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# Syene Road Reconstruction Study

## Report

City of

Fitchburg, WI

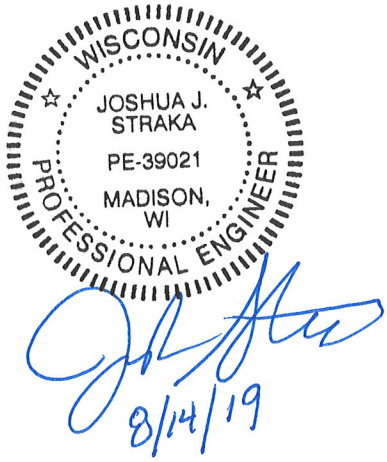
August 2019

STRAND ASSOCIATES®

Report for

# City of Fitchburg, Wisconsin

## Syene Road Reconstruction Study

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August 2019

STRAND ASSOCIATES®

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The City of Fitchburg, Wisconsin (City) hired Strand Associates, Inc.® (Strand) to complete the Syene Road Reconstruction Study to evaluate a future project along Syene Road between Lacy Road and McCoy Road on the east side of the City. The City wishes to reconstruct Syene Road to better accommodate the continued mixed-use development in the area.

## PROJECT DESCRIPTION

The City is the Project Sponsor and Facility Owner. The project lies entirely within the City of Fitchburg, Dane County, Wisconsin. The project corridor is on Syene Road from Lacy Road to McCoy Road. It is located entirely inside the Madison Urbanized Area and less than 1 mile from the boundary. Figure 1 shows the project location from the Wisconsin Department of Transportation's (WisDOT) Wisconsin Information System for Local Roads (WISLR).

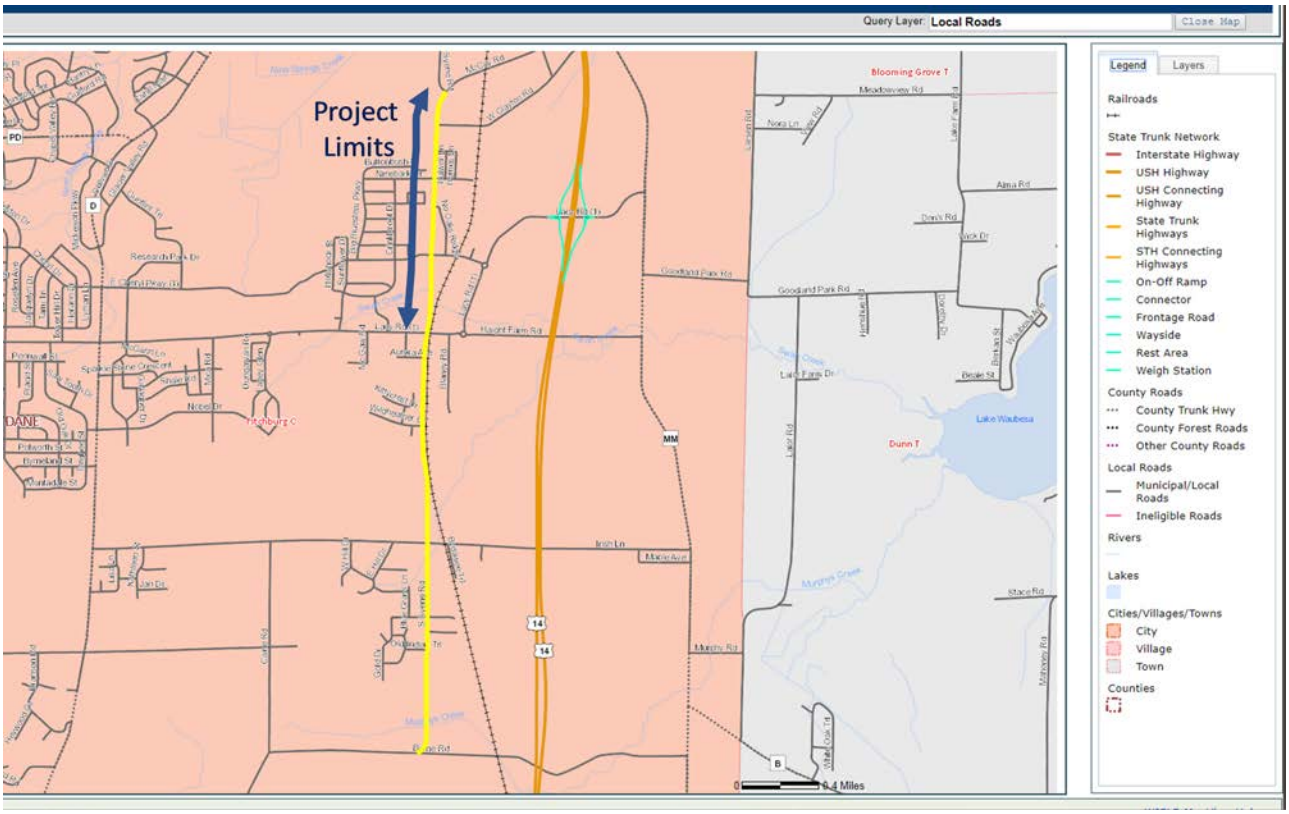



**Figure 1 WISLR Project Map**

The project length is 1.2 miles. The 2019 Average Daily Traffic (ADT) is 3,450 to 8,250 vehicles per day (vpd). The posted speed limit is 45 miles per hour (mph). Syene Road is functionally classified as a Collector by the Madison Area Transportation Planning Board (MATPB), the Metropolitan Planning Organization for the City of Madison urbanized area. There is no functional classification map change anticipated during this program cycle.

## EXISTING FACILITY

### A. Roadway Characteristics

The Syene Road project corridor has the following roadway characteristics:

1. Travel lanes: Two
2. Lane width: 11 feet
3. Cross section: Rural
4. Pavement: Asphalt
5. Pavement width: 28 feet
6. Pavement rating: Pavement Surface Evaluation and Rating (PASER) 3 to 5, weighted average of 3.82
7. Pavement condition: Fair to Poor
8. Year last improved: 2012 resurfacing (overlay)

### B. Pedestrian and Bicycle Accommodations

The Syene Road project corridor has the following pedestrian and bicycle characteristics:

1. Shoulders: Combination asphalt and gravel, generally 3 feet paved, 3 feet gravel.
2. Sidewalk: No existing sidewalk. Sidewalks are designated as part of a regional or local bicycle or pedestrian system.
3. Bicycle accommodations: Existing 10-foot wide asphalt sidepath on the west side of the corridor. Bicycle and pedestrian accommodations are designated as part of a regional or local bicycle or pedestrian system.
4. Lighting: Spot lighting (at intersections).

### C. Additional Features

The Syene Road project corridor has the following additional features:

1. Alignment: The horizontal alignments appear to meet standards. The vertical alignment was not reviewed.
2. Structures: There are no federal-aid-eligible structures within the existing facility.
3. Railroad: There is a railroad facility within 1,000 feet of the project limits. It is parallel and to the east of the project corridor.
4. Safety: There are no known safety issues along the project corridor.

## PROJECT JUSTIFICATION

### A. Summary

Development planned for in the City's Comprehensive Plan, the Northeast Transportation and Traffic Studies, and the SmartCode zoning of Uptown continue to increase the traffic demands on and along Syene Road. In recent years the City has incorporated a new connection of East Cheryl Parkway to

Syene Road and installed a four-way stop at both the East Cheryl Parkway and Lacy Road intersections. In 2013, the No Oaks Ridge connection to Syene Road north of East Cheryl Parkway was completed for the development of apartments and residential land uses in the northeast quadrant of Syene Road and East Cheryl Parkway. With these improvements and additional completed and planned nearby development combined with deteriorating pavement conditions, the City understands that the time is right for a broad look at the Syene Road corridor so that needed improvements will fit into the overall regional plans for this important north-south route.

