63		2,857			2,635		31		2,852			104		13		255			67		62		281			21		2		76		6,321		
ADT	**18**	**462**	**9,300**	**221**	**109**	**10,000**		**508**	**9,223**	**144**	**109**	**137**	**9,982**		**4**	**364**	**480**	**46**	**4**	**893**		**179**	**235**	**354**	**217**	**7**	**984**		**70**	**74**	**116**	**7**	**0**	**266**		**22,124**		
Maximum Period 4:45-5:45	1	28	729	29	6	787		54	857	15	9	3	935		1	22	34	1	0	58		14	21	7	12	1	54		8	9	15	2	0	34				1,868

to be changed based on the peak hour

	FROM NORTH							FROM SOUTH							FROM EAST							FROM WEST								
	LEFT	B LEFT	THRU	RIGHT	COML.	TOTAL	%comm.	LEFT	THRU	B RIGHT	H RIGHT	COML.	TOTAL	%comm.	LEFT	B LEFT	THRU	RIGHT	COML.	TOTAL	%comm.	LEFT	THRU	B RIGHT	RIGHT	COML.	TOTAL	%comm.	Total	%comm.
AM PEAK 7:30-8:30	**1**	**54**	**605**	**6**	**5**	**666**	**1%**	**24**	**557**	**6**	**9**	**20**	**596**	**3%**	**0**	**52**	**68**	**8**	**0**	**128**	**0%**	**13**	**17**	**70**	**17**	**0**	**117**	**0%**	**1**	**3**	**3**	**0**	**0**	**7**	**0%**	**1,514**	**2**
PM PEAK 4:45-5:45	**1**	**28**	**729**	**29**	**6**	**787**	**1%**	**54**	**857**	**15**	**9**	**3**	**935**	**0%**	**1**	**22**	**34**	**1**	**0**	**58**	**0%**	**14**	**21**	**7**	**12**	**1**	**54**	**2%**	**8**	**9**	**15**	**2**	**0**	**34**	**0%**	**1,868**	**1**

LOCATION	Warrensville Center Road and Fairmount Boulevard		
CITY :	University Heights		
DATE	Wednesday, November 19, 2014	COUNTED BY :	
		# OF HOURS COUNTED :	4.0
SEASONAL ADJUSTMENT FACTOR :	1.00	ADT ADJUSTMENT FACTOR :	3.50

	Warrensville Center Road														Fairmount Blvd.						
	SOUTHBOUND							NORTHBOUND							WESTBOUND						
TIME PERIOD	THRU	RIGHT	U-TURN		COML.	TOTAL	HOURLY VOLUME	LEFT	THRU	U-TURN		COML.	TOTAL	HOURLY VOLUME	LEFT	THRU	RIGHT		COML.	TOTAL	HOURLY VOLUME
7:00-7:15	116	23	0	0	2	139		1	67	1	0	1	69		5	136	8	0	1	149	
7:15-7:30	125	42	0	0	3	167		0	102	0	0	2	102		19	165	14	0	3	198	
7:30-7:45	157	55	0	0	0	212		0	114	0	0	2	114		8	165	12	0	3	185	
7:45-8:00	127	42	0	0	1	169	687	0	121	0	0	2	121	406	17	178	20	0	0	215	747
8:00-8:15	136	37	0	0	1	173	721	1	152	0	0	2	153	490	5	145	16	0	0	166	**764**
8:15-8:30	130	31	0	0	0	161	715	0	143	0	0	2	143	531	10	149	17	0	3	176	742
8:30-8:45	151	35	0	0	1	186	689	1	120	0	0	4	121	538	10	132	13	0	2	155	712
8:45-9:00	144	24	0	0	0	168	688	1	126	0	0	6	127	544	13	132	11	0	4	156	653
9:00-9:15	0	0	0	0	0	0	515	0	0	0	0	0	0	391	0	0	0	0	0	0	487
9:15-9:30	0	0	0	0	0	0	354	0	0	0	0	0	0	248	0	0	0	0	0	0	311
9:30-9:45	0	0	0	0	0	0	168	0	0	0	0	0	0	127	0	0	0	0	0	0	156
9:45-10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00-10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15-10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30-10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45-11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00-11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15-11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30-11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45-12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00-12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15-12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30-12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45-1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00-1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15-1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30-1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45-2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00-2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15-2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30-2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45-3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00-3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15-3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30-3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45-4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00-4:15	150	25	0	0	0	175	175	2	166	0	0	3	168	168	25	121	36	0	1	182	182
4:15-4:30	158	32	0	0	1	190	365	0	176	0	0	0	176	344	25	102	20	0	1	147	329
4:30-4:45	182	32	0	0	1	214	579	0	177	0	0	1	177	521	34	123	23	0	3	180	509
4:45-5:00	162	44	0	0	4	206	785	1	185	0	0	1	186	707	26	142	36	0	3	204	713
5:00-5:15	137	27	0	0	0	164	774	0	171	0	0	0	171	710	27	130	31	0	0	188	719
5:15-5:30	175	41	0	0	2	216	800	0	206	0	0	0	206	740	19	142	32	0	0	193	765
5:30-5:45	150	30	0	0	0	180	766	0	209	0	0	0	209	772	22	143	31	0	0	196	**781**
5:45-6:00	126	27	0	0	0	153	713	0	195	0	0	0	195	781	28	136	26	0	2	190	767
6:00-6:15	0	0	0	0	0	0	549	0	0	0	0	0	0	610	0	0	0	0	0	0	579
6:15-6:30	0	0	0	0	0	0	333	0	0	0	0	0	0	404	0	0	0	0	0	0	386
6:30-6:45	0	0	0	0	0	0	153	0	0	0	0	0	0	195	0	0	0	0	0	0	190
6:45-7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0	2,326		0		16			7		1		26			293		346		26		
Hour Total		547		0		2,873			2,430		0		2,438			2,241		0		2,880	
ADT	**8,141**	**1,915**	**0**	**0**	**56**	**10,056**		**25**	**8,505**	**4**	**0**	**91**	**8,533**		**1,026**	**7,844**	**1,211**	**0**	**91**	**10,080**	
Maximum Period 4:45-5:45	624	142	0	0	6	766		1	771	0	0	1	772		94	557	130	0	3	781	

to be changed based on the peak hour

	SOUTHBOUND							NORTHBOUND							WESTBOUND						
	THRU	RIGHT	U-TURN		COML.	TOTAL	%comm.	LEFT	THRU	U-TURN		COML.	TOTAL	%comm.	LEFT	THRU	RIGHT		COML.	TOTAL	%comm.
AM PEAK 7:15-8:15	**545**	**176**	**0**	**0**	**5**	**721**	**1%**	**1**	**489**	**0**	**0**	**8**	**490**	**2%**	**49**	**653**	**62**	**0**	**6**	**764**	**1%**
PM PEAK 4:45-5:45	**624**	**142**	**0**	**0**	**6**	**766**	**1%**	**1**	**771**	**0**	**0**	**1**	**772**	**0%**	**94**	**557**	**130**	**0**	**3**	**781**	**0%**

Appendix C: Multimodal Traffic Analysis

Table 1: Alternative I, Lane Width Reduction

Silsby	Northbound				Southbound				Eastbound				Westbound				Northwestbound			
Movement	L	Th	B R	R	L	B L	Th	R	L	Th	B R	R	L	B L	Th	R		L	B R	R
Delay	15.30	23.32	23.34	23.34	13.83	13.83	23.44	23.48	63.85	48.70	32.50	32.50	51.51	51.51	52.60	52.60		51.95	50.27	50.27
LOS	B	C	C	C	B	B	C	C	E	D	C	C	D	D	D	D		D	D	D
Approach	22.23/C				22.77/C				42.95/D				52.50/D				51.29/D			
Intersection	28.51/C																			
v/c	0.422																			

Meadowbrook	Northbound				Southbound				Westbound				Northeastbound				Souhtwestbound			
Movement	L	Th	B R	R	L	B L	Th	R	L	Th	B R	R	L	Th	B R	R	L	B L	Th	R
Delay	10.26	19.16	19.16	19.16	10.30	10.30	17.00	17.01	59.56	59.56	59.56	59.56	46.49	46.49	46.49	46.49	46.55	46.55	46.55	46.55
LOS	B	B	B	B	B	B	B	B	E	E	E	E	D	D	D	D	D	D	D	D
Approach	18.64/B				16.76/B				59.56/E				46.49/D				46.55/D			
Intersection	20.27/C																			
v/c	0.368																			

Fairmount	Northbound				Southbound				Eastbound				Westbound							
Movement		Th				Th	R						L	Th	R					
Delay		15.57				13.84	12.41						19.64	22.88	20.76					
LOS		B				B	B						B	C	C					
Approach	15.57/B				13.58/B								22.14/C							
Intersection	17.13/C																			
v/c	0.403																			

Table 2: Alternative II-A, Road Diet

Silsby	Northbound				Southbound				Eastbound				Westbound				Northwestbound			
Movement	L	Th	B R	R	L	B L	Th	R	L	Th	B R	R	L	B L	Th	R		L	B R	R
Delay	22.77	50.20	50.20	50.20	25.93	25.93	34.97	17.44	67.41	50.24	33.33	33.33	52.74	52.74	54.80	54.80		51.81	50.03	50.03
LOS	C	D	D	D	C	C	C	B	E	D	C	C	D	D	D	D		D	D	D
Approach	46.46/D				32.86/C				44.48/D				54.61/D				51.13/D			
Intersection Delay/LOS	42.15/D																			
Intersection V/C	0.645																			
Meadowbrook	Northbound				Southbound				Westbound				Northeastbound				Souhtwestbound			
Movement	L	Th	B R	R	L	B L	Th	R	L	Th	B R	R	L	Th	B R	R	L	B L	Th	R
Delay	18.17	48.18	48.18	48.18	24.64	24.64	29.26	29.26	59.56	59.56	59.56	59.56	46.49	46.49	46.49	46.49	46.55	46.55	46.55	46.55
LOS	B	D	D	D	C	C	C	C	E	E	E	E	D	D	D	D	D	D	D	D
Approach	46.47/D				29.10/C				59.56/E				46.49/D				46.55/D			
Intersection Delay/LOS	39.40/D																			
Intersection V/C	0.627																			
Fairmount	Northbound				Southbound				Eastbound				Westbound							
Movement		Th				Th	R						L	Th	R					
Delay		10.49				13.62	8.33						25.82	31.01	27.62					
LOS		B				B	A						C	C	C					
Approach	10.49/B				12.64/B								29.82/C							
Intersection Delay/LOS	17.71/B																			
Intersection V/C	0.529																			

Table 3: Alternative II-B, Road Diet with Washington Boulevard Realignment

Silsby	Northbound				Southbound				Eastbound				Westbound				Northwestbound			
Movement	L	Th	B R	R	L		Th	R	L	Th		R		B L	Th	R				
Delay	12.08	22.13	22.13		14.38		18.94	10.39	57.14	57.26		57.26		54.82	43.20	43.20				
LOS	B	C	C		B		B	B	E	E		E		D	D	D				
Approach	20.79/C				17.90/B				57.24/E				43.25/D							
Intersection Delay/LOS	26.74/C																			
Intersection V/C	0.639																			

Vistro File: P:\...\WarrensvilleCenter_Alt_1_092_PM.vistro
Report File: P:\...\Alt_1_092_F.pdf

Scenario: Base Scenario
3/9/2015

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Silsby Intersection	Signalized	HCM2010	EBL	0.422	28.5	C
4	Meadowbrook Boulevard	Signalized	HCM2010	WBR	0.368	20.3	C
5	Fairmount Boulevard	Signalized	HCM2010	WBT	0.403	17.1	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

Generated with PTV VISTRO

Version 3.00-04

Intersection Level Of Service Report

#1: Silsby Intersection

Control Type:	Signalized	Delay (sec / veh):	28.5
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.422

Intersection Setup

Name												
Approach	Northbound				Southbound				Eastbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left	Thru	Right	Right2
Lane Width [ft]	10.00	11.00	11.00	11.00	10.00	11.00	11.00	11.00	10.00	10.00	11.00	11.00
No. of Lanes in Pocket	1	0	0	0	1	0	0	0	1	0	0	1
Pocket Length [ft]	130.00	100.00	100.00	100.00	120.00	100.00	100.00	100.00	170.00	100.00	100.00	170.00
Speed [mph]	35.00				25.00				25.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	yes				yes				yes			