This project proposes a reconstruction of Syene Road from Lacy Road the McCoy Road. The existing two travel lanes (one in each direction) will be maintained. Improvements will be made at intersections and driveways to add left-turn lanes.

Despite a recent overlay in 2012, the roadway is showing reflective pavement cracking, some edge raveling, and surface deterioration. The project will add sidewalk to the east side of the corridor, improving pedestrian connectivity in this increasingly residential and mixed-use area of the City. The project will also add on-street buffered bike lanes.

## B. Previous Studies

In preparation of the alternatives analysis and conceptual layout, the project team reviewed several previous studies of the area. Following is a summary of the information pertinent to the Syene Road project corridor.

### 1. Northeast Fitchburg Transportation Study, Supplement 1

This study was finalized in December 2002. The forecasted horizon year daily traffic volumes on Syene Road were from 13,400 to 23,700 vpd. The forecasts assumed a full interchange at US 14 and McCoy Road as well as a full interchange at US 14 and Lacy Road (on its old alignment that is now Haight Farm Road).

### 2. City of Fitchburg Comprehensive Plan

This plan was finalized in March 2009. It does not include traffic forecasts for Lacy Road. It defines Syene Road as a Major Collector and recommends 80 feet of right-of-way (ROW).

### 3. McGaw Park Neighborhood Plan

This plan was finalized in May 2009. The forecasted horizon year daily traffic volumes on Syene Road were from 7,900 to 9,900 vehicles per day (vpd). It recommends that Syene Road remain a two-lane corridor with improved control at the intersections.

### 4. Nine Springs Technical Memorandum

This technical memorandum was finalized in April 2012. The forecasted horizon year daily traffic volumes on Syene Road were from 6,500 to 10,700 vpd.

5. City of Fitchburg Bicycle and Pedestrian Plan

This plan was finalized in March 2017. It does not include traffic forecasts for Lacy Road. It states that the upcoming Syene Road project may include a reduced speed limit (35 mph), sidewalk on the east side, on-street bike lanes, a roundabout (RAB) at East Cheryl Parkway, and a signal at Lacy Road.

## PROPOSED IMPROVEMENT

### A. Summary

The proposed improvement is a Reconstruction of Syene Road. The project is 6,231 feet in length. All 1.18 miles will use an Urban cross section including curb and gutter and a storm sewer system to convey runoff. The project will not add through travel lanes, but will add turn lanes at intersections and some driveways. There will be Moderate grading associated with the project. The new pavement will be Hot Mix Asphalt (HMA). A 5-foot wide sidewalk will be added to the east side of the corridor. On-street buffered bike lanes will be provided (2-foot buffer, 4-foot lane). The City anticipates reducing the speed limit from the existing posted speed of 45 mph to 35 mph.

The Syene Road project typical section has the following roadway characteristics:

1. Travel lanes: Two
2. Lane width: 11 feet
3. Raised median or left-turn area width: 13 to 16 feet
4. Cross section: Urban
5. Pavement: Asphalt
6. Pavement width: Up to 50 feet
7. Construction year: 2021 anticipated

Figure 2 shows the proposed typical section.

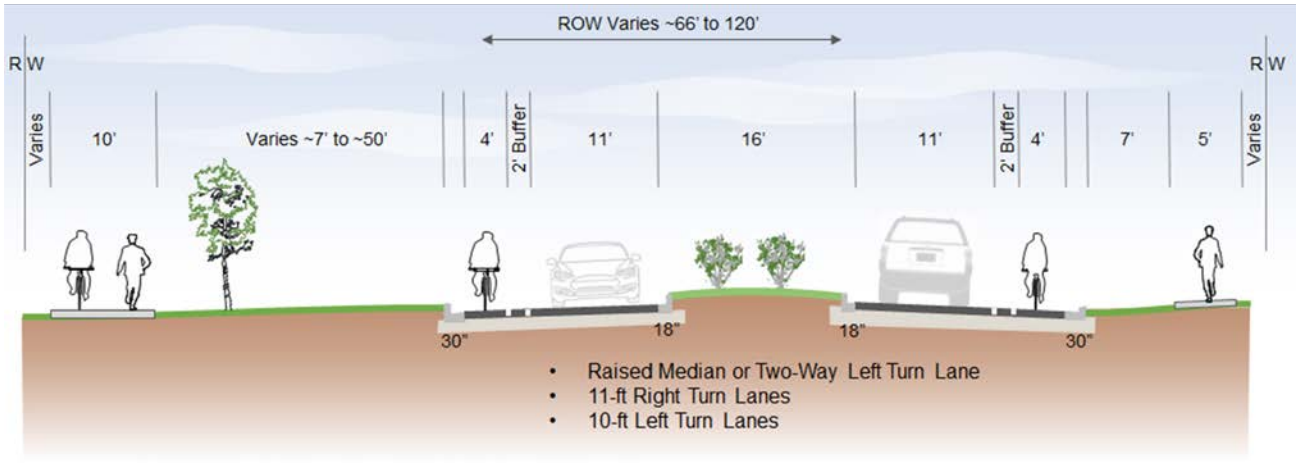



**Figure 2 Proposed Typical Section**

Sidewalk will be added to the east side from Lacy Road to Clayton Road (5,230 feet). There will be on-street bike accommodations with a 4-foot wide bike lane and 2-foot buffer. The curb and gutter will total approximately 12,462 feet. Intersection control (traffic signal or RAB) may be upgraded at the Lacy Road, East Cheryl Parkway, Ninebark Drive, and/or McCoy Road intersections. This will be finalized during design[1]. There are no railroad or freight-related improvements expected. Standard lighting will be provided at the intersections and along the corridor. No beam guard is anticipated. Permanent pavement marking and signing will be included in the plans.

The storm sewer is expected to include storm sewer to feed into the ponds along the roadway. There will not be any numbered structures involved in the project. Syene Road is expected to be closed to through traffic during construction with no posted detour. There are no exceptions to standards anticipated. The proposed improvement can be seen in Appendix D.

## B. Traffic Operations Approach and Results

The Lacy Road, Cheryl Parkway, Ninebark Drive and McCoy Road intersections with Syene Road were evaluated with the Highway Capacity Manual, sixth edition (HCM 6) using Synchro 10 and Sidra 7 software. A 2045 horizon year forecast was developed by the Madison Area Transportation Planning Board using the Dane County Regional Travel Demand Model, which included a new planned connection between Syene Road to Lacy Road by extending Ninebark Drive. April 2019 traffic counts provided by the City were used to develop the 2045 peak hour traffic volumes. The Syene Road corridor peak hourly volumes occur between 7:15 to 8:15 A.M. and 4:30 to 5:30 P.M. See Appendices A and B for the traffic forecast and traffic count data. A summary of the intersection traffic operations follows with detailed summaries and lane configurations contained within Appendix C**.**

The Lacy Road and Syene Road intersection operates acceptably at Level of Service (LOS) B overall in 2045 with the existing all-way stop control (AWSC) as well as a potential signalized intersection. The signalized intersection adds a northbound left-turn lane and converts the existing southbound approach from a right-turn lane and through/left lane to a through/right lane and a left-turn lane. The intersection could be expanded in the future to add northbound and southbound right-turn lanes, if necessary. Because of the proximity to the railroad tracks and acceptable operations of AWSC and signal alternatives, a RAB was not analyzed. Table 1 summarizes the operations of each alternative for below.

| Operation: HCM 6 | | Intersection Delay (seconds) | Intersection LOS | Highest Movement | Delay | LOS |
|---|---|---|---|---|---|---|
| Alt 1: AWSC | AM | 11.4 | B | EBT/R/L | 12.9 | B |
| | PM | 14.3 | B | EBT/R/L | 18.2 | C |
| Alt 2: Signal | AM | 10.1 | B | EBL | 14.2 | B |
| | PM | 10.8 | B | WBL | 14.8 | B |

Notes:
EBT/R/L=eastbound through/right/left
WBT/R/L=westbound through/right/left

**Table 1 Lacy Road and Syene Road–2045 Intersection Operations Summary**

[1] The cost estimate assumes a signal at Lacy Road, a RAB at East Cheryl Parkway, a traffic signal at Ninebark Drive, and a RAB at McCoy Road.