Volumes

Name												
Base Volume Input [veh/h]	124	758	6	21	14	41	666	66	55	90	69	91
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	758	6	21	14	41	666	66	55	90	69	91
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	206	2	6	4	11	181	18	15	24	19	25
Total Analysis Volume [veh/h]	135	824	7	23	15	45	724	72	60	98	75	99
Presence of On-Street Parking	no			no	no			no	no			no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0				0			
Bicycle Volume [bicycles/h]	0				0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	MultiBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss
Signal Group	1	6	0	0	0	5	2	0	0	4	3	0
Auxiliary Signal Groups											3,4	
Lead / Lag	Lead	-	-	-	-	Lead	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	0	7	20	0	0	8	8	0
Maximum Green [s]	8	45	0	0	0	8	45	0	0	20	14	0
Amber [s]	3.0	4.0	0.0	0.0	0.0	3.0	4.0	0.0	0.0	4.0	4.0	0.0
All red [s]	2.0	3.0	0.0	0.0	0.0	2.0	3.0	0.0	0.0	3.0	3.0	0.0
Split [s]	16	63	0	0	0	12	59	0	0	23	22	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	0	0	5	0	0	5	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	10	0	0	10	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	5.0	0.0	0.0	0.0	3.0	5.0	0.0	0.0	5.0	5.0	0.0
Minimum Recall	no	no				no	no			no	no	
Maximum Recall	no	yes				no	yes			yes	no	
Pedestrian Recall	no	no				no	no			no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	20.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	R
L, Total Lost Time per Cycle [s]	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	5.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00
g_i, Effective Green Time [s]	68	57	57	68	56	56	18	18	38
g / C, Green / Cycle	0.57	0.48	0.48	0.57	0.47	0.47	0.15	0.15	0.32
(v / s)_i Volume / Saturation Flow Rate	0.16	0.23	0.23	0.08	0.22	0.22	0.05	0.05	0.11
s, saturation flow rate [veh/h]	839	1863	1840	794	1863	1804	1250	1863	1583
c, Capacity [veh/h]	466	887	876	440	873	845	143	285	499
d1, Uniform Delay [s]	13.74	21.42	21.42	13.19	21.65	21.65	54.98	45.43	31.61
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.23
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.56	1.89	1.92	0.64	1.77	1.83	8.87	3.27	0.90
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.29	0.48	0.48	0.14	0.46	0.46	0.42	0.34	0.35
d, Delay for Lane Group [s/veh]	15.30	23.31	23.34	13.83	23.42	23.48	63.85	48.70	32.50
Lane Group LOS	B	C	C	B	C	C	E	D	C
Critical Lane Group	yes	no	no	no	no	yes	no	no	yes
50th-Percentile Queue Length [veh]	1.85	8.49	8.39	0.81	8.21	7.97	2.14	2.90	4.06
50th-Percentile Queue Length [ft]	46.36	212.34	209.87	20.22	205.25	199.26	53.61	72.55	101.58
95th-Percentile Queue Length [veh]	3.34	13.27	13.15	1.46	12.91	12.60	3.86	5.22	7.31
95th-Percentile Queue Length [ft]	83.44	331.83	328.66	36.40	322.73	315.01	96.50	130.59	182.85

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	15.30	23.32	23.34	23.34	13.83	13.83	23.44	23.48	63.85	48.70	32.50	32.50
Movement LOS	B	C	C	C	B	B	C	C	E	D	C	C
d_A, Approach Delay [s/veh]	22.23				22.77				42.95			
Approach LOS	C				C				D			
d_I, Intersection Delay [s/veh]	28.51											
Intersection LOS	C											
Intersection V/C	0.422											

Intersection Setup

Name								
Approach	Westbound				Northwestbound			
Lane Configuration								
Turning Movement	Left2	Left	Thru	Right	Left2	Left	Thru	Right
Lane Width [ft]	9.00	9.00	10.00	10.00	12.00	9.00	9.00	9.00
No. of Lanes in Pocket	1	0	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00				25.00			
Grade [%]	0.00				0.00			
Crosswalk	yes				yes			

Volumes

Name								
Base Volume Input [veh/h]	12	1	97	27	0	68	42	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	1	97	27	0	68	42	2
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	26	7	0	18	11	1
Total Analysis Volume [veh/h]	13	1	105	29	0	74	46	2
Presence of On-Street Parking	no			no				no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0			
Bicycle Volume [bicycles/h]	0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	MultiBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Protected	Permissive	Permissive
Signal Group	0	0	4	0	0	3	3	0
Auxiliary Signal Groups								
Lead / Lag	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	0	8	0	0	8	8	0
Maximum Green [s]	0	0	20	0	0	14	14	0
Amber [s]	0.0	0.0	4.0	0.0	0.0	4.0	4.0	0.0
All red [s]	0.0	0.0	3.0	0.0	0.0	3.0	3.0	0.0
Split [s]	0	0	23	0	0	22	22	0
Vehicle Extension [s]	0.0	0.0	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	5	0	0	5	5	0
Pedestrian Clearance [s]	0	0	10	0	0	10	10	0
I1, Start-Up Lost Time [s]	0.0	0.0	2.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	5.0	0.0	0.0	5.0	5.0	0.0
Minimum Recall			no			no	no	
Maximum Recall			yes			no	no	
Pedestrian Recall			no			no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	20.0	0.0	0.0	20.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	L	C
L, Total Lost Time per Cycle [s]	7.00	7.00	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	5.00	5.00	5.00	5.00
g_i, Effective Green Time [s]	18	18	12	12
g / C, Green / Cycle	0.15	0.15	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.01	0.07	0.04	0.03
s, saturation flow rate [veh/h]	1240	1794	1703	1775
c, Capacity [veh/h]	168	275	177	184
d1, Uniform Delay [s]	50.54	46.51	50.37	49.52
k, delay calibration	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.97	6.09	1.57	0.74
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00

Lane Group Results

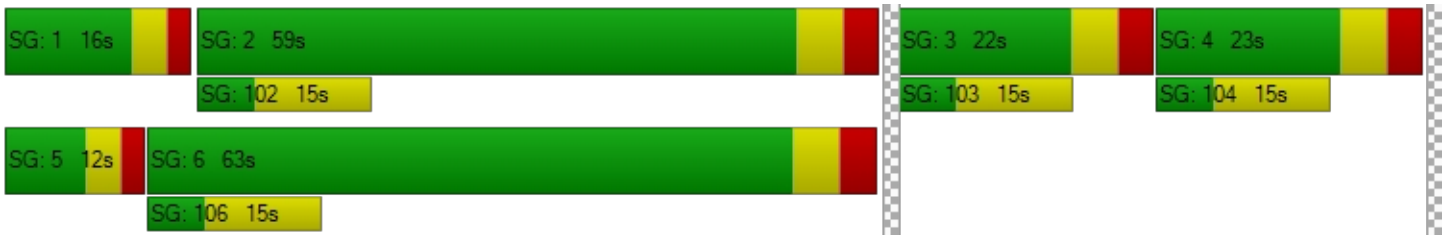
X, volume / capacity	0.08	0.49	0.42	0.26
d, Delay for Lane Group [s/veh]	51.51	52.60	51.95	50.27
Lane Group LOS	D	D	D	D
Critical Lane Group	no	yes	no	no
50th-Percentile Queue Length [veh]	0.44	4.16	2.18	1.38
50th-Percentile Queue Length [ft]	10.95	104.10	54.58	34.52
95th-Percentile Queue Length [veh]	0.79	7.50	3.93	2.49
95th-Percentile Queue Length [ft]	19.71	187.39	98.24	62.14

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	51.51	51.51	52.60	52.60	0.00	51.95	50.27	50.27
Movement LOS	D	D	D	D		D	D	D
d_A, Approach Delay [s/veh]	52.50				51.29			
Approach LOS	D				D			
d_I, Intersection Delay [s/veh]	28.51							
Intersection LOS	C							
Intersection V/C	0.422							

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Version 3.00-04

Intersection Level Of Service Report

#4: Meadowbrook Boulevard

Control Type:	Signalized	Delay (sec / veh):	20.3
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.368

Intersection Setup

Name												
Approach	Northbound				Southbound				Westbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left	Thru	Right	Right2
Lane Width [ft]	10.00	11.00	11.00	11.00	10.00	11.00	11.00	11.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	1	0	0	0	0	0	0	0
Pocket Length [ft]	130.00	100.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00				35.00				25.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	yes				no				yes			

Volumes

Name												
Base Volume Input [veh/h]	54	857	15	9	1	28	729	29	8	9	15	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	54	857	15	9	1	28	729	29	8	9	15	2
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	233	4	2	0	8	198	8	2	2	4	1
Total Analysis Volume [veh/h]	59	932	16	10	1	30	792	32	9	10	16	2
Presence of On-Street Parking	no			no	no			no	no			no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0				0			
Bicycle Volume [bicycles/h]	0				0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	39.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	2	0	0	5	5	6	0	0	4	0	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	Lead	Lead	-	-	-	-	-	-
Minimum Green [s]	7	26	0	0	7	7	26	0	0	8	0	0
Maximum Green [s]	10	45	0	0	10	10	45	0	0	12	0	0
Amber [s]	3.0	4.0	0.0	0.0	3.0	3.0	4.0	0.0	0.0	4.0	0.0	0.0
All red [s]	2.0	3.0	0.0	0.0	2.0	2.0	3.0	0.0	0.0	3.0	0.0	0.0
Split [s]	12	61	0	0	13	13	60	0	0	22	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	3.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0
Walk [s]	0	5	0	0	0	0	5	0	0	5	0	0
Pedestrian Clearance [s]	0	10	0	0	0	0	10	0	0	10	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0
I2, Clearance Lost Time [s]	3.0	5.0	0.0	0.0	3.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0
Minimum Recall	no	no				no	no			no		
Maximum Recall	no	yes				no	yes			no		
Pedestrian Recall	no	no				no	no			no		
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	0.0	0.0	0.0	20.0	20.0	0.0	0.0	0.0	20.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C
L, Total Lost Time per Cycle [s]	6.00	7.00	7.00	7.00	7.00	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	5.00	5.00	0.00	5.00	5.00	5.00
g_i, Effective Green Time [s]	75	64	64	75	66	66	6
g / C, Green / Cycle	0.63	0.54	0.54	0.63	0.55	0.55	0.05
(v / s)_i Volume / Saturation Flow Rate	0.08	0.26	0.26	0.04	0.22	0.22	0.02
s, saturation flow rate [veh/h]	773	1863	1845	726	1863	1837	1696
c, Capacity [veh/h]	486	997	988	448	1020	1006	81
d1, Uniform Delay [s]	9.81	17.47	17.48	10.23	15.79	15.79	55.61
k, delay calibration	0.43	0.50	0.50	0.11	0.50	0.50	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.44	1.67	1.69	0.06	1.20	1.22	3.95
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.12	0.48	0.48	0.07	0.41	0.41	0.46
d, Delay for Lane Group [s/veh]	10.26	19.15	19.16	10.30	17.00	17.01	59.56
Lane Group LOS	B	B	B	B	B	B	E
Critical Lane Group	yes	no	yes	no	no	no	yes
50th-Percentile Queue Length [veh]	0.63	8.49	8.41	0.30	6.72	6.63	1.19
50th-Percentile Queue Length [ft]	15.70	212.27	210.37	7.54	167.98	165.85	29.73
95th-Percentile Queue Length [veh]	1.13	13.27	13.17	0.54	10.97	10.86	2.14
95th-Percentile Queue Length [ft]	28.26	331.74	329.30	13.58	274.25	271.45	53.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	10.26	19.16	19.16	19.16	10.30	10.30	17.00	17.01	59.56	59.56	59.56	59.56
Movement LOS	B	B	B	B	B	B	B	B	E	E	E	E
d_A, Approach Delay [s/veh]	18.64				16.76				59.56			
Approach LOS	B				B				E			
d_I, Intersection Delay [s/veh]	20.27											
Intersection LOS	C											
Intersection V/C	0.368											

Intersection Setup

Name								
Approach	Northeastbound				Southwestbound			
Lane Configuration								
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00				25.00			
Grade [%]	0.00				0.00			
Crosswalk	yes				yes			

Volumes

Name								
Base Volume Input [veh/h]	14	21	7	12	1	22	34	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	21	7	12	1	22	34	1
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	6	2	3	0	6	9	0
Total Analysis Volume [veh/h]	15	23	8	13	1	24	37	1
Presence of On-Street Parking	no			no	no			no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0			
Bicycle Volume [bicycles/h]	0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	39.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	0	3	0	0	0	0	3	0
Auxiliary Signal Groups								
Lead / Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	18	0	0	0	0	18	0
Maximum Green [s]	0	20	0	0	0	0	20	0
Amber [s]	0.0	4.0	0.0	0.0	0.0	0.0	4.0	0.0
All red [s]	0.0	3.0	0.0	0.0	0.0	0.0	3.0	0.0
Split [s]	0	25	0	0	0	0	25	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	10	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	5.0	0.0	0.0	0.0	0.0	5.0	0.0
Minimum Recall		no					no	
Maximum Recall		yes					yes	
Pedestrian Recall		no					no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	C
L, Total Lost Time per Cycle [s]	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	2.00
l2, Clearance Lost Time [s]	5.00	5.00
g_i, Effective Green Time [s]	18	18
g / C, Green / Cycle	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	0.04	0.04
s, saturation flow rate [veh/h]	1657	1672
c, Capacity [veh/h]	286	293
d1, Uniform Delay [s]	44.86	44.88
k, delay calibration	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00
d2, Incremental Delay [s]	1.63	1.68
d3, Initial Queue Delay [s]	0.00	0.00
Rp, platoon ratio	1.00	1.00
PF, progression factor	1.00	1.00

Lane Group Results

X, volume / capacity	0.21	0.22
d, Delay for Lane Group [s/veh]	46.49	46.55
Lane Group LOS	D	D
Critical Lane Group	no	yes
50th-Percentile Queue Length [veh]	1.70	1.81
50th-Percentile Queue Length [ft]	42.42	45.28
95th-Percentile Queue Length [veh]	3.05	3.26
95th-Percentile Queue Length [ft]	76.36	81.50

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	46.49	46.49	46.49	46.49	46.55	46.55	46.55	46.55
Movement LOS	D	D	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	46.49				46.55			
Approach LOS	D				D			
d_I, Intersection Delay [s/veh]	20.27							
Intersection LOS	C							
Intersection V/C	0.368							

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Generated with PTV VISTRO

Version 3.00-04

Intersection Level Of Service Report
#5: Fairmount Boulevard

Control Type:	Signalized	Delay (sec / veh):	17.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.403

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	10.00	12.00	12.00	10.00	11.00	12.00	12.00	12.00	11.00	11.00	11.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00	130.00
Speed [mph]		35.00			35.00			35.00			35.00	
Grade [%]		0.00			0.00			0.00			0.00	
Crosswalk		no			no			no			no	

Volumes

Name												
Base Volume Input [veh/h]	0	772	0	0	624	142	0	0	0	94	557	130
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	1.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	772	0	0	624	142	0	0	0	94	557	130
Peak Hour Factor	1.0000	0.9200	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	210	0	0	170	39	0	0	0	26	151	35
Total Analysis Volume [veh/h]	0	839	0	0	678	154	0	0	0	102	605	141
Presence of On-Street Parking						no				no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]		0			0			0			0	
Bicycle Volume [bicycles/h]		0			0			0			0	

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	0	0	0	4	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	25	0	0	25	0	0	0	0	20	20	0
Maximum Green [s]	0	45	0	0	45	0	0	0	0	35	35	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0
Split [s]	0	51	0	0	51	0	0	0	0	39	39	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	7	0	0	5	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	0	0	10	10	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	4.0	4.0	0.0
Minimum Recall		no			no						no	
Maximum Recall		yes			yes						no	
Pedestrian Recall		no			no						no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	C	R		L	C	R
L, Total Lost Time per Cycle [s]	6.00	5.00	5.00		6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00		0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	3.00	3.00		4.00	4.00	4.00
g_i, Effective Green Time [s]	45	46	46		33	33	33
g / C, Green / Cycle	0.50	0.51	0.51		0.37	0.37	0.37
(v / s)_i Volume / Saturation Flow Rate	0.23	0.19	0.10		0.06	0.17	0.09
s, saturation flow rate [veh/h]	3582	3582	1599		1792	3582	1599
c, Capacity [veh/h]	1791	1831	817		657	1313	586
d1, Uniform Delay [s]	14.69	13.27	11.90		19.14	21.72	19.80
k, delay calibration	0.50	0.50	0.50		0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00		1.00	1.00	1.00
d2, Incremental Delay [s]	0.88	0.58	0.51		0.50	1.17	0.97
d3, Initial Queue Delay [s]	0.00	0.00	0.00		0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00		1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00		1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.47	0.37	0.19		0.16	0.46	0.24
d, Delay for Lane Group [s/veh]	15.57	13.84	12.41		19.64	22.88	20.76
Lane Group LOS	B	B	B		B	C	C
Critical Lane Group	yes	no	no		no	yes	no
50th-Percentile Queue Length [veh]	5.36	3.96	1.67		1.47	4.84	2.13
50th-Percentile Queue Length [ft]	134.08	98.92	41.72		36.70	121.08	53.13
95th-Percentile Queue Length [veh]	9.16	7.12	3.00		2.64	8.45	3.83
95th-Percentile Queue Length [ft]	229.03	178.05	75.09		66.05	211.31	95.64

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	15.57	0.00	0.00	13.84	12.41	0.00	0.00	0.00	19.64	22.88	20.76
Movement LOS		B			B	B				B	C	C
d_A, Approach Delay [s/veh]	15.57			13.58			0.00			22.14		
Approach LOS	B			B			A			C		
d_I, Intersection Delay [s/veh]	17.13											
Intersection LOS	B											
Intersection V/C	0.403											

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Vistro File: P:\...\WarrensvilleCenter_Alt_2_092_PM.vistro
Report File: P:\...\Alternative_II_PM_F.pdf

Scenario: Base Scenario
3/10/2015

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Silsby Intersection	Signalized	HCM2010	EBL	0.645	42.2	D
4	Meadowbrook Boulevard	Signalized	HCM2010	WBR	0.627	39.4	D
5	Fairmount Boulevard	Signalized	HCM2010	WBT	0.529	17.7	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
#1: Silsby Intersection

Control Type:	Signalized	Delay (sec / veh):	42.2
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.645

Intersection Setup

Name												
Approach	Northbound				Southbound				Eastbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left	Thru	Right	Right2
Lane Width [ft]	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	10.00	10.00	11.00	11.00
No. of Lanes in Pocket	1	0	0	0	1	0	0	0	1	0	0	1
Pocket Length [ft]	130.00	100.00	100.00	100.00	120.00	100.00	100.00	100.00	170.00	100.00	100.00	170.00
Speed [mph]	35.00				25.00				25.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	yes				yes				yes			

Volumes

Name												
Base Volume Input [veh/h]	124	758	6	21	14	41	666	66	55	90	69	91
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	758	6	21	14	41	666	66	55	90	69	91
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	206	2	6	4	11	181	18	15	24	19	25
Total Analysis Volume [veh/h]	135	824	7	23	15	45	724	72	60	98	75	99
Presence of On-Street Parking	no			no	no			no	no			no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0				0			
Bicycle Volume [bicycles/h]	0				0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss
Signal Group	1	6	0	0	0	5	2	0	0	4	3	0
Auxiliary Signal Groups											3,4	
Lead / Lag	Lead	-	-	-	-	Lead	-	-	-	-	-	-
Minimum Green [s]	7	20	0	0	0	7	20	0	0	8	8	0
Maximum Green [s]	8	45	0	0	0	8	45	0	0	20	14	0
Amber [s]	3.0	4.0	0.0	0.0	0.0	3.0	4.0	0.0	0.0	4.0	4.0	0.0
All red [s]	2.0	3.0	0.0	0.0	0.0	2.0	3.0	0.0	0.0	3.0	3.0	0.0
Split [s]	12	64	0	0	0	12	64	0	0	22	22	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	0	0	5	0	0	5	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	10	0	0	10	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	5.0	0.0	0.0	0.0	3.0	5.0	0.0	0.0	5.0	5.0	0.0
Minimum Recall	no	no				no	no			no	no	
Maximum Recall	no	yes				no	yes			yes	no	
Pedestrian Recall	no	no				no	no			no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	20.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00
g_i, Effective Green Time [s]	69	58	69	57	57	17	17	37
g / C, Green / Cycle	0.58	0.48	0.58	0.48	0.48	0.14	0.14	0.31
(v / s)_i Volume / Saturation Flow Rate	0.15	0.46	0.08	0.39	0.05	0.05	0.05	0.11
s, saturation flow rate [veh/h]	877	1851	792	1863	1583	1250	1863	1583
c, Capacity [veh/h]	355	896	263	889	755	130	268	486
d1, Uniform Delay [s]	19.69	29.63	23.92	26.84	17.19	56.14	46.42	32.38
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.23
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.08	20.57	2.01	8.12	0.25	11.27	3.82	0.96
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.38	0.95	0.23	0.81	0.10	0.46	0.37	0.36
d, Delay for Lane Group [s/veh]	22.77	50.20	25.93	34.97	17.44	67.41	50.24	33.33
Lane Group LOS	C	D	C	C	B	E	D	C
Critical Lane Group	no	yes	yes	no	no	no	no	yes
50th-Percentile Queue Length [veh]	1.91	27.47	0.86	19.52	1.17	2.22	2.96	4.12
50th-Percentile Queue Length [ft]	47.87	686.79	21.49	488.04	29.21	55.54	73.97	103.06
95th-Percentile Queue Length [veh]	3.45	36.07	1.55	26.77	2.10	4.00	5.33	7.42
95th-Percentile Queue Length [ft]	86.16	901.68	38.69	669.19	52.58	99.97	133.15	185.51

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	22.77	50.20	50.20	50.20	25.93	25.93	34.97	17.44	67.41	50.24	33.33	33.33
Movement LOS	C	D	D	D	C	C	C	B	E	D	C	C
d_A, Approach Delay [s/veh]	46.46				32.86				44.48			
Approach LOS	D				C				D			
d_I, Intersection Delay [s/veh]	42.15											
Intersection LOS	D											
Intersection V/C	0.645											

Intersection Setup

Name								
Approach	Westbound				Northwestbound			
Lane Configuration								
Turning Movement	Left2	Left	Thru	Right	Left2	Left	Thru	Right
Lane Width [ft]	9.00	9.00	10.00	10.00	12.00	9.00	9.00	9.00
No. of Lanes in Pocket	1	0	0	0	1	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00				25.00			
Grade [%]	0.00				0.00			
Crosswalk	yes				yes			

Volumes

Name								
Base Volume Input [veh/h]	12	1	97	27	0	68	42	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	1	97	27	0	68	42	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	26	7	0	18	11	0
Total Analysis Volume [veh/h]	13	1	105	29	0	74	46	0
Presence of On-Street Parking	no			no				no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0			
Bicycle Volume [bicycles/h]	0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Split	Split	Split	Split
Signal Group	0	0	4	0	0	0	3	0
Auxiliary Signal Groups								
Lead / Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	0	8	0	0	0	8	0
Maximum Green [s]	0	0	20	0	0	0	14	0
Amber [s]	0.0	0.0	4.0	0.0	0.0	0.0	4.0	0.0
All red [s]	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0
Split [s]	0	0	22	0	0	0	22	0
Vehicle Extension [s]	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	5	0	0	0	5	0
Pedestrian Clearance [s]	0	0	10	0	0	0	10	0
I1, Start-Up Lost Time [s]	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0
Minimum Recall			no				no	
Maximum Recall			yes				no	
Pedestrian Recall			no				no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	20.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	L	C
L, Total Lost Time per Cycle [s]	7.00	7.00	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	5.00	5.00	5.00	5.00
g_i, Effective Green Time [s]	17	17	13	13
g / C, Green / Cycle	0.14	0.14	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.01	0.07	0.04	0.03
s, saturation flow rate [veh/h]	1240	1794	1703	1788
c, Capacity [veh/h]	156	258	178	187
d1, Uniform Delay [s]	51.61	47.52	50.27	49.36
k, delay calibration	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.13	7.28	1.54	0.67
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00

Lane Group Results

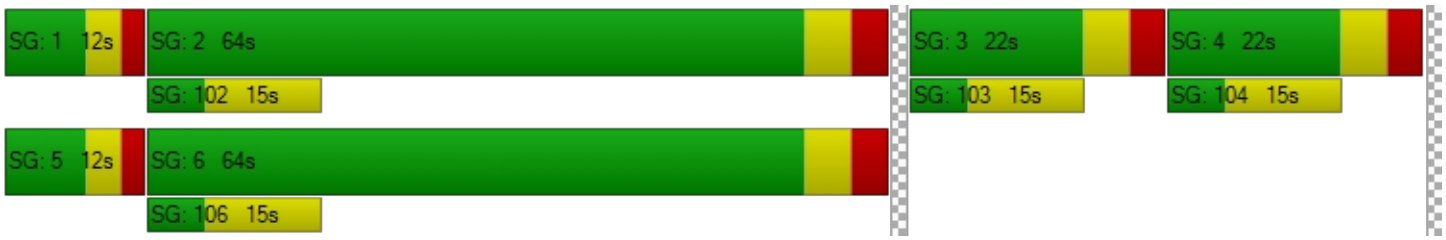
X, volume / capacity	0.09	0.52	0.41	0.25
d, Delay for Lane Group [s/veh]	52.74	54.80	51.81	50.03
Lane Group LOS	D	D	D	D
Critical Lane Group	no	yes	no	no
50th-Percentile Queue Length [veh]	0.45	4.27	2.18	1.32
50th-Percentile Queue Length [ft]	11.16	106.66	54.49	32.97
95th-Percentile Queue Length [veh]	0.80	7.65	3.92	2.37
95th-Percentile Queue Length [ft]	20.08	191.35	98.08	59.35

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	52.74	52.74	54.80	54.80	0.00	51.81	50.03	50.03
Movement LOS	D	D	D	D		D	D	D
d_A, Approach Delay [s/veh]	54.61				51.13			
Approach LOS	D				D			
d_I, Intersection Delay [s/veh]	42.15							
Intersection LOS	D							
Intersection V/C	0.645							

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#4: Meadowbrook Boulevard

Control Type:	Signalized	Delay (sec / veh):	39.4
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.627

Intersection Setup

Name												
Approach	Northbound				Southbound				Westbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left	Thru	Right	Right2
Lane Width [ft]	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	1	0	0	0	0	0	0	0
Pocket Length [ft]	130.00	100.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00				35.00				25.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	yes				no				yes			