The Cheryl Parkway and Syene Road intersection operates at LOS E and F during the AM and PM peak hours in 2045, respectively, with the existing AWSC condition. The existing AWSC breaks down because of the single lane northbound movement and heavy PM southbound through/left movement. The signal and RAB alternatives operate acceptably at LOS B overall. The signalized intersection adds an exclusive northbound and southbound left-turn lane and maintains the eastbound and westbound configuration. The RAB alternative has one northbound and southbound lane, and maintains two eastbound and westbound lanes on Cheryl Parkway through the RAB. The signalized alternative likely has more additional capacity than the RAB because of the limited space and ROW for adding a southbound right-turn bypass lane for the RAB. Table 2 summarizes the operations of each alternative below.

| Operation: HCM 6 | | Intersection Delay (seconds) | Intersection LOS | Highest Movement | Delay | LOS |
|---|---|---|---|---|---|---|
| Alt 1: AWSC | AM | 36.7 | E | NBT/R/L | 64.5 | F |
| | PM | 84.3 | F | SBT/L | 202.8 | F |
| Alt 2: Signal | AM | 10.8 | B | EBL | 15.4 | B |
| | PM | 10.8 | B | EBL | 16.1 | B |
| Alt 3: RAB | AM | 7.5 | B | SBT/R/L | 10 | B |
| | PM | 10.3 | B | SBT/R/L | 13.4 | B |

Notes:
NBT/R/L=northbound through/right/left
SBT/R/L=southbound through/right/left

**Table 2 Cheryl Parkway and Syene Road–2045 Intersection Operations Summary**

The Ninebark Drive and Syene Road intersection operates at LOS F and D during the AM and PM peak hours in 2045, respectively, with the existing two-way stop controlled (TWSC) condition. The Ninebark Drive eastbound and westbound left turns begin to experience increased delays waiting for gaps on Syene Road; however, minimal queuing occurs on Ninebark Drive. A signal and RAB alternative operate well at LOS A overall. The signalized intersection adds an exclusive northbound left-turn lane and maintains the south-, east- and westbound configurations. The RAB alternative has one approach lane in each direction; however, ROW constraints impact the feasibility of the RAB alternative. Traffic signal warrants would likely need to be evaluated before implementing a signal at Ninebark Drive. In the interim, a TWSC intersection with an added northbound left-turn lane could be sufficient, and traffic volumes and patterns could be re-evaluated after the planned, new connection to Lacy Road. Table 3 summarizes the operations of each alternative below.

| Operation: HCM 6 | | Intersection Delay (seconds) | Intersection LOS | Highest Movement | Delay | LOS |
|---|---|---|---|---|---|---|
| Alt 1: TWSC | AM | 56.5 | F | EBL | 56.5 | F |
| | PM | 33.8 | D | EBL | 33.8 | D |
| Alt 2: Signal | AM | 9.3 | A | SBL | 13.4 | B |
| | PM | 7.9 | A | EBL | 15.9 | B |
| Alt 3: RAB | AM | 8.1 | A | NBT/R/L | 9.8 | A |
| | PM | 9.7 | A | SBT/R/L | 11.7 | B |

**Table 3 Ninebark Drive and Syene Road–2045 Intersection Operations Summary**

The McCoy Road and Syene Road intersection operates at LOS F during the AM and PM peak hours in 2045 with the existing one-way stop controlled (OWSC) condition. The eastbound left and right-turn movements experience large delays and the PM peak volume to capacity ratio is well over 1 at 1.74. The signalized alternative operates at LOS B overall during the AM and PM peak hours with the addition of separate eastbound left- and right-turn lanes. The RAB alternative operates the best of the three alternatives at LOS A and B during the AM and PM peak hours, respectively. The RAB has one approach lane in each direction with a southbound right-turn bypass. The RAB alternative would serve as a traffic calming feature and could provide a transition on the north end of the Syene Road corridor from a rural 45 mph section to an urban 35 mph section. Table 4 summarizes the operations of each alternative below.

| Operation: HCM 6 | | Intersection Delay (seconds) | Intersection LOS | Highest Movement | Delay | LOS |
|---|---|---|---|---|---|---|
| Alt 1: OWSC | AM | 116.8 | F | EBL/R | 116.8 | F |
| | PM | 370.6 | F | EBL/R | 370.6 | F |
| Alt 2: Signal | AM | 12.0 | B | EBL | 20.5 | C |
| | PM | 18.2 | B | EBL | 25.2 | C |
| Alt 3: RAB | AM | 9.5 | A | NBT/L | 10.5 | B |
| | PM | 12.3 | B | EBL/R | 22.7 | C |

**Table 4 McCoy Road and Syene Road–2045 Intersection Operations Summary**

## ENVIRONMENTAL AND CULTURAL ISSUES

Formal investigation of environmental and cultural issues have not been completed. The following discussion is based on engineering judgment and familiarity with the project corridor.

### A. Agriculture

Minimal impacts to agriculture and agricultural land are anticipated due to the project. This area of the City is planned for continued development and transition from agricultural to mixed residential and commercial uses.

B. Archaeological Sites

Field archaeological investigations have not been completed. Minimal impacts to archaeological resources are anticipated because of the project.

C. Historical Sites

A literature search on the Architecture and History Inventory from the Wisconsin Historical Society has not been completed. The McCoy Farmhouse is on the west side of Syene Road between Clayton Road and Ninebark Drive. The City's Comprehensive Plan notes that it is listed on the National Register of Historic Places.

D. Lakes, Waterways, and Floodplains

There is a culvert under Syene Road just south of Ninebark Drive that serves a detention pond in the southeast quadrant of the intersection. There is a box culvert under Syene Road approximately 575-feet north of Lacy Road that carries a creek to a detention area west of the multiuse trail on the west side of Syene Road.

E. Wetland

Wetlands have not been field delineated. There appears to be the potential for wetland impact on the north end of the corridor in the area near the Syene Road and McCoy Road intersection and in the southeast quadrant of the Ninebark Drive intersection.

F. Stormwater Management

The project will add curb and gutter and storm sewer infrastructure.

G. Hazardous Materials Sites

The potential for hazardous materials sites has not been investigated.

H. Hazardous Materials on Existing Structure

The only existing structure is a box culvert approximately 575 feet north of Lacy Road. It has not been field reviewed. Hazardous materials on the structure are not anticipated.

I. Upland Habitat

Upland habitat has not been field delineated. Minimal impacts to upland habitat are expected.

J. Endangered/Threatened/Migratory Bird Species

The presence of endangered/threatened/migratory bird species has not been investigated.

K. Section 4(f)

A portion of the Capital Springs State Recreation Area abuts the west side of Syene Road south of McCoy Road. Nanberry Park is on the west side of Syene Road north of East Cheryl Parkway. Swan Creek Park is on the west side of Syene Road south of East Cheryl Parkway. Minimal impacts to these parks and open space resources are anticipated.

L. Section 6(f)

The sources of funding for the parks and open spaces along the corridor have not been investigated.

M. Through or Adjacent to Tribal Land

The corridor does not travel through nor is it adjacent to Tribal Land.

## MISCELLANEOUS ISSUES

Following are additional issues included in the WisDOT Surface Transportation Block Grant (STBG)-Urban program application.

A. Construction Schedule Restrictions

No restrictions on construction activities because of threatened species or local events are anticipated.

B. Real Estate and Right of Way

No real estate has been acquired or transferred in anticipation of this project. Zero to less than one acre of strip ROW is expected to be acquired for the project. No ROW from parklands or large parcels is expected. There may be some temporary ROW interests (easements) required for construction.

C. Funding

The municipality has not requested or been approved for other federal or state funding from WisDOT.

D. Additional Information

There is no additional information.