Volumes

Name												
Base Volume Input [veh/h]	54	857	15	9	1	28	729	29	8	9	15	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	54	857	15	9	1	28	729	29	8	9	15	2
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	233	4	2	0	8	198	8	2	2	4	1
Total Analysis Volume [veh/h]	59	932	16	10	1	30	792	32	9	10	16	2
Presence of On-Street Parking	no			no	no			no	no			no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0				0			
Bicycle Volume [bicycles/h]	0				0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	39.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	2	0	0	5	5	6	0	0	4	0	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	-	Lead	Lead	-	-	-	-	-	-
Minimum Green [s]	7	26	0	0	7	7	26	0	0	8	0	0
Maximum Green [s]	10	45	0	0	10	10	45	0	0	12	0	0
Amber [s]	3.0	4.0	0.0	0.0	3.0	3.0	4.0	0.0	0.0	4.0	0.0	0.0
All red [s]	2.0	3.0	0.0	0.0	2.0	2.0	3.0	0.0	0.0	3.0	0.0	0.0
Split [s]	12	61	0	0	13	13	60	0	0	22	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	3.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0
Walk [s]	0	5	0	0	0	0	5	0	0	5	0	0
Pedestrian Clearance [s]	0	10	0	0	0	0	10	0	0	10	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	2.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0
I2, Clearance Lost Time [s]	3.0	5.0	0.0	0.0	3.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0
Minimum Recall	no	no				no	no			no		
Maximum Recall	no	yes				no	yes			no		
Pedestrian Recall	no	no				no	no			no		
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	0.0	0.0	0.0	20.0	20.0	0.0	0.0	0.0	20.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	L	C	C
L, Total Lost Time per Cycle [s]	6.00	7.00	7.00	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	5.00	0.00	5.00	5.00
g_i, Effective Green Time [s]	75	64	75	66	6
g / C, Green / Cycle	0.63	0.54	0.63	0.55	0.05
(v / s)_i Volume / Saturation Flow Rate	0.08	0.52	0.04	0.45	0.02
s, saturation flow rate [veh/h]	773	1854	726	1850	1696
c, Capacity [veh/h]	329	992	253	1013	81
d1, Uniform Delay [s]	17.68	26.82	24.42	22.13	55.61
k, delay calibration	0.43	0.50	0.11	0.50	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.03	21.36	0.22	7.13	3.95
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.18	0.97	0.12	0.81	0.46
d, Delay for Lane Group [s/veh]	18.71	48.18	24.64	29.26	59.56
Lane Group LOS	B	D	C	C	E
Critical Lane Group	yes	yes	no	no	yes
50th-Percentile Queue Length [veh]	0.66	30.41	0.31	19.77	1.19
50th-Percentile Queue Length [ft]	16.56	760.24	7.72	494.14	29.73
95th-Percentile Queue Length [veh]	1.19	39.45	0.56	27.06	2.14
95th-Percentile Queue Length [ft]	29.81	986.33	13.89	676.42	53.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	18.71	48.18	48.18	48.18	24.64	24.64	29.26	29.26	59.56	59.56	59.56	59.56
Movement LOS	B	D	D	D	C	C	C	C	E	E	E	E
d_A, Approach Delay [s/veh]	46.47				29.10				59.56			
Approach LOS	D				C				E			
d_I, Intersection Delay [s/veh]	39.40											
Intersection LOS	D											
Intersection V/C	0.627											

Intersection Setup

Name								
Approach	Northeastbound				Southwestbound			
Lane Configuration								
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00				25.00			
Grade [%]	0.00				0.00			
Crosswalk	yes				yes			

Volumes

Name								
Base Volume Input [veh/h]	14	21	7	12	1	22	34	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	21	7	12	1	22	34	1
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	6	2	3	0	6	9	0
Total Analysis Volume [veh/h]	15	23	8	13	1	24	37	1
Presence of On-Street Parking	no			no	no			no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0				0			
Bicycle Volume [bicycles/h]	0				0			

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	39.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal Group	0	3	0	0	0	0	3	0
Auxiliary Signal Groups								
Lead / Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	18	0	0	0	0	18	0
Maximum Green [s]	0	20	0	0	0	0	20	0
Amber [s]	0.0	4.0	0.0	0.0	0.0	0.0	4.0	0.0
All red [s]	0.0	3.0	0.0	0.0	0.0	0.0	3.0	0.0
Split [s]	0	25	0	0	0	0	25	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	10	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	5.0	0.0	0.0	0.0	0.0	5.0	0.0
Minimum Recall		no					no	
Maximum Recall		yes					yes	
Pedestrian Recall		no					no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	C
L, Total Lost Time per Cycle [s]	7.00	7.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	2.00
l2, Clearance Lost Time [s]	5.00	5.00
g_i, Effective Green Time [s]	18	18
g / C, Green / Cycle	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	0.04	0.04
s, saturation flow rate [veh/h]	1657	1672
c, Capacity [veh/h]	286	293
d1, Uniform Delay [s]	44.86	44.88
k, delay calibration	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00
d2, Incremental Delay [s]	1.63	1.68
d3, Initial Queue Delay [s]	0.00	0.00
Rp, platoon ratio	1.00	1.00
PF, progression factor	1.00	1.00

Lane Group Results

X, volume / capacity	0.21	0.22
d, Delay for Lane Group [s/veh]	46.49	46.55
Lane Group LOS	D	D
Critical Lane Group	no	yes
50th-Percentile Queue Length [veh]	1.70	1.81
50th-Percentile Queue Length [ft]	42.42	45.28
95th-Percentile Queue Length [veh]	3.05	3.26
95th-Percentile Queue Length [ft]	76.36	81.50

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	46.49	46.49	46.49	46.49	46.55	46.55	46.55	46.55
Movement LOS	D	D	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	46.49				46.55			
Approach LOS	D				D			
d_I, Intersection Delay [s/veh]	39.40							
Intersection LOS	D							
Intersection V/C	0.627							

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
#5: Fairmount Boulevard

Control Type:	Signalized	Delay (sec / veh):	17.7
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.529

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	10.00	12.00	12.00	11.00	11.00	12.00	12.00	12.00	11.00	11.00	11.00
No. of Lanes in Pocket	0	0	0	0	0	1	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	240.00	100.00	100.00	100.00	100.00	100.00	130.00
Speed [mph]		35.00			35.00			35.00			35.00	
Grade [%]		0.00			0.00			0.00			0.00	
Crosswalk		no			no			no			no	

Volumes

Name												
Base Volume Input [veh/h]	0	772	0	0	624	142	0	0	0	94	557	130
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	1.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	772	0	0	624	142	0	0	0	94	557	130
Peak Hour Factor	1.0000	0.9200	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	210	0	0	170	39	0	0	0	26	151	35
Total Analysis Volume [veh/h]	0	839	0	0	678	154	0	0	0	102	605	141
Presence of On-Street Parking						no				no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]		0			0			0			0	
Bicycle Volume [bicycles/h]		0			0			0			0	

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss
Signal Group	0	2	0	0	6	0	0	0	0	4	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	Lead	-	-
Minimum Green [s]	0	25	0	0	25	0	0	0	0	20	20	0
Maximum Green [s]	0	45	0	0	45	0	0	0	0	35	35	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0
Split [s]	0	59	0	0	59	0	0	0	0	31	31	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	7	0	0	5	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	0	0	10	10	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	4.0	4.0	0.0
Minimum Recall		no			no						no	
Maximum Recall		yes			yes						no	
Pedestrian Recall		no			no						no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	C	R		L	C	R
L, Total Lost Time per Cycle [s]	6.00	5.00	5.00		6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00		0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	3.00	3.00		4.00	4.00	4.00
g_i, Effective Green Time [s]	53	54	54		25	25	25
g / C, Green / Cycle	0.59	0.60	0.60		0.28	0.28	0.28
(v / s)_i Volume / Saturation Flow Rate	0.23	0.36	0.10		0.06	0.17	0.09
s, saturation flow rate [veh/h]	3582	1881	1599		1792	3582	1599
c, Capacity [veh/h]	2109	1129	959		498	995	444
d1, Uniform Delay [s]	9.93	11.26	7.97		24.89	28.24	25.74
k, delay calibration	0.50	0.50	0.50		0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00		1.00	1.00	1.00
d2, Incremental Delay [s]	0.56	2.37	0.36		0.93	2.76	1.87
d3, Initial Queue Delay [s]	0.00	0.00	0.00		0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00		1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00		1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.40	0.60	0.16		0.20	0.61	0.32
d, Delay for Lane Group [s/veh]	10.49	13.62	8.33		25.82	31.01	27.62
Lane Group LOS	B	B	A		C	C	C
Critical Lane Group	no	yes	no		no	yes	no
50th-Percentile Queue Length [veh]	4.09	8.05	1.27		1.74	5.82	2.54
50th-Percentile Queue Length [ft]	102.28	201.13	31.74		43.62	145.54	63.55
95th-Percentile Queue Length [veh]	7.36	12.70	2.29		3.14	9.78	4.58
95th-Percentile Queue Length [ft]	184.10	317.43	57.13		78.52	244.46	114.40

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	10.49	0.00	0.00	13.62	8.33	0.00	0.00	0.00	25.82	31.01	27.62
Movement LOS		B			B	A				C	C	C
d_A, Approach Delay [s/veh]	10.49			12.64			0.00			29.82		
Approach LOS	B			B			A			C		
d_I, Intersection Delay [s/veh]	17.71											
Intersection LOS	B											
Intersection V/C	0.529											

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Vistro File:
P:\...\WarrensvilleCenter_Alt_II_B_WashingtonRealign_092_EB_2Lanes_PM.vistro

Scenario: Base Scenario

Report File: P:\...\PM_Alternative II_ Washington Realignment_EB2Lanes.pdf

8/10/2015

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Silsby Intersection	Signalized	HCM2010	EBT	0.639	26.7	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
#1: Silsby Intersection

Control Type:	Signalized	Delay (sec / veh):	26.7
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.639

Intersection Setup

Name											
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	11.00	11.00	11.00	11.00	11.00	11.00	10.00	10.00	10.00	9.00	10.00	10.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	130.00	100.00	100.00	120.00	100.00	100.00	170.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			25.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	124	800	6	55	666	66	55	159	91	1	165	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	800	6	55	666	66	55	159	91	1	165	27
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	217	2	15	181	18	15	43	25	0	45	7
Total Analysis Volume [veh/h]	135	870	7	60	724	72	60	173	99	1	179	29
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	no
Signal Coordination Group	1 - Coordination Group
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	4	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	7	20	0	7	20	0	0	8	0	0	5	0
Maximum Green [s]	8	45	0	30	45	0	0	20	0	0	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	0.0	4.0	0.0	0.0	3.0	0.0
All red [s]	2.0	3.0	0.0	1.0	3.0	0.0	0.0	3.0	0.0	0.0	1.0	0.0
Split [s]	12	78	0	11	77	0	0	31	0	0	31	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	5.0	0.0	2.0	5.0	0.0	0.0	5.0	0.0	0.0	2.0	0.0
Minimum Recall	no	no		no	no			no			no	
Maximum Recall	no	yes		no	yes			no			no	
Pedestrian Recall	no	no		no	no			no			no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	20.0	0.0	0.0	20.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	L	C	R	L	C	L	C
L, Total Lost Time per Cycle [s]	7.00	7.00	7.00	7.00	7.00	7.00	7.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	2.00
g_i, Effective Green Time [s]	83	73	83	72	72	23	23	26	26
g / C, Green / Cycle	0.70	0.61	0.70	0.60	0.60	0.19	0.19	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.16	0.47	0.08	0.39	0.05	0.05	0.16	0.00	0.11
s, saturation flow rate [veh/h]	851	1860	740	1863	1583	1169	1750	1185	1818
c, Capacity [veh/h]	498	1139	389	1111	945	139	328	106	386
d1, Uniform Delay [s]	10.74	17.08	13.53	15.97	10.23	55.02	46.91	54.79	42.03
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.11	0.22	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.34	5.05	0.84	2.97	0.16	2.12	10.35	0.03	1.17
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.27	0.77	0.15	0.65	0.08	0.43	0.83	0.01	0.54
d, Delay for Lane Group [s/veh]	12.08	22.13	14.38	18.94	10.39	57.14	57.26	54.82	43.20
Lane Group LOS	B	C	B	B	B	E	E	D	D
Critical Lane Group	no	yes	yes	no	no	no	yes	no	no
50th-Percentile Queue Length [veh]	1.21	17.93	0.56	13.72	0.86	1.88	8.80	0.02	5.66
50th-Percentile Queue Length [ft]	30.37	448.15	13.92	343.02	21.42	46.96	220.07	0.62	141.55
95th-Percentile Queue Length [veh]	2.19	24.87	1.00	19.80	1.54	3.38	13.67	0.04	9.56
95th-Percentile Queue Length [ft]	54.67	621.74	25.05	494.89	38.55	84.53	341.71	1.11	239.11

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	12.08	22.13	22.13	14.38	18.94	10.39	57.14	57.26	57.26	54.82	43.20	43.20
Movement LOS	B	C	C	B	B	B	E	E	E	D	D	D
d_A, Approach Delay [s/veh]	20.79			17.90			57.24			43.25		
Approach LOS	C			B			E			D		
d_I, Intersection Delay [s/veh]	26.74											
Intersection LOS	C											
Intersection V/C	0.639											

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ARTPLAN 2012 Conceptual Planning Analysis

Project Information

Analyst		**Arterial Name**	Warrensville Center	**Study Period**	**Standard K**
Date Prepared	1/21/2015 11:11:39 AM	**From**		**Modal Analysis**	Multimodal
Agency		**To**		**Program**	ARTPLAN 2012
Area Type	Large Urbanized	**Peak Direction**	Northbound	**Version Date**	12/12/2012
Arterial Class	2				
File Name	P:\Transportation Studies\Technical Assistance Project Development\University Heights\Recommendations\Bike LOS\Warrensville Bike LOS.xap				
User Notes					

Arterial Data

K	0.09	**PHF**	1	**Control Type**	CoordinatedActuated
D	0.565	**% Heavy Vehicles**	3	**Base Sat. Flow Rate**	1950

Automobile Intersection Data

Cross Street	Cycle Length	Thru g/C	Arr. Type	INT # Dir.Lanes	% Left Turns	% Right Turns	Left Turn Lanes	Left Turn Phasing	# Left Turn Lanes	LT Storage Length	Left g/C	Right Turn Lanes
	120	0.44	4	2	12	12	Yes	Protected	1	235	0.15	No

Automobile Segment Data

Segment #	Length	AADT	Hourly Vol.	SEG # Dir.Lanes	Posted Speed	Free Flow Speed	Median Type	On-Street Parking	Parking Activity
1 (to)	1000	18000	915	2	35	40	None	Yes	Medium

Automobile LOS

Segment #	Thru Mvmt Flow Rate	Adj. Sat. Flow Rate	v/c	Control Delay	Int. Approach LOS	Queue Ratio	Speed (mph)	Segment LOS
1 (to)	805	3127	0.585	19.35	B	0.38	17.38	C

Arterial Length	0.2008	Weighted g/C	0.44	FFS Delay	24.54	Threshold Delay	0.00	Auto Speed	17.38	Auto LOS	C

Automobile Service Volumes

Note: The maximum normally acceptable directional service volume for LOS E in Florida for this facility type and area type is 1000 veh/h/ln.

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1					
2					
3					
4					
*					
Lanes	**Hourly Volume In Both Directions**				
2					
4					
6					
8					
*					
Lanes	**Annual Average Daily Traffic**				
2					
4					
6					
8					
*					

Multimodal Segment Data

Segment #	Outside Lane Width	Pave Cond	Pave Shldr /Bike Lane	Side Path	Side Path Separation	Side walk	Sidewalk Roadway Separation	Sidewalk Roadway Protective Barrier	Bus Freq	Passenger Load Factor	Amenities	Bus Stop Type
1 (to)	Typical	Typical	No	No	N/A	Yes	Typical	No	2	0.8	Excellent	Typical

Pedestrian SubSegment Data

	% of Segment			Sidewalk			Separation			Barrier		
Segment #	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
1 (to)	100			Yes			Typical			No		

Multimodal LOS

	Bicycle Street		Bicycle Sidepath		Pedestrian					Bus	
Link #	**Score**	**LOS**	**Score**	**LOS**	**1**	**2**	**3**	**Score**	**LOS**	**Adj. Buses**	**LOS**
1 (to)	4.49	E	N/A	N/A				2.24	B	1.97	E

Bicycle LOS	4.49	E	Pedestrian LOS	2.24	B	Bus LOS	1.97	E

MultiModal Service Volume Tables

Bicycle

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Hourly Volume In Both Directions**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Annual Average Daily Traffic**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Pedestrian

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Hourly Volume In Both Directions**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Annual Average Daily Traffic**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Bus

A	B	C	D	E
Buses Per Hour In Peak Direction				
Buses in Study Hour in Peak Direction (Daily)				

*** Service Volumes for the specific facility being analyzed, based on # of lanes from the intersection and segment data screens.**
**** Cannot be achieved based on input data provided.**
***** Not applicable for that level of service letter grade. See generalized tables notes for more details.**
 # Under the given conditions, left turn lane storage is highly likely to overflow. The number of directional thru lanes should be reduced accordingly.
Facility weighted g/C exceeds normally acceptable upper range (0.5); verify that g/C inputs are correct.
Intersection capacity (ies) are exceeded for the full hour; an operational level analysis tool is more appropriate for this situation.

ARTPLAN 2012 Conceptual Planning Analysis

Project Information

Analyst		**Arterial Name**	Warrensville Center	**Study Period**	**Standard K**
Date Prepared	1/21/2015 11:11:39 AM	**From**		**Modal Analysis**	Multimodal
Agency		**To**		**Program**	ARTPLAN 2012
Area Type	Large Urbanized	**Peak Direction**	Northbound	**Version Date**	12/12/2012
Arterial Class	2				
File Name	P:\Transportation Studies\Technical Assistance Project Development\University Heights\Recommendations\Bike LOS\Warrensville Bike LOS.xap				
User Notes					

Arterial Data

K	0.09	**PHF**	1	**Control Type**	CoordinatedActuated
D	0.565	**% Heavy Vehicles**	3	**Base Sat. Flow Rate**	1950

Automobile Intersection Data

Cross Street	Cycle Length	Thru g/C	Arr. Type	INT # Dir.Lanes	% Left Turns	% Right Turns	Left Turn Lanes	Left Turn Phasing	# Left Turn Lanes	LT Storage Length	Left g/C	Right Turn Lanes
	120	0.44	4	2	12	12	Yes	Protected	1	235	0.15	No

Automobile Segment Data

Segment #	Length	AADT	Hourly Vol.	SEG # Dir.Lanes	Posted Speed	Free Flow Speed	Median Type	On-Street Parking	Parking Activity
1 (to)	1000	18000	915	2	35	40	None	Yes	Medium

Automobile LOS

Segment #	Thru Mvmt Flow Rate	Adj. Sat. Flow Rate	v/c	Control Delay	Int. Approach LOS	Queue Ratio	Speed (mph)	Segment LOS
1 (to)	805	3127	0.585	19.35	B	0.38	17.38	C

Arterial Length	0.2008	Weighted g/C	0.44	FFS Delay	24.54	Threshold Delay	0.00	Auto Speed	17.38	Auto LOS	C

Automobile Service Volumes

Note: The maximum normally acceptable directional service volume for LOS E in Florida for this facility type and area type is 1000 veh/h/ln.

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1					
2					
3					
4					
*					
Lanes	**Hourly Volume In Both Directions**				
2					
4					
6					
8					
*					
Lanes	**Annual Average Daily Traffic**				
2					
4					
6					
8					
*					

Multimodal Segment Data

Segment #	Outside Lane Width	Pave Cond	Pave Shldr /Bike Lane	Side Path	Side Path Separation	Side walk	Sidewalk Roadway Separation	Sidewalk Roadway Protective Barrier	Bus Freq	Passenger Load Factor	Amenities	Bus Stop Type
1 (to)	Typical	Typical	Yes	No	N/A	Yes	Typical	No	2	0.8	Excellent	Typical

Pedestrian SubSegment Data

	% of Segment			Sidewalk			Separation			Barrier		
Segment #	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
1 (to)	100			Yes			Typical			No		

Multimodal LOS

	Bicycle Street		Bicycle Sidepath		Pedestrian					Bus	
Link #	**Score**	**LOS**	**Score**	**LOS**	**1**	**2**	**3**	**Score**	**LOS**	**Adj. Buses**	**LOS**
1 (to)	2.99	C	N/A	N/A				2.12	B	1.97	E

Bicycle LOS	2.99	C	Pedestrian LOS	2.12	B	Bus LOS	1.97	E

MultiModal Service Volume Tables

Bicycle

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Hourly Volume In Both Directions**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Annual Average Daily Traffic**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Pedestrian

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Hourly Volume In Both Directions**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Annual Average Daily Traffic**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Bus

A	B	C	D	E
Buses Per Hour In Peak Direction				
Buses in Study Hour in Peak Direction (Daily)				

*** Service Volumes for the specific facility being analyzed, based on # of lanes from the intersection and segment data screens.**
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Automobile Segment Data

Segment #	Length	AADT	Hourly Vol.	SEG # Dir.Lanes	Posted Speed	Free Flow Speed	Median Type	On-Street Parking	Parking Activity
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Automobile LOS

Segment #	Thru Mvmt Flow Rate	Adj. Sat. Flow Rate	v/c	Control Delay	Int. Approach LOS	Queue Ratio	Speed (mph)	Segment LOS
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Arterial Length	0.2008	Weighted g/C	0.44	FFS Delay	24.54	Threshold Delay	0.00	Auto Speed	17.38	Auto LOS	C

Automobile Service Volumes

Note: The maximum normally acceptable directional service volume for LOS E in Florida for this facility type and area type is 1000 veh/h/ln.

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1					
2					
3					
4					
*					
Lanes	**Hourly Volume In Both Directions**				
2					
4					
6					
8					
*					
Lanes	**Annual Average Daily Traffic**				
2					
4					
6					
8					
*					

Multimodal Segment Data

Segment #	Outside Lane Width	Pave Cond	Pave Shldr /Bike Lane	Side Path	Side Path Separation	Side walk	Sidewalk Roadway Separation	Sidewalk Roadway Protective Barrier	Bus Freq	Passenger Load Factor	Amenities	Bus Stop Type
1 (to)	Typical	Typical	No	Yes	20.00	Yes	Typical	No	2	0.8	Excellent	Typical

Pedestrian SubSegment Data

	% of Segment			Sidewalk			Separation			Barrier		
Segment #	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
1 (to)	100			Yes			Typical			No		

Multimodal LOS

	Bicycle Street		Bicycle Sidepath		Pedestrian					Bus	
Link #	**Score**	**LOS**	**Score**	**LOS**	**1**	**2**	**3**	**Score**	**LOS**	**Adj. Buses**	**LOS**
1 (to)	4.49	E	1.53	B				2.24	B	1.97	E

Bicycle LOS	1.53	B	Pedestrian LOS	2.24	B	Bus LOS	1.97	E

MultiModal Service Volume Tables

Bicycle

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Hourly Volume In Both Directions**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Annual Average Daily Traffic**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Pedestrian

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Hourly Volume In Both Directions**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	**Annual Average Daily Traffic**				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Bus

A	B	C	D	E
Buses Per Hour In Peak Direction				
Buses in Study Hour in Peak Direction (Daily)				

*** Service Volumes for the specific facility being analyzed, based on # of lanes from the intersection and segment data screens.**
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 # Under the given conditions, left turn lane storage is highly likely to overflow. The number of directional thru lanes should be reduced accordingly.
Facility weighted g/C exceeds normally acceptable upper range (0.5); verify that g/C inputs are correct.
Intersection capacity (ies) are exceeded for the full hour; an operational level analysis tool is more appropriate for this situation.

Appendix D: Parking Occupancy Analyses

Warrensville Center Road On-Street Parking

Whole Foods Market Parking

Warrensville Center Road On-Street Parking

Number of vehicles parked and parking duration in the two sections: from Traymore Road to Hillbrook Road and from Meadowbrook Boulevard to Fairmount Boulevard

Evening 6:00-6:30

Traymore to Hillbrook			Meadowbrook to Fairmount		
Parking Space	**No. of Vehicles Parked**	**Time Used Minutes**	**Parking Space**	**No. of Vehicles Parked**	**Time Used Minutes**
1	0	0	1	1	30
2	0	0	2	1	15
3	2	30	3	1	30
4	1	15	4	1	30
5	0	0	5	1	30
6	1	15	6	1	30
7	0	0	7	0	0
8	0	0	8	0	0
9	0	0	9	0	0
10	0	0	10	0	0
11	0	0	11	0	0
12	1	30	12	0	0
13	1	15	13	0	0
14	0	0	14	0	0
15	1	30	15	1	30
16	1	15	16	1	30
17	0	0	17	1	15
18	0	0	18	0	0
19	0	0	19	1	15
20	1	30	20	0	0
21	1	30	21	0	0
22	1	30	22	0	0
23	0	0	23	0	0
24	0	0	24	0	0
25	0	0	25	0	0
26	1	30	26	0	0
27	1	30	27	0	0
28	2	30	28	0	0
			29	0	0
			30	0	0
			31	0	0
Total	15	330		10	255

Number of vehicles parked and parking duration in the two sections: from Traymore Road to Hillbrook Road and from Meadowbrook Boulevard to Fairmount Boulevard

Midday 12:00-12:30

Traymore to Hillbrook			Meadowbrook to Fairmount		
Parking Space	**No. of Vehicles Parked**	**Time Used Minutes**	**Parking Space**	**No. of Vehicles Parked**	**Time Used Minutes**
1	0	0	1	1	30
2	1	30	2	0	0
3	0	0	3	1	30
4	1	15	4	1	30
5	1	30	5	1	30
6	0	0	6	1	30
7	1	30	7	1	30
8	0	0	8	0	0
9	1	30	9	1	30
10	0	0	10	0	0
11	1	30	11	0	0
12	0	0	12	1	30
13	0	0	13	0	0
14	0	0	14	0	0
15	0	0	15	0	0
16	0	0	16	1	30
17	1	30	17	0	0
18	0	0	18	1	30
19	1	30	19	1	30
20	0	0	20	0	0
21	0	0	21	1	30
22	0	0	22	1	30
23	0	0	23	1	30
24	0	0	24	0	0
25	0	0	25	0	0
26	0	0	26	1	30
27	0	0	27	0	0
28	0	0	28	0	0
			29	0	0
			30	0	0
			31	0	0
Total	8	225		15	450