## OPINION OF COSTS, PRIORITY, AND SCHEDULING

The total project design and construction cost is estimated to be $9,495,000.The design is anticipated to be 100 percent locally funded. The future construction application for $5,620,000 is anticipated in June 2020 for FY 2021 construction[2].

[2] The STBG-Urban program does not allow requesting design and construction projects in the same FY.

A. Construction

The basis for the construction estimate is itemized bid items, per mile costs, and past projects. The project priority is High. Construction is anticipated in FY 2023.

1. Roadway

| | |
|---|---|
| ▪ Federal Share of the Participating Construction Cost (80 percent) | $5,500,000 |
| ▪ Local Share of the Participating Construction Cost (20 percent) | $1,375,000 |
| ▪ Non-Participating Construction Cost (100 percent Local) | $220,000 |

2. Structure(s)

| | |
|---|---|
| ▪ Federal Share of the Participating Construction Cost (80 percent) | $120,000 |
| ▪ Local Share of the Participating Construction Cost (20 percent) | $30,000 |
| ▪ Non-Participating Construction Cost (100 percent Local) | $0 |

| | | |
|---|---|---|
| 3. | Subtotal Construction Costs | $7,245,000 |
| 4. | State Review for Construction (10%) | $750,000 |
| 5. | Construction with State Review Cost Estimate Total | $8,745,000 |

B. Design

The design will be 100 percent federally funded. The project priority is High. Design is anticipated in FY 2020.

| | | |
|---|---|---|
| 1. | Plan Development | $650,000 |
| 2. | State Review for Design | $100,000 |
| 3. | Design with State Review Cost Estimate Total | $750,000 |

C. Real Estate

The project priority for real estate is Moderate. Very little real estate is anticipated. A small amount of strip real estate as well as Temporary Limited Easements for construction have been assumed. Real estate is anticipated in FY 2021.

| | | |
|---|---|---|
| 1. | Total Real Estate Cost | $ 569,250 |

D. Other (Planning, Administration, or Other Non-Infrastructure)

There are no Other costs anticipated.

| | | |
|---|---|---|
| 1. | Total Other Cost | $0 |

## MATPB SUPPLEMENTAL QUESTIONS

The following items are asked for in the MATPB STBG-Urban project application supplement:

1. There are no known planned design details beyond those included in this report and WisDOT's application form.

2. There is a multiuse sidepath on the west side of Syene Road that is asphalt with short portions of concrete pavement that is 10 feet wide. There is no existing sidewalk along Syene Road. The proposed project will add sidewalk to the east side of the corridor. The path and future sidewalk will connect to existing sidewalk on both sides of Ninebark Drive, No Oaks Ridge, East Cheryl Parkway, and an existing multiuse sidepath along the south side of Lacy Road.

3. There are no difficult or extraordinary engineering or planning issues associated with the project other than those noted in this study and the WisDOT application form.

4. There are no other obstacles or problems that must be overcome to implement the project schedule other than those noted in this report and the WisDOT application form.

5. The project was not scoped with public participation.

The following information is provided to answer the MATPB Supplemental Questions

A. System Preservation

The existing pavement rating from WisDOT's PASER is 3 to 5, with a weighted average of 3.82. Curb ramps exist for the asphalt sidepath on the west side of Syene Road at Ninebark Drive, East Cheryl Parkway (no detectable warning fields), and Lacy Road. These will be checked for Americans with Disabilities Act (ADA) compliance during design and replaced if needed. Very little curb and gutter is present. The radii at the Lacy Road intersection are curb and gutter, the intersection of East Cheryl Parkway has curb and gutter on the east and west legs and on Syene Road approaching the intersection southbound (north leg). The existing stormwater is conveyed by ditches and culverts for most of the project corridor. The proposed corridor will include an urban section with curb and gutter and will add storm sewer.

B. Congestion Mitigation and Transportation System Management (TSM)

The existing, future no build, and proposed delays and level of service at the project intersections are provided in the Proposed Improvement section on this study. The project will improve motor vehicle, pedestrian, and bicycle travel by providing facilities that meet current standards and providing a cohesive, multimodal corridor for the length of the project. Existing Syene Road enjoys a high level of access control and this will be maintained and improved with the proposed project. Left-turn refuge areas are proposed at all street intersections and driveways.

At this time, RABs are planned at the McCoy Road and East Cheryl Parkway intersections. The intersections of Ninebark Road and Lacy Road will be designed to accommodate traffic signals. Whether or not these signals will be installed as part of the project will be determined during design.

C. Safety Enhancement

Crash analysis has not been completed for the project corridor and there are no known safety concerns. Pedestrian and bicyclist comfort and potentially safety will be improved with the addition of sidewalk on the east side and on-street buffered bike lanes on Syene Road.

D. Enhancement of Multi-Modal Options/Service

The City is committed to providing multimodal travel options to its residents and visitors. Pedestrian and bicycle travel will be improved along Syene Road with the addition of sidewalk on the east side and on-street buffered bicycle lanes. The corridor connects to east-west pedestrian and bicycle friendly corridors at Ninebark Drive, East Cheryl Parkway, and Lacy Road. The project will provide marked crosswalks at all street intersections.

E. Supports Transportation Efficient Land Use, Livability, and Economic Prosperity

The proposed Syene Road supports transportation efficient land use and is consistent with regional and local plans.

1. MATPB Regional Transportation Plan 2050

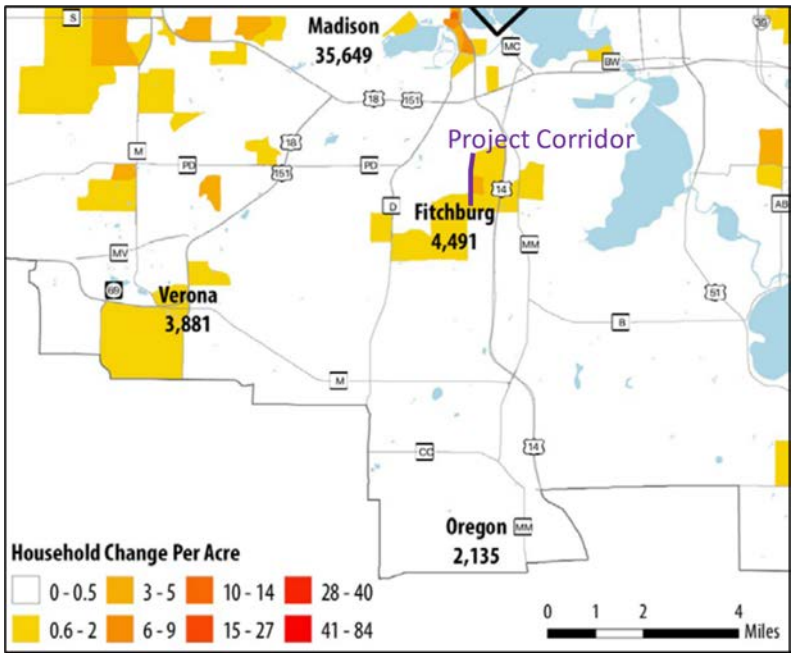
The proposed Syene Road project advances the following recommendations from the RTP 2050:

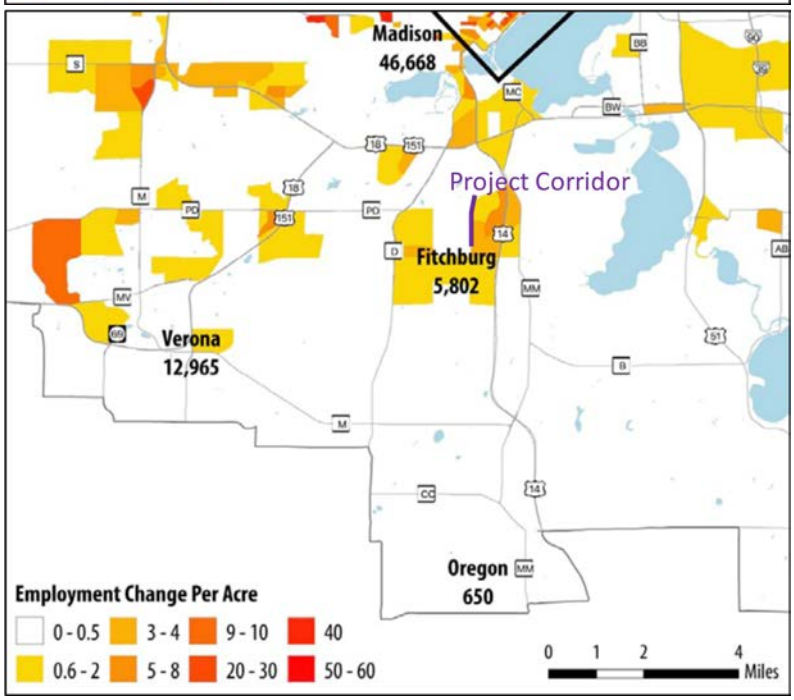
a. Develop urban areas with a mix of housing types and land uses to provide walkable, affordable neighborhoods. Figure 3 shows how the project corridor relates to housing and employment growth areas. It provides improved north-south connectivity in an area of the City that will continue to see moderately dense, mixed-use development.

b. Preserve and maintain the region's street and highway system.

c. Build a well-connected network of regional roadways to accommodate future growth and efficiently distribute traffic. The project corridor is a parallel route to US 14 and Lacy Road and part of a regional grid system that has been planned since the early 2000s.

d. Incorporate complete streets and green streets concepts for regional and local roadways. The project includes multimodal accommodations and will meet regional stormwater quality and quantity standards.




Source: MATPB RTP 2050

**Figure 3 Syene Road Location and City Household and Employment Growth 2010 to 2050**

2. Bicycle Transportation Plan (BTP) for the Madison Metropolitan Area and Dane County

The proposed Syene Road project maintains the designation of Syene Road as part of the Primary Bicycle Network (Shared-Use Path) contained in the BTP. It also advances the project corridor's designation "Need for New or Improved On Street Facilities". Figure 4 shows a portion of the Bicycle Network Plan Madison Area map.

3. City's Comprehensive Plan

The proposed Syene Road project is consistent with the following goals from the Comprehensive Plan:

a. Land Use Goal 2: Develop a compact urban community that is visually and functionally distinct from its rural and agricultural community. The Syene Road corridor improvements strengthen the multimodal corridor grid serving the activity center located east of Syene Road and north and west of Lacy Road.

b. Economic Development Goal 2: Encourage economic development opportunities appropriate to the resources, character, and service levels in the City.

(1) Objective 1: Encourage the creation of compact mixed-use activity centers as an alternative to suburban style, single use, low density office, and research parks. The Syene Road corridor improvements strengthen the multimodal corridor grid serving the activity center located east of Syene Road and north and west of Lacy Road. This location is exactly the type of land use that Objective 1 is referring to.

c. Transportation Goal 1: Develop and maintain a coordinated land use and transportation system. The Syene Road corridor improvements strengthen the multimodal corridor grid serving the activity center located east of Syene Road and north and west of Lacy Road.

d. Transportation Goal 2: Provide a safe and efficient transportation system that allows for the convenient movement of people and goods. The proposed project will address poor pavement conditions and allow for upgraded intersection control at two or more intersections.

e. Transportation Goal 3: Develop and maintain a multi-modal transportation system that reduces automobile dependency and increases transportation choices. The proposed project adds sidewalk to the east side of Syene Road and on-street buffered bicycle lanes.

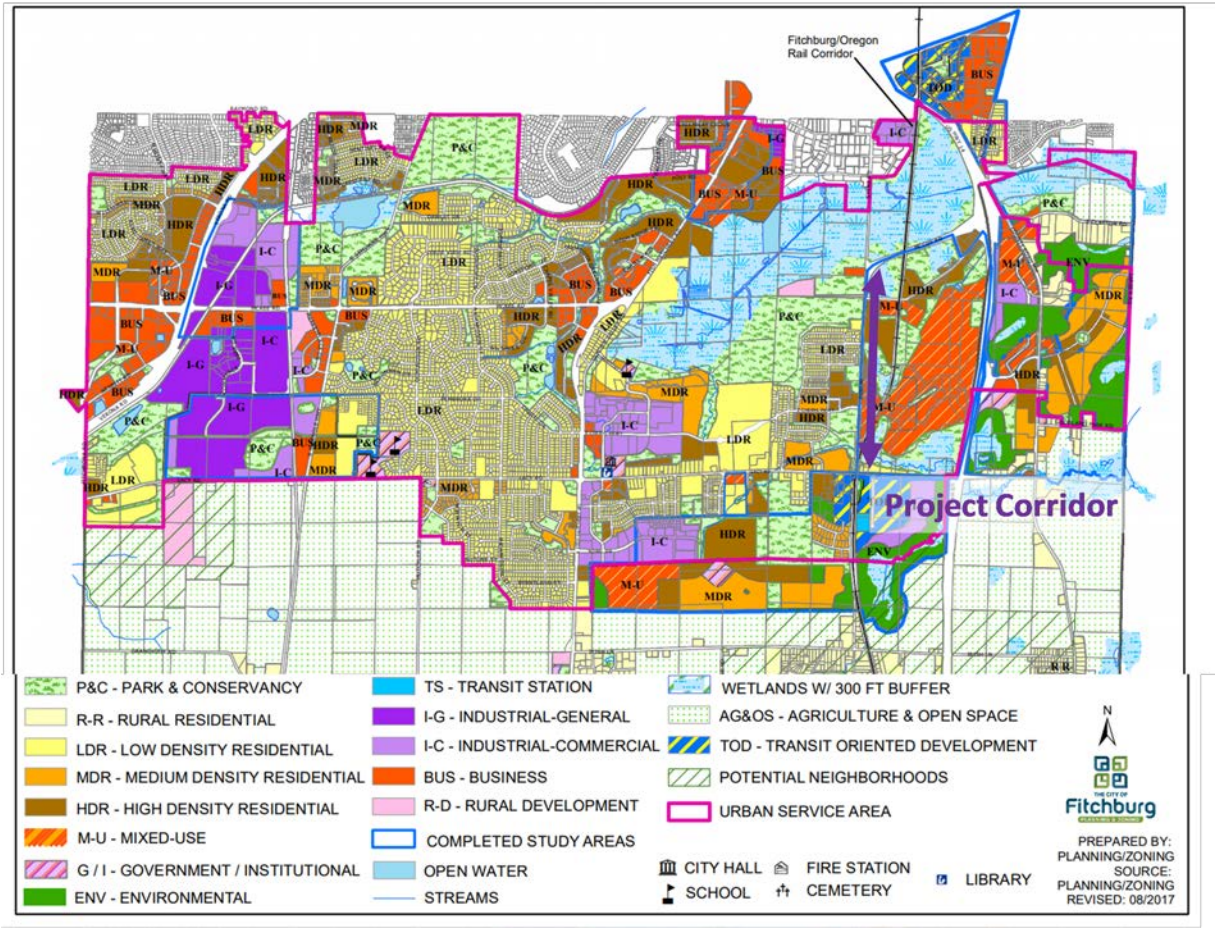
Figure 5 shows the project location on the City's future land use map. It serves a large area designated as Mixed Use as well as a diverse mix of residential uses ranging from Low to High Density. This portion of the City is also designated as the City's Intended Growth Sector.


Source: MATPB RTP 2050

**Figure 4 Syene Road Location on the Bicycle Network Plan Madison Area**

4. City of Fitchburg Bicycle and Pedestrian Plan

This plan was finalized in March 2017. It states that the upcoming Syene Road project may include a reduced speed limit (35 mph), sidewalk on the east side, on-street bike lanes, a RAB at East Cheryl Parkway and a signal at Lacy Road.