Whole Foods Parking Analysis

Parking Data:
Whole Foods Market Roof Parking collected between 1:00 and 3:00 pm, Saturday April 11, 2015

Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes
1	2	100	21	0	0	41	3	120	61	2	80
2	3	120	22	1	40	42	3	100	62	4	80
3	1	120	23	1	120	43	1	20	63	4	120
4	4	120	24	1	120	44	0	0	64	4	80
5	3	120	25	1	100	45	2	120	65	3	100
6	2	80	26	0	0	46	4	120	66	2	120
7	3	100	27	1	120	47	4	120	67	5	120
8	3	100	28	1	20	48	3	120	68	0	0
9	5	100	29	1	40	49	3	120	69	0	0
10	2	100	30	1	40	50	4	120	70	1	120
11	1	120	31	2	40	51	4	100			
12	3	60	32	2	40	52	3	120			
13	2	100	33	1	20	53	4	120			
14	3	80	34	2	80	54	1	80			
15	2	60	35	3	60	55	2	80			
16	1	20	36	1	80	56	1	80			
17	1	20	37	2	80	57	1	120			
18	1	20	38	3	100	58	1	20			
19	1	20	39	3	80	59	1	80			
20	2	60	40	3	100	60	2	80			
Total	45	1620		30	1280		47	1840		25	820

Parking Data:
Whole Foods Market Main Surface Parking collected between 1:00 and 3:00 pm, Saturday April 11, 2015

Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes
1	0	0	**21**	3	100	**41**	5	120	**61**	2	120
2	2	120	**22**	4	120	**42**	4	120	**62**	3	120
3	3	80	**23**	5	120	**43**	4	120	**63**	3	100
4	2	120	**24**	2	120	**44**	1	120	**64**	2	100
5	1	120	**25**	3	120	**45**	5	120	**65**	1	100
6	1	120	**26**	1	120	**46**	3	120	**66**	3	100
7	1	120	**27**	1	120	**47**	4	100	**67**	4	120
8	1	120	**28**	4	100	**48**	3	120	**68**	2	120
9	2	80	**29**	1	120	**49**	3	100	**69**	4	100
10	3	120	**30**	2	120	**50**	4	120	**70**	4	120
11	1	120	**31**	2	120	**51**	3	120			
12	1	120	**32**	4	120	**52**	5	120			
13	4	100	**33**	2	100	**53**	3	120			
14	3	120	**34**	4	120	**54**	1	120			
15	1	120	**35**	4	120	**55**	3	120			
16	1	120	**36**	3	120	**56**	2	120			
17	2	100	**37**	3	120	**57**	3	80			
18	5	100	**38**	2	100	**58**	1	100			
19	1	120	**39**	3	120	**59**	3	120			
20	2	100	**40**	4	120	**60**	5	120			
Total	37	2120		57	2320		65	2300		28	1100

Parking Space	No. of Vehicles Parked	Time Used Minutes
1	1	120
2	3	80
3	1	120
4	2	60
5	2	120
6	1	120
7	3	60
8	4	120
9	1	120
10	1	120
11	4	100
12	1	120
13	4	120
14	4	120
15	3	120
16	4	120
17	4	120
18	4	120
19	1	120
20	4	120
21	1	120
22	4	120
23	1	120
24	4	80
Total	62	2660

Collected Parking Data:

Whole Foods Market Front Parking, the north side,
collected between 1:00 and 3:00 pm, Saturday April 11, 2015

Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes
1	1	120	21	1	120
2	1	120	22	1	120
3	1	120	23	1	100
4	3	120	24	1	100
5	4	100	25	1	120
6	3	100	26	1	100
7	1	120	27	1	120
8	2	120	28	1	120
9	2	120	29	1	120
10	1	120			
11	2	120			
12	1	100			
13	1	120			
14	1	100			
15	2	120			
16	2	100			
17	2	40			
18	2	100			
19	1	100			
20	1	100			
Total	34	2160		9	1020

Whole Foods Market Front Parking, the south side,
collected between 1:00 and 3:00 pm, Saturday April 11, 2015

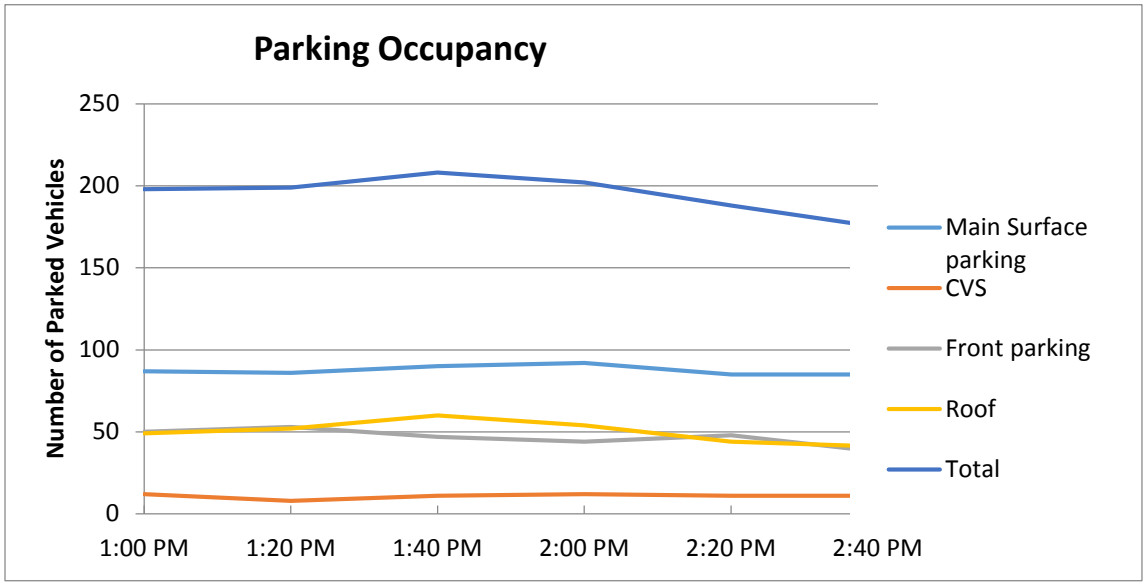
Parking Space	No. of Vehicles Parked	Time Used Minutes	Parking Space	No. of Vehicles Parked	Time Used Minutes
1	3	100	21	3	100
2	2	80	22	1	80
3	2	100	23	1	20
4	3	100	24	2	40
5	2	120	25	2	120
6	2	120	26	0	0
7	2	120	27	2	100
8	3	80	28	0	0
9	3	120	29	1	20
10	1	20			
11	1	120			
12	3	80			
13	2	80			
14	1	100			
15	1	120			
16	3	100			
17	3	100			
18	1	100			
19	2	100			
20	1	80			
Total	41	1940		12	480

Collected Parking Data:
CVS Pharmacy Parking, collected between 1:00 and 3:00 pm, Saturday April 11, 2015

Parking Space	No. of Vehicles Parked	Time Used Minutes
1	0	0
2	2	40
3	2	100
4	2	100
5	2	120
6	1	120
7	1	120
8	1	120
9	1	120
10	1	120
11	1	120
12	3	120
13	1	120
Total	18	1320

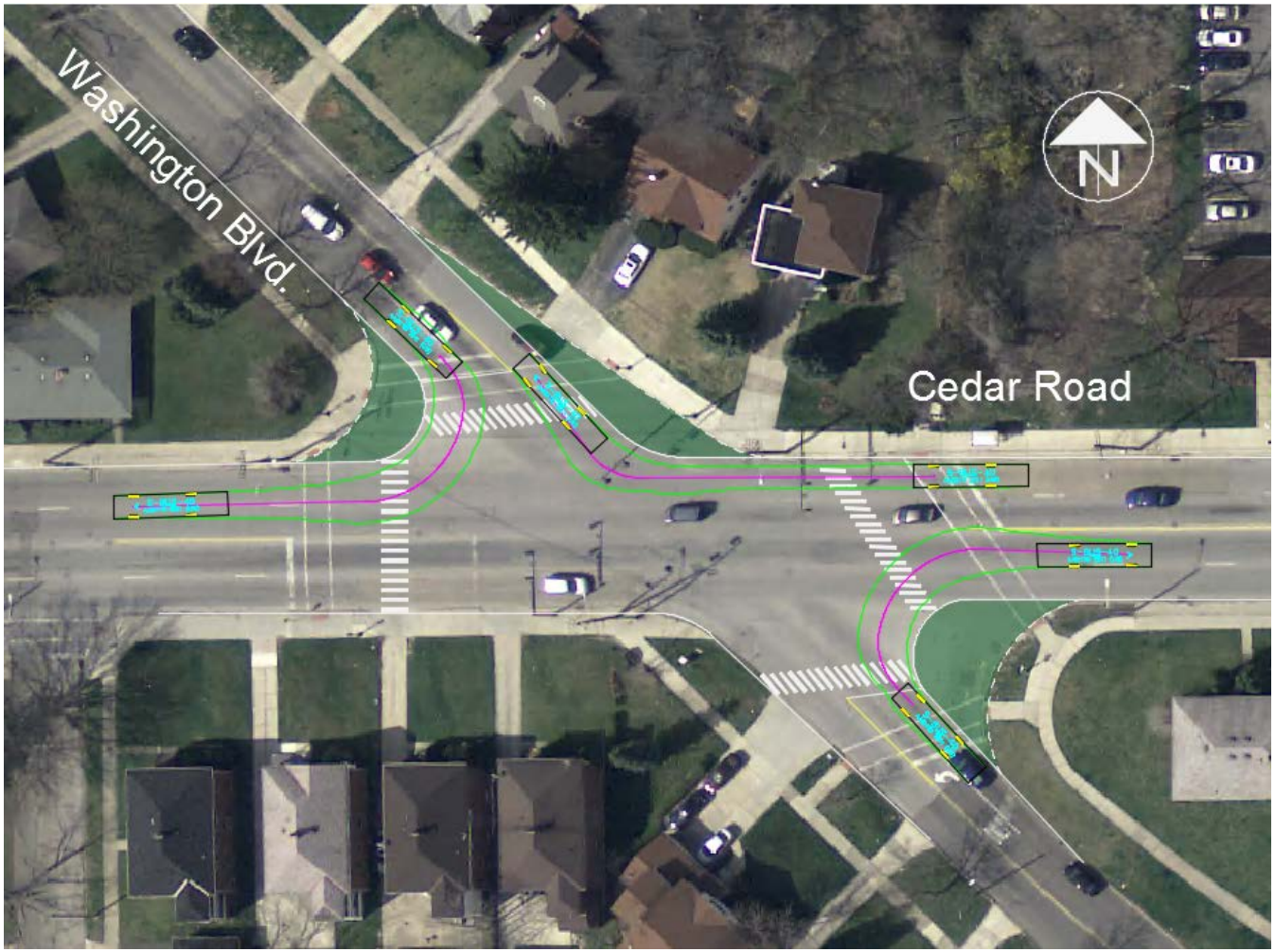
Results summary for the parking Survey conducted on Saturday April 11, 2015 between 1:00 and 3:00 pm

	1:00-2:00 PM	1:00-3:00 PM
Available Spaces	235	235
Volume (Number of parked Vehicles)	322	510
Total Time Used	11720	22980
Turnover (Vehicle/space)	1.37	1.09
Average Duration (Minute/vehicle)	36.40	45.06
Parking Load	83.12%	81.49%

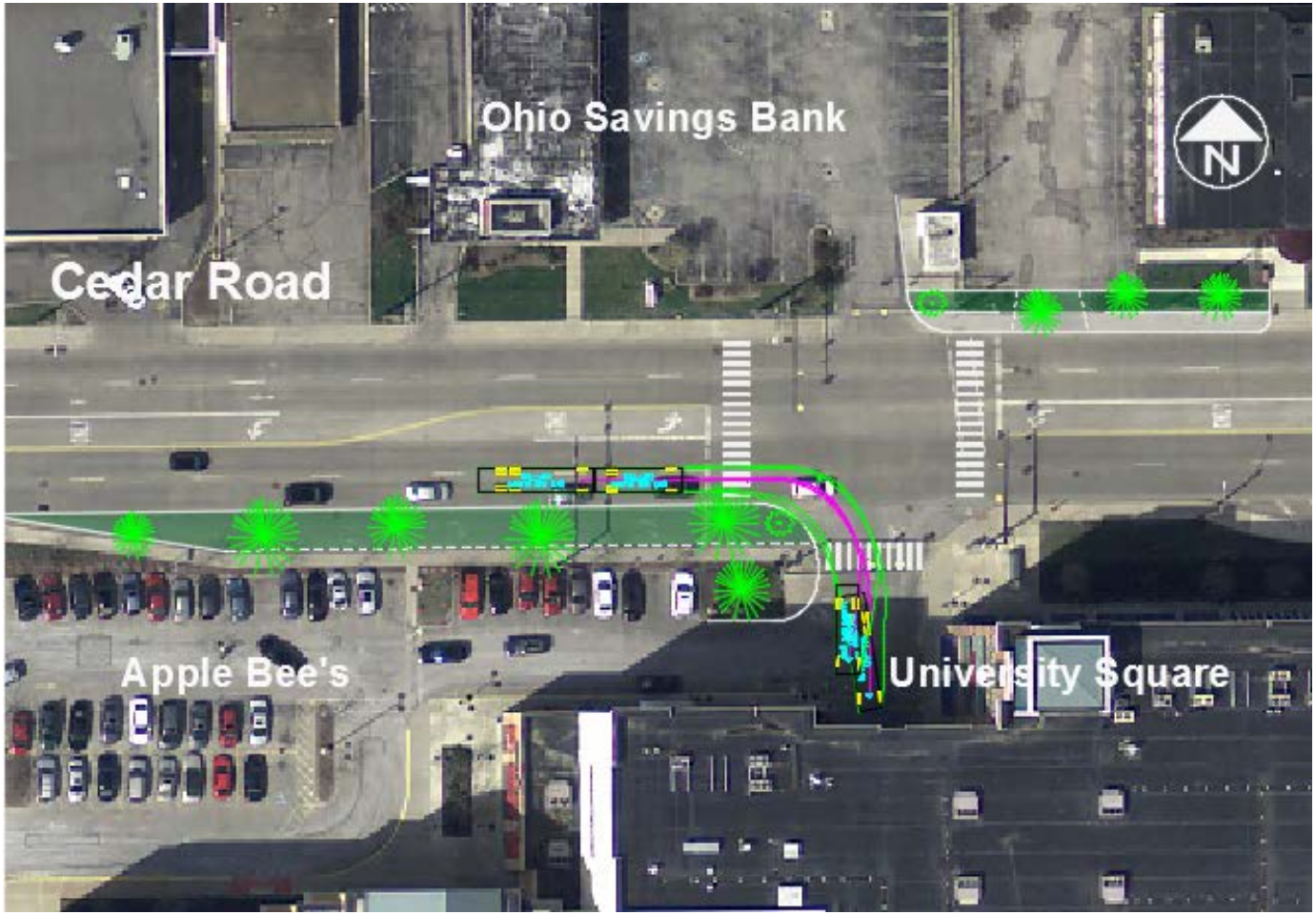


Appendix E: Truck/Bus Turning Movement Paths

Cedar Road and Washington Boulevard Intersection



Cedar Road and University Square west entrance intersection



Cedar Road and University Square East Entrance intersection

Appendix F: Cost Opinion

	Intersection Improvements	Quantity		Unit	Unit Cost	Low	High
		University Heights	South Euclid				
1	**Cedar Rd @ Washington**					**$62,000**	**$152,000**
	curb extensions	3		each	$10000-$40000	$30,000	$120,000
	crosswalk	4		each	$3,000.00	$12,000	
	countdown pedestrian signals	1		intersection	$20,000.00	$20,000	
2	**Cedar Rd @ Belvoir**					**$35,000**	
	crosswalks	2		each	$3,000.00	$6,000	
	curb ramps	6		each	$1,500.00	$9,000	
	countdown pedestrian signals	1		intersection	$20,000.00	$20,000	
3	**Cedar Rd @ Univ Sq West**					**$109,000**	
	curb extensions	2			$40,000.00	$80,000	
	crosswalk	3		each	$3,000.00	$9,000	
	countdown pedestrian signals	1		intersection	$20,000.00	$20,000	
4	**Cedar Rd @ Univ Sq East**					**$39,000**	**$69,000**
	curb extension	1		each	$10000-$40000	$10,000	$40,000
	crosswalk	3		each	$3,000.00	$9,000	
	countdown pedestrian signals	1		intersection	$20,000.00	$20,000	

	Intersection Improvements	Quantity		Unit	Unit Cost	Low	High
	Intersection Improvements	**Quantity**		**Unit**	**Unit Cost**	**Low**	**High**
		University Heights	South Euclid				
5	**Warrensville Center @ Traymore/Hillbrook**	2		intersection	$46,000.00	**$92,000**	**$166,000**
	curb extensions	4		each	$10000-$40000	$40,000	$160,000
	crosswalks	2		each	$3,000.00	$6,000	
6	**Warrensville Center @ Univ Sq**					**$95,000**	**$155,000**
	curb extensions	3		each	$10000-$40000	$60,000	$120,000
	crosswalks	4		each	$3,000.00	$12,000	
	countdown pedestrian signals	1		intersection	$20,000.00	$20,000	
	curb ramps	2		each	$1,500.00	$3,000	
7	**Warrensville Center @ Silsby/Washington**					**$125,000**	
	curb extensions	2		each	$40,000.00	$80,000	
	curb revision	1		each	$10,000.00	$10,000	
	crosswalks	5		each	$3,000.00	$15,000	
	countdown pedestrian signals	1		intersection	$20,000.00	$20,000	
8	**Warrensville Center @ Meadowbrook/Milford**					**$69,500**	**$159,500**
	curb extensions	3		each	$10000-$40000	$30,000	$120,000
	crosswalks	6		each	$3,000.00	$18,000	
	curb ramps	1		each	$1,500.00	$1,500	
	pedestrian countdown signals	1		intersection	$20,000.00	$20,000	

	Intersection Improvements	Quantity		Unit	Unit Cost	Low	High
	Intersection Improvements	Quantity		Unit	Unit Cost	Low	High
		University Heights	South Euclid				
9	**Warrensville Center @ Fairmount Circle**					**$16,000**	**$56,000**
	median island	1			$10000-$50000	$10,000	$50,000
	crosswalk	2			$3,000.00	$6,000	
Midblock Crosswalk							
between Traymore & Hillbrook						**$63,000**	
crosswalk		1		each	$3,000.00	$3,000	
curb extensions (small)		6		each	$10,000.00	$60,000	
between Fairmount & Meadowbrook						**$16,000**	**$56,000**
crosswalk		2		each	$3,000.00	$6,000	
median island		1		each	$10000-$50000	$10,000	$50,000
Cedar Rd Utility Relocation						**$50,000**	
Hydrants		5	6	each	$2,000.00	$10,000	
Mast Arms		6	2	each	$2,000.00	$12,000	
Overhead Signs		1	1	each	$2,000.00	$2,000	
Utility Poles		4	2	each	$2,000.00	$8,000	
Control Boxes		2	0	each	$2,000.00	$4,000	
Pedestrian Signals		2	1	each	$2,000.00	$4,000	
Post-mounted signs		5	2	each	$2,000.00	$10,000	

Intersection Improvements	Quantity		Unit	Unit Cost	Low	High
	Quantity					
	University Heights	South Euclid				
Warrensville Center Rd Restriping	0.8		mile	$40,000.00	**$32,000**	
Signed & Marked Bike Routes					**$78,000**	
Washington Blvd	2		mile	$13,000.00	$26,000	
Silsby Rd	2		mile	$13,000.00	$26,000	
Traymore Rd	1		mile	$13,000.00	$13,000	
Belvoir Rd	1		mile	$13,000.00	$13,000	
Replant vacant tree pits	10		each	$750.00	**$7,500**	
SUBTOTAL					**$889,000**	**$1,313,000**
30% Contingency					**$266,700**	**$393,900**
TOTAL					**$1,155,700**	**$1,706,900**
10% Design Engineering Cost					**$115,570**	**$170,690**
FINAL TOTAL					$1,271,270	$1,877,590

Appendix G: Eastside Greenway TLCI Plan Draft Recommendations
(The plan is expected to be finalized in July 2015)

Appendix G: Eastside Greenway TLCI plan draft recommendations, which is expected to be finalized in July 2015.

GREENWAY NETWORK

ASSEMBLING A COHERENT NETWORK

The final step in developing the Primary Greenway Network was to rectify the findings and priorities of the public with those of the technical analysis. While the technical analysis builds a strong case for the potential benefits and impacts of each greenway route, the public and local expert input on high priority that incorporate a nuanced understanding of the place, context, and opportunities is equally important.

MAP 3.3A combines the high priority routes from the Major Missing Links based on both the technical analysis and public preferences (workshops and MetroQuest) as well as high scoring secondary connectors.

Also critical at this step was considering whether there are critical gaps or linkages in the network that should be included, irrespective of their score or public preferences, because they play a critical role in providing network connections between existing routes and/or proposed routes. These routes are also included. MAP 3.3A at the left shows the Primary Greenway Network by source of input.

MAP 3.3A - PRIMARY GREENWAY NETWORK BY SOURCE OF INPUT

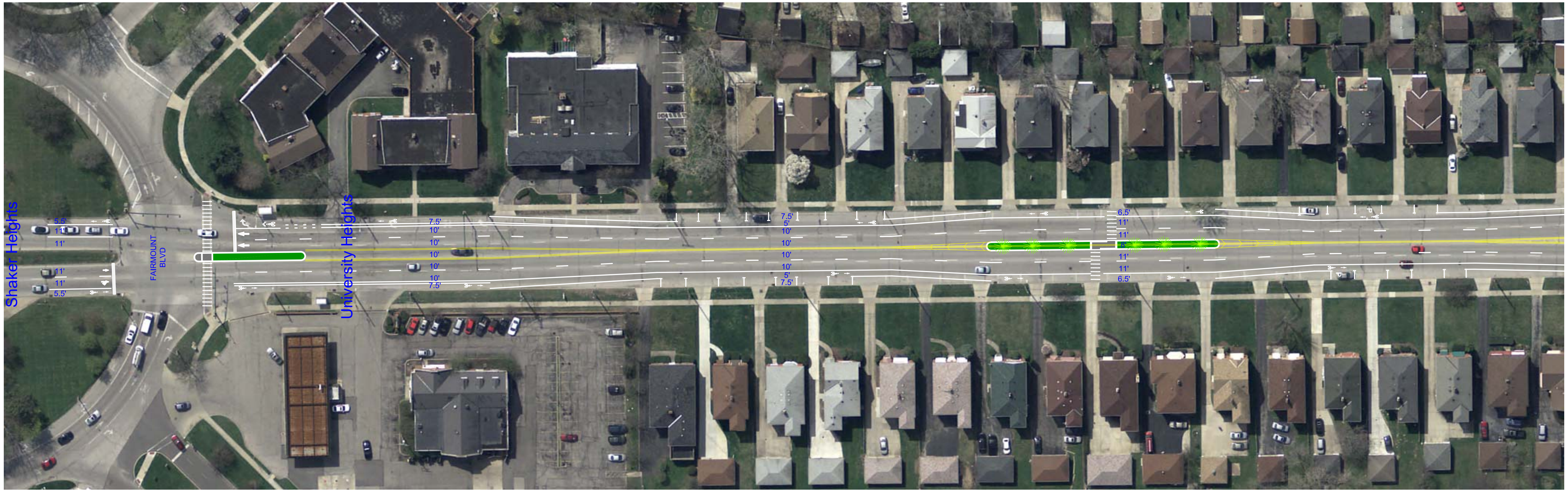
PRIMARY GREENWAY ROUTES

MAP 3.3B depicts the overall primary greenway routes and network. This plan reflects the culmination of the greenway networking activities and prioritization, and was presented to the public for feedback and validation during the 3rd round of community workshops.

Chapter 4 will break down this network into different priority levels, and provide additional alignment and route design guidance for higher priority routes and/or near-term implementation opportunities.