Source: City of Fitchburg Comprehensive Plan

**Figure 5 Syene Road Location on the City's Future Land Use Plan Map**

## F. Environment

There are no known environmental or cultural issues beyond those included in this study and WisDOT's application form. The project proposes a "right sized" Syene Road corridor that does not add motor vehicle lanes, but does provide refuge for left-turning vehicles, the ability to upgrade to traffic signal control at Ninebark Drive and Lacy Road if and when necessary, RAB control at McCoy Road and East Cheryl Parkway, and improved conditions for pedestrians and bicyclists in an area that will continue to see moderately dense, mixed-use development.

## G. Cost Benefit

The project does not leverage any additional private or public funding beyond the required local match or result in other cost efficiencies.

## CONCLUSION

The proposed Syene Road improvements will address poor pavement conditions, improve pedestrian and bicycle connections, upgrade intersection control, improve drainage, and enhance multimodal connectivity in this important Intended Growth Sector in the City.

# APPENDIX A
# 2045 TRAFFIC FORECAST

# WisDOT TRAFFIC FORECAST REPORT

PROJECT ID(S):

ROUTE(S): McCoy Road/S. Syene Road

Region/COUNTY(IES): Dane County

LOCATION: McCoy Road/ S. Syene Road

COMPLETED: May 16, 2019

MADISON AREA TRANSPORTATION PLANNING BOARD


Developed by: David Kanning

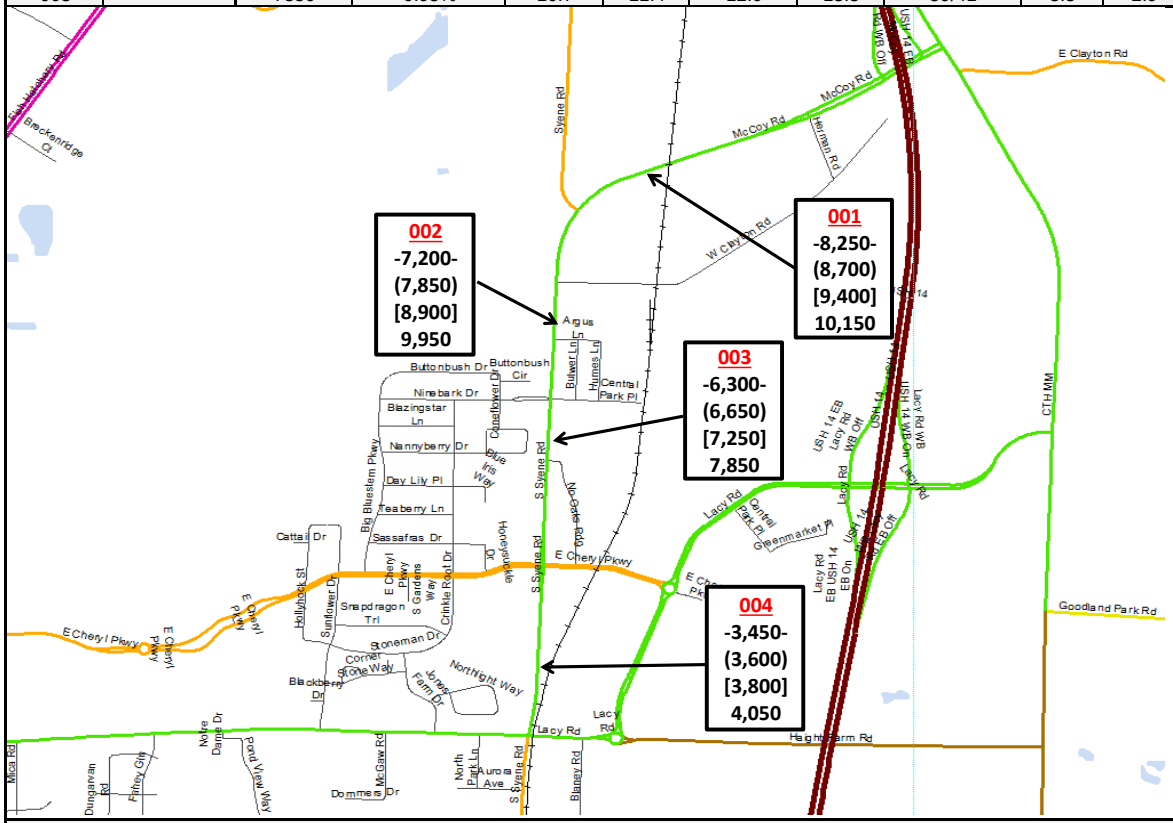
Phone: (608) 266-4335

FAX #: (608) 261-9967

E-Mail: dkanning@cityofmadison.com


Madison Area T • P • B Transportation Planning Board
A Metropolitan Planning Organization (MPO)

| Site(s) | Route(s) | Design Values (%) Volume(s) | Site Growth % | K250 | K100 | K30 | P | D(Dsgn. Hr.) | T(DHV) | T(PHV) | Truck Classification AADTT | 2D | 3AX | 2S1+2S2 | 3-S2 | DBL-BTM | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001 | | 10150 | 0.89% | 10.5 | 11.2 | 11.8 | 13.0 | 59/41 | 3.1 | 2.7 | 300 | 1.4 | 1.1 | 0.5 | 0.5 | 0.1 | 3.6% |
| 002 | | 9960 | 1.46% | 10.5 | 11.2 | 11.8 | 13.1 | 59/41 | 3.2 | 2.8 | 270 | 1.4 | 1.2 | 0.5 | 0.5 | 0.1 | 3.7% |
| 003 | | 7850 | 0.95% | 10.7 | 11.4 | 12.0 | 13.3 | 59/41 | 3.3 | 2.9 | 240 | 1.4 | 1.3 | 0.5 | 0.5 | 0.1 | 3.8% |




| Full Vehicle Classification Site(s) | Route(s) | MC | CARS | SU2-4 | BUSES | SU2-6 | SU3 | SU4+ | ST4- | ST5 | ST6+ | MU5- | MU6 | MU7+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

N

SITE ID = Colored, **bolded**, and underlined

| Symbol | Count |
|---|---|
| -000- | 2019 Count |

| Symbol | Forecast |
|---|---|
| (000) | 2025 AADT |
| [000] | 2035 AADT |
| 000 | 2045 AADT |

**NOTES ON THE FORECAST:**

1. This projection assumes that no major new traffic generators will be added to the development already included in the 2010/2050 Dane County Regional Travel Demand Model.
2. Truck classification percentages were taken from a table representative of similar facilities and locations throughout the state of Wisconsin.
3. Syene Road is a Factor Group II (Urban-Other) roadway (indicating low to moderate fluctuation in traffic from a seasonal perspective). It is functionally classified as a Minor Arterial (16) for count purposes.
4. Roadway improvements coded within the existing plus committed + planned (E+C+P) network of the 2010/2050 Dane County Regional Travel Demand Model were assumed to be in place for the purposes of developing this forecast.

# APPENDIX B
# 2019 AND 2045 TRAFFIC VOLUMES

# APPENDIX B

## S Syene Road Peak Hour

| 2019 AM PEAK | Cheryl Hourly Sum | Ninebark Hourly Sum | McCoy Hourly Sum | Lacy Hourly Sum | **Corridor Hourly Sum** |
|---|---|---|---|---|---|
| 6:00 - 7:00 | 499 | 415 | 548 | 291 | **1753** |
| 6:15 - 7:15 | 646 | 524 | 674 | 366 | **2210** |
| 6:30 - 7:30 | 783 | 649 | 836 | 467 | **2735** |
| 6:45 - 7:45 | 935 | 773 | 974 | 559 | **3241** |
| 7:00 - 8:00 | 1032 | 863 | 1115 | 641 | **3651** |
| 7:15 - 8:15 | 1073 | 923 | 1214 | 651 | **3861** |
| 7:30 - 8:30 | 1055 | 916 | 1206 | 614 | **3791** |
| 7:45 - 8:45 | 970 | 839 | 1136 | 545 | **3490** |
| 8:00 - 9:00 | 810 | 720 | 978 | 450 | **2958** |

| 2019 PM PEAK | Cheryl Hourly Sum | Ninebark Hourly Sum | McCoy Hourly Sum | Lacy Hourly Sum | **Corridor Hourly Sum** |
|---|---|---|---|---|---|
| 3:00 - 4:00 | 636 | 551 | 820 | 440 | **2447** |
| 3:15 - 4:15 | 758 | 632 | 919 | 500 | **2809** |
| 3:30 - 4:30 | 883 | 717 | 1024 | 579 | **3203** |
| 3:45 - 4:45 | 992 | 774 | 1109 | 629 | **3504** |
| 4:00 - 5:00 | 1087 | 810 | 1129 | 697 | **3723** |
| 4:15 - 5:15 | 1170 | 864 | 1165 | 743 | **3942** |
| 4:30 - 5:30 | 1194 | 906 | 1179 | 808 | **4087** |
| 4:45 - 5:45 | 1152 | 902 | 1148 | 771 | **3973** |
| 5:00 - 6:00 | 1048 | 877 | 1101 | 710 | **3736** |

## APPENDIX B

**Lacy Road and S Syene Road**

MPO Growth Factor = **0.81%** ---> average of site 001 and 002

LACY @ SYENE 3.26.2019 A.M.

| Interval End Time | NBT | NBR | NBL | SBT | SBR | SBL | EBT | EBR | EBL | WBT | WBR | WBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6:15 | 7 | 3 | | 1 | 7 | | 15 | 2 | 7 | 7 | 1 | 1 | 51 | 291 | 0.72 |
| 6:30 | 16 | 3 | | 2 | 3 | 1 | 14 | | 3 | 10 | 1 | 2 | 55 | 366 | 0.73 |
| 6:45 | 25 | 7 | 2 | 4 | 1 | 1 | 12 | | 11 | 16 | 4 | 1 | 84 | 467 | 0.75 |
| 7:00 | 29 | 2 | | 5 | 16 | 1 | 11 | | 15 | 15 | 7 | | 101 | 559 | 0.79 |
| 7:15 | 21 | 5 | 2 | 6 | 16 | | 18 | | 16 | 36 | 3 | 3 | 126 | 641 | 0.88 |
| 7:30 | 29 | 10 | 3 | 7 | 19 | | 30 | 1 | 22 | 28 | 1 | 6 | 156 | 651 | **0.89** |
| 7:45 | 20 | 13 | 3 | 19 | 19 | | 29 | 1 | 34 | 30 | 4 | 4 | 176 | 614 | 0.84 |
| 8:00 | 17 | 12 | 1 | 11 | 30 | | 35 | | 21 | 43 | 9 | 4 | 183 | 545 | 0.74 |
| 8:15 | 26 | 6 | | 18 | 21 | 1 | 19 | | 17 | 22 | 3 | 3 | 136 | 450 | 0.83 |
| 8:30 | 18 | 9 | 1 | 8 | 19 | | 21 | 1 | 12 | 20 | 6 | 4 | 119 | | |
| 8:45 | 20 | 8 | | 10 | 14 | 2 | 17 | 1 | 17 | 14 | 3 | 1 | 107 | | |
| 9:00 | 14 | 3 | 5 | 4 | 14 | 2 | 12 | 3 | 14 | 14 | 2 | 1 | 88 | | |
| 2019 AM Hourly Sum | 92 | 41 | 7 | 55 | 89 | 1 | 113 | 2 | 94 | 123 | 17 | 17 | | | |
| **2045 AM Hourly Sum** | **110** | **50** | **10** | **65** | **110** | **10*** | **135** | **10*** | **115** | **150** | **20** | **20** | | | |

**Override to get delay operations*

NINEBARK @ SYENE 3.26.2019 P.M.

| Interval End Time | NBT | NBR | NBL | SBT | SBR | SBL | EBT | EBR | EBL | WBT | WBR | WBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3:15 | 9 | 1 | | 13 | 8 | 2 | 24 | 2 | 12 | 13 | | 6 | 90 | 440 | 0.79 |
| 3:30 | 5 | 4 | 2 | 10 | 15 | 1 | 14 | 1 | 12 | 12 | | 4 | 80 | 500 | 0.83 |
| 3:45 | 11 | 4 | 3 | 22 | 17 | 2 | 29 | 4 | 16 | 20 | 3 | 8 | 139 | 579 | 0.91 |
| 4:00 | 4 | 2 | 1 | 25 | 15 | 2 | 37 | 4 | 12 | 19 | 1 | 9 | 131 | 629 | 0.83 |
| 4:15 | 9 | 4 | 2 | 29 | 20 | 3 | 39 | 4 | 10 | 23 | 1 | 6 | 150 | 697 | 0.88 |
| 4:30 | 8 | 4 | 1 | 29 | 20 | 5 | 45 | 1 | 8 | 27 | 2 | 9 | 159 | 743 | 0.93 |
| 4:45 | 8 | 7 | 1 | 31 | 27 | 5 | 63 | 1 | 19 | 21 | 1 | 5 | 189 | 808 | **0.90** |
| 5:00 | 17 | 5 | 1 | 29 | 41 | 5 | 48 | 2 | 18 | 25 | | 8 | 199 | 771 | 0.86 |
| 5:15 | 14 | 2 | 1 | 33 | 27 | 5 | 51 | 3 | 19 | 34 | 1 | 6 | 196 | 710 | 0.79 |
| 5:30 | 8 | 3 | | 43 | 32 | 5 | 51 | 1 | 18 | 45 | 3 | 15 | 224 | | |
| 5:45 | 14 | 3 | 3 | 23 | 25 | 3 | 29 | 1 | 17 | 21 | 1 | 12 | 152 | | |
| 6:00 | 18 | 3 | 2 | 10 | 16 | 7 | 27 | 5 | 20 | 23 | 1 | 6 | 138 | | |
| 2019 PM Hourly Sum | 47 | 17 | 3 | 136 | 127 | 20 | 213 | 7 | 74 | 125 | 5 | 34 | | | |
| **2045 PM Hourly Sum** | **55** | **20** | **5** | **165** | **155** | **25** | **260** | **10** | **90** | **150** | **5** | **40** | | | |

## APPENDIX B

**E Cheryl Parkway and S Syene Road**

MPO Growth Factor = **1.21%** ---> average of site 002 and 003

E. CHERYL @ SYENE 4.10.2019 A.M.

| Interval End Time | NBT | NBR | NBL | SBT | SBR | SBL | EBT | EBR | EBL | WBT | WBR | WBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6:15 | 12 | 1 | 1 | 9 | 12 | 1 | 10 | | 8 | 14 | 9 | 1 | 78 | 499 | 0.60 |
| 6:30 | 17 | 3 | 4 | 9 | 12 | 1 | 6 | | 11 | 18 | 12 | 1 | 94 | 646 | 0.72 |
| 6:45 | 27 | 0 | 3 | 7 | 12 | 1 | 10 | 1 | 15 | 20 | 20 | 3 | 119 | 783 | 0.85 |
| 7:00 | 41 | 3 | 6 | 21 | 17 | 2 | 21 | 6 | 24 | 27 | 30 | 10 | 208 | 935 | 0.86 |
| 7:15 | 46 | 5 | 2 | 32 | 34 | 5 | 24 | 1 | 22 | 27 | 24 | 3 | 225 | 1032 | 0.85 |
| 7:30 | 38 | 7 | 6 | 26 | 32 | 14 | 22 | 1 | 29 | 31 | 21 | 4 | 231 | 1073 | **0.88** |
| 7:45 | 49 | 2 | 5 | 30 | 49 | 9 | 21 | 1 | 25 | 47 | 27 | 6 | 271 | 1055 | 0.86 |
| 8:00 | 52 | 4 | 15 | 47 | 52 | 5 | 15 | 5 | 23 | 44 | 34 | 9 | 305 | 970 | 0.80 |
| 8:15 | 38 | 2 | 11 | 47 | 49 | 3 | 14 | 3 | 25 | 40 | 28 | 6 | 266 | 810 | 0.76 |
| 8:30 | 37 | 4 | 5 | 26 | 52 | 2 | 15 | 2 | 20 | 30 | 14 | 6 | 213 | | |
| 8:45 | 20 | 3 | 1 | 33 | 41 | 6 | 18 | 6 | 19 | 26 | 10 | 3 | 186 | | |
| 9:00 | 35 | 1 | 4 | 14 | 14 | 5 | 13 | 3 | 11 | 36 | 8 | 1 | 145 | | |
| 2019 AM Hourly Sum | 177 | 15 | 37 | 150 | 182 | 31 | 72 | 10 | 102 | 162 | 110 | 25 | | | |
| **2045 AM Hourly Sum** | **230** | **20** | **50** | **195** | **240** | **40** | **95** | **15** | **135** | **215** | **145** | **35** | | | |