MAP 3.3B - PRIMARY GREENWAY ROUTES

Appendix H: Striping Plan



HORIZONTAL SCALE IN FEET

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CALCULATED MRT

CHECKED ST

WARRENSVILLE CENTER RD

ALTERNATIVE 1: LANE DIET STRIPING PLAN

NOACA TECHNICAL ASSISTANCE

UNIV HTS MULTIMODAL PLAN

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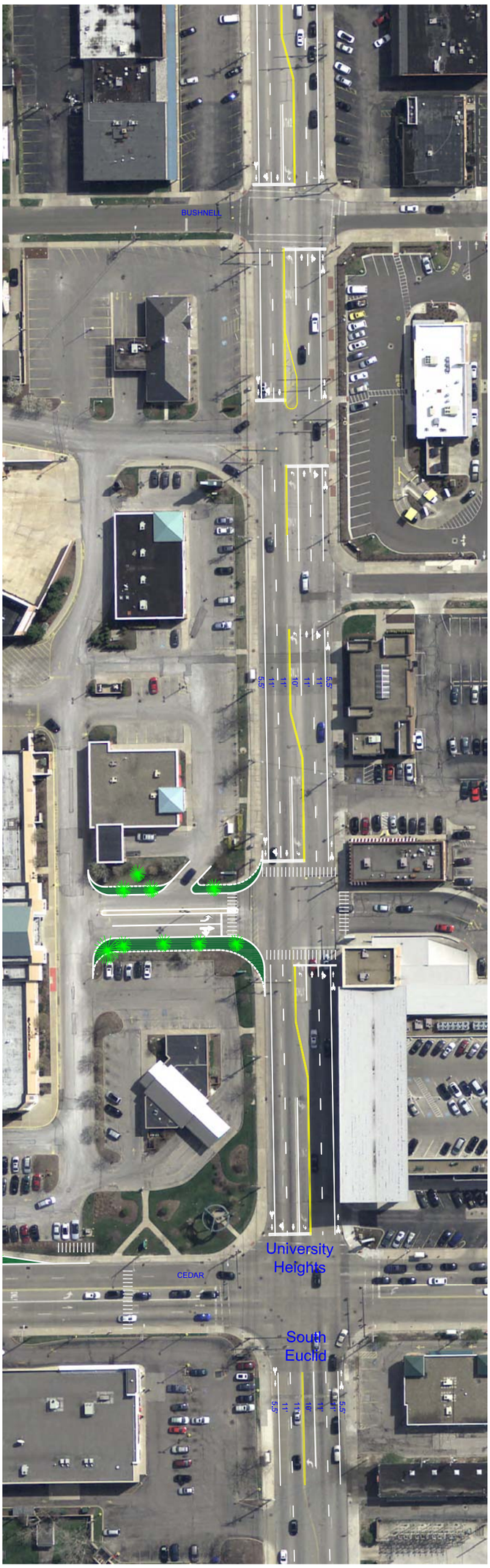

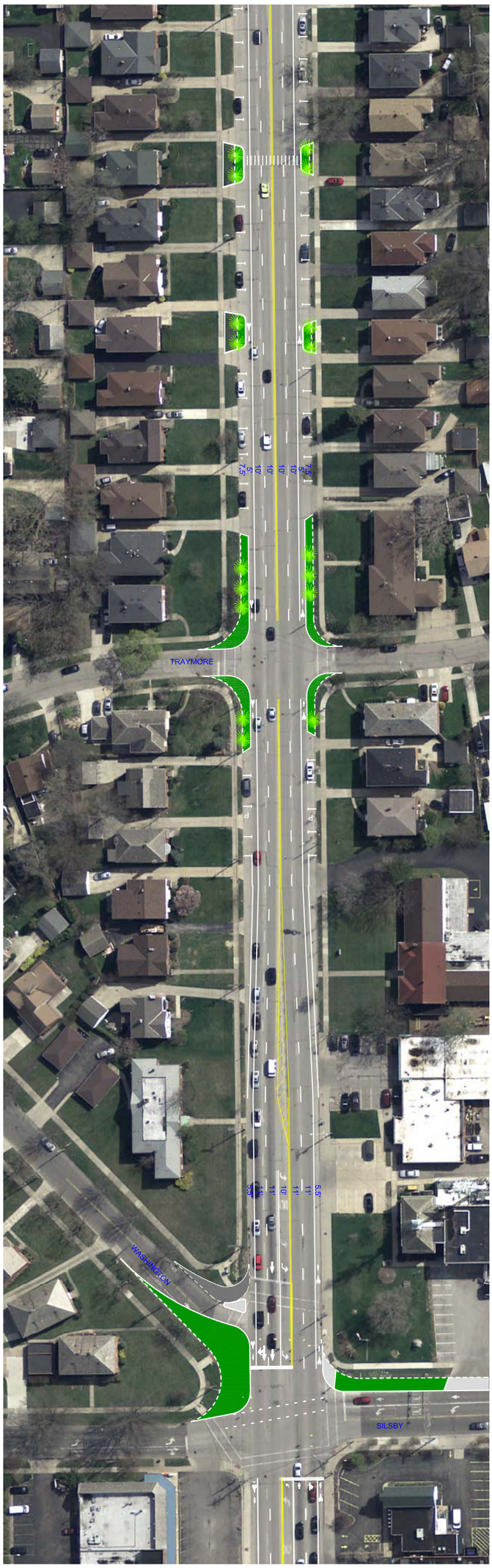

NOACA TECHNICAL ASSISTANCE
UNIV HTS MULTIMODAL PLAN

WARRENSVILLE CENTER RD
ALTERNATIVE I: LANE DIET STRIPING PLAN

CALCULATED MRT
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HORIZONTAL SCALE IN FEET

Appendix I: Public Outreach

Northeast Ohio Areawide Coordinating Agency
Warrensville Center and Cedar Roads Multimodal Transportation Plan
City of University Heights
Public Meeting 2
April 21, 2015

	Name		Organization	Email Address/Phone Number
1	Susan Infeld	✓	University Heights Mayor	Mayor @ universityheights.com
2	Eric Tuck-Macalla		University Heights Building Commissioner	
3	Michael Caito		Architect, University Heights Architectural Review Board	
4	Jeff Pokorny	✓	University Heights Service Director	jpokorny @ universityheights.com
5	Michael Cucciarre	✓	University Heights Architectural Review Board	Michael.Cucciarre@vocon.com
6	John Rach		University Heights resident Board of Zoning Appeals	
7	Nancy English	✓	University Heights Councilwoman	nenglish@universityheights.com
8	Paul Siemborski	✓	University Heights Planning Commission	
9	Richard Kieley		University Heights Architectural Review Board	
10	Carol Dietz	✓	John Carroll Associate Vice President of Facilities	cdietz@jcu.edu (216) 397-4314
11	Dan Feinstein	✓	Shaker Heights Senior Planner	
12	Joyce Braverman	✓	Shaker Heights Director of Planning	
13	Michael Schwarber	✓	Shaker Heights Police Deputy Chief	
14	John M. Motl	jmm	ODOT Modes Management Engineer	
15	Melinda Bartizal	✓	ODOT, Transportation Planner	
16	Michael Love		South Euclid Economic Development Coordinator	
17	Jen Waxman	✓		
18	Bill Nadeau			
19	Melissa Thompson		NOACA	mthompson@mpo.noaca.org
20	Joe Cimi		Univ. Hts. City Engineer	jcimi@gpdgroup.com
21	PHIL ERTEL		UH COUNCIL	
22	STEVE HAMMETT		CITY OF UH	shammett@UNIVERSITYHEIGHTS.COM

	Name	Organization	Email Address/Phone Number
26	KEVIN SMITH	Cedar Taylor Development Association	smithkp@gmail.com 216-509-3573
27	KEVIN LEESON	CUYAHOGA COUNTY PLANNING COMMISSION	kleason@cuyahogacounty.us 216.443.3700
28	Aurora Martinez	CH-UH Public Library	amartine@heightslibrary.org
29	John Motl	ODOT, Dist. 12	john.motl@dot.state.oh.us
30	Chris RATKA	Resident of University Heights	216.702.9948
31	JOE MACDONALD	NOACA (Resident of Shaker Heights)	jmacdonald@mpo.noaca.org (216.906.5893)
32	Sam Marcum	University Heights resident	
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Northeast Ohio Areawide Coordinating Agency
Warrensville Center and Cedar Roads Multimodal Transportation Plan
Public Meeting 1
November 5, 2014

DATE	NAME	Email
11/5/2014	NANCY E. ENGLISH	nenglish@UNIVERSITYheights.com
"	DORA PRUCE	dpruce@jcu.edu
	Kate Malone	kmalone@jcu.edu
	Jeffrey Pokorny	Jpokorny@universityheights.com
	MICHAEL CUCCIARRE	michael.cucciarre@vocon.com
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	Melinda Bartizal	melinda.bartizal@dot.state.oh.us
	John Mottl	john.mottl@dot.state.oh.us
	Sue Pardee	susan.pardee@[redacted]gmail.com
	Eric Pardee	eric.a.pardee@gmail.com
	DENNIS SLOTTA	DENNIS.SLOTTA@EYELIGHTING.COM
	SCOTT WACHTER	WACHTER@NACS.NET
	JOHN RACH	JRACH@CBLHDESIGN.COM
	Michael Casto	caitoarchitect@gmail.com
	Dan Feinstein	daniel.feinstein@shakeronline.com
	Eric Tuck-Macula	eric.tuck-macula@universityheights.com
	Susan Infeld	mayor@universityheights.com

University Heights Multimodal Transportation Plan Survey

Pedestrian Facilities

1. How often do you walk to any of the activity centers marked on the attached map?

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Less than Monthly
- ◯ Never

2. How comfortable are you in walking on Cedar Rd sidewalks to the commercial centers at:

	South Taylor	Warrensville Center	South Green
Very Comfortable	☐	☐	☐
Somewhat Comfortable	☐	☐	☐
Neutral	☐	☐	☐
Somewhat Uncomfortable	☐	☐	☐
Very Uncomfortable	☐	☐	☐

If uncomfortable, please state why:

3. How comfortable are you in walking on Warrensville Center Rd sidewalks to the commercial centers at:

	Fairmount Circle	Cedar Road
Very Comfortable	☐	☐
Somewhat Comfortable	☐	☐
Neutral	☐	☐
Somewhat Uncomfortable	☐	☐
Very Uncomfortable	☐	☐

If uncomfortable, please state why:

University Heights Multimodal Transportation Plan Survey

4. Do you think elementary and middle school children are safe walking to school alone?

- ◯ Very Comfortable
- ◯ Somewhat Comfortable
- ◯ Neutral
- ◯ Somewhat Uncomfortable
- ◯ Very Uncomfortable

5. What would encourage you to walk more often? Rank the following in order of importance, (1 for the most important – 7 for the least important)

☐	Better sidewalk surface condition
☐	Improved roadway crossings
☐	Count down pedestrian signals
☐	Keep sidewalks clear of snow
☐	Keep sidewalks clear of shrubbery
☐	Better lighting
☐	Separation between sidewalks and traffic lanes

6. Which of the following concerns you most when walking on Cedar Road. Please rank them 1 through 4 with 1 causing the most concern.

☐	Speeding cars
☐	Amount of traffic
☐	Road noise
☐	Proximity to cars

7. Which of the following concerns you most when walking on Warrensville Center Road. Please rank them 1 through 4 with 1 causing the most concern.

☐	Speeding cars
☐	Amount of traffic
☐	Road noise
☐	Proximity to cars

University Heights Multimodal Transportation Plan Survey

8. Do you think the "WALK" times at signalized pedestrian crossings are adequate? If not, please state where.

- [ ] Yes
- [ ] No

Where

University Heights Multimodal Transportation Plan Survey

Bicycle Facilities

9. How often do you Bike to any of the activity centers marked on the attached map?

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Less than Monthly
- ◯ Never

10. When biking, which do you prefer to use?

- ◯ Cedar and Warrensville Center Roads
- ◯ Minor roads such as Washington, S. Belvoir and Miramar

11. When biking, which do you prefer to use?

- ◯ Sidewalks
- ◯ Share traffic lanes

12. What would encourage you to bike more often? Rank the following in order of importance to you, (1 for the most important – 9 for the least important)

☐	Provision of bike racks
☐	Provision of bike storages
☐	Improved Signage for bicycle routes
☐	Improvement of connections with transit
☐	Improvement of connections with other bike paths
☐	Provision of off-street bicycle paths
☐	Provision of on-street bicycle lanes
☐	Shared vehicle-bike lanes
☐	Improved lighting

13. Which of the following concerns you most when biking on Cedar Road. Please rank them 1 through 4 with 1 causing the most concern.

- [ ] Speeding cars
- [ ] Amount of traffic
- [ ] Road noise
- [ ] Proximity to cars

14. Which of the following concerns you most when biking on Warrensville Center Road. Please rank them 1 through 4 with 1 causing the most concern.

- [ ] Speeding cars
- [ ] Amount of traffic
- [ ] Road noise
- [ ] Proximity to cars

University Heights Multimodal Transportation Plan Survey

Public Transit

15. How often do you use transit?

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Less than Monthly
- ◯ Never

16. If you use RTA Green Line, how do you get to the Rapid station? (More than one option can be selected)

- ☐ Walking
- ☐ Biking
- ☐ Transit
- ☐ Driving
- ☐ I do not use the RTA Green Line

17. Select the following amenities that are adequately provided at bus stops.

- ☐ Wayfinding signs to destinations
- ☐ Signs with service hours, frequency, and route maps
- ☐ Benches
- ☐ Shelters
- ☐ Bicycles racks at major stops

18. Are the following amenities adequately provided at rapid stations

	Yes	No
Wayfinding signs to destinations	☐	☐
Signs with service hours, frequency, and route maps	☐	☐
Convenient walking/bicycling access to/from stations	☐	☐
Bicycles racks at stations	☐	☐

19. Would you use public transit more if one or more of the following is offered?

	Yes	No
Increased bike racks/parking at stops/stations	◯	◯
Improved informational signs	◯	◯
Improved bus stops	◯	◯
More frequent service	◯	◯
Public transit is not a viable option	◯	◯

20. Why do you use public transportion?

- [ ] Convenience
- [ ] Cost
- [ ] Don't have a car
- [ ] Choice (prefer taking a bus to driving, walking or bicycling

Other (please specify)

21. If you do not use public transportation, what discourages you from using local transit?

- [ ] Faster to drive
- [ ] Cost
- [ ] Unreliability
- [ ] Poor area coverage

Other (please specify)


NORTHEAST
OHIO
Lake
Geauga
Cuyahoga
Lorain
Medina
AREAWIDE
COORDINATING
AGENCY
NOACA: Planning For Greater Cleveland