E. CHERYL @ SYENE 4.10.2019 P.M.

| Interval End Time | NBT | NBR | NBL | SBT | SBR | SBL | EBT | EBR | EBL | WBT | WBR | WBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3:15 | 11 | 1 | 1 | 42 | 8 | 6 | 19 | 5 | 19 | 10 | 4 | 0 | 126 | 636 | 0.87 |
| 3:30 | 22 | 4 | 2 | 23 | 16 | 18 | 19 | 6 | 24 | 10 | 4 | 2 | 150 | 758 | 0.76 |
| 3:45 | 4 | 21 | 1 | 44 | 18 | 14 | 26 | 3 | 20 | 21 | 8 | 3 | 183 | 883 | 0.80 |
| 4:00 | 20 | 1 | 2 | 44 | 26 | 8 | 34 | 7 | 19 | 11 | 4 | 1 | 177 | 992 | 0.85 |
| 4:15 | 20 | 7 | 1 | 66 | 32 | 20 | 34 | 4 | 28 | 27 | 3 | 6 | 248 | 1087 | 0.93 |
| 4:30 | 19 | 6 | 3 | 80 | 36 | 18 | 56 | 10 | 28 | 14 | 4 | 1 | 275 | 1170 | 0.88 |
| 4:45 | 25 | 9 | 3 | 75 | 39 | 24 | 54 | 10 | 29 | 17 | 4 | 3 | 292 | 1194 | **0.90** |
| 5:00 | 18 | 5 | 1 | 81 | 32 | 15 | 53 | 3 | 28 | 18 | 13 | 5 | 272 | 1152 | 0.87 |
| 5:15 | 29 | 5 | 2 | 75 | 57 | 28 | 70 | 10 | 22 | 23 | 7 | 3 | 331 | 1048 | 0.79 |
| 5:30 | 26 | 7 | 11 | 77 | 52 | 28 | 42 | 6 | 22 | 20 | 3 | 5 | 299 | | |
| 5:45 | 20 | 7 | 4 | 68 | 39 | 18 | 34 | 9 | 24 | 15 | 10 | 2 | 250 | | |
| 6:00 | 14 | 10 | 3 | 36 | 18 | 6 | 37 | 6 | 10 | 19 | 5 | 4 | 168 | | |
| 2019 PM Hourly Sum | 98 | 26 | 17 | 308 | 180 | 95 | 219 | 29 | 101 | 78 | 27 | 16 | | | |
| **2045 PM Hourly Sum** | **130** | **35** | **20** | **405** | **235** | **125** | **290** | **40** | **135** | **100** | **35** | **20** | | | |

## APPENDIX B

**Ninebark Drive and S Syene Road**

MPO Growth Factor = **1.21%** ---> average of site 002 and 003

NINEBARK @ SYENE 4.19.2019 A.M.

| Interval End Time | NBT | NBR | NBL | SBT | SBR | SBL | EBT | EBR | EBL | WBT | WBR | WBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6:15 | 28 | 2 | 0 | 20 | 1 | 0 | 0 | 1 | 4 | 0 | 2 | 0 | 58 | 415 | 0.68 |
| 6:30 | 47 | 5 | 0 | 15 | 1 | 2 | 0 | 1 | 6 | 0 | 1 | 2 | 80 | 524 | 0.78 |
| 6:45 | 70 | 3 | 0 | 30 | 2 | 4 | 0 | 0 | 11 | 0 | 2 | 2 | 124 | 649 | 0.79 |
| 7:00 | 88 | 3 | 0 | 39 | 2 | 4 | 0 | 0 | 13 | 0 | 2 | 2 | 153 | 773 | 0.78 |
| 7:15 | 88 | 1 | 0 | 43 | 4 | 6 | 0 | 2 | 16 | 0 | 6 | 1 | 167 | 863 | 0.87 |
| 7:30 | 109 | 3 | 1 | 64 | 1 | 2 | 0 | 1 | 15 | 0 | 5 | 4 | 205 | 923 | **0.93** |
| 7:45 | 133 | 2 | 0 | 68 | 1 | 9 | 0 | 4 | 24 | 0 | 2 | 5 | 248 | 916 | 0.92 |
| 8:00 | 122 | 2 | 1 | 75 | 3 | 6 | 1 | 0 | 23 | 2 | 5 | 3 | 243 | 839 | 0.86 |
| 8:15 | 93 | 2 | 0 | 109 | 3 | 5 | 0 | 3 | 8 | 1 | 0 | 3 | 227 | 720 | 0.79 |
| 8:30 | 89 | 0 | 1 | 85 | 1 | 5 | 0 | 0 | 13 | 0 | 3 | 1 | 198 | | |
| 8:45 | 68 | 5 | 0 | 79 | 1 | 5 | 0 | 0 | 8 | 0 | 3 | 2 | 171 | | |
| 9:00 | 59 | 3 | 1 | 43 | 1 | 5 | 0 | 1 | 8 | 0 | 1 | 2 | 124 | | |
| 2019 AM Hourly Sum | 457 | 9 | 2 | 316 | 8 | 22 | 1 | 8 | 70 | 3 | 12 | 15 | | | |
| **2045 AM Hourly Sum** | **600** | **10** | **5** | **415** | **10** | **30** | **10**** | **10** | **80**** | **5** | **15** | **20** | | | |

***Override w/ new ninebark connection to Lacy*

NINEBARK @ SYENE 4.9.2019 P.M.

| Interval End Time | NBT | NBR | NBL | SBT | SBR | SBL | EBT | EBR | EBL | WBT | WBR | WBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3:15 | 38 | 2 | 1 | 52 | 6 | 3 | 0 | 0 | 4 | 0 | 5 | 0 | 111 | 551 | 0.85 |
| 3:30 | 41 | 2 | 1 | 65 | 8 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 120 | 632 | 0.82 |
| 3:45 | 58 | 2 | 1 | 69 | 7 | 5 | 0 | 1 | 8 | 0 | 5 | 6 | 162 | 717 | 0.87 |
| 4:00 | 38 | 2 | 2 | 84 | 13 | 4 | 0 | 1 | 2 | 1 | 4 | 7 | 158 | 774 | 0.88 |
| 4:15 | 48 | 2 | 4 | 109 | 8 | 1 | 1 | 1 | 5 | 0 | 4 | 9 | 192 | 810 | 0.92 |
| 4:30 | 57 | 3 | 3 | 116 | 8 | 4 | 0 | 2 | 3 | 0 | 3 | 6 | 205 | 864 | 0.88 |
| 4:45 | 62 | 2 | 1 | 120 | 18 | 3 | 0 | 1 | 4 | 0 | 4 | 4 | 219 | 906 | **0.92** |
| 5:00 | 43 | 8 | 3 | 126 | 6 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 194 | 902 | 0.91 |
| 5:15 | 55 | 3 | 0 | 155 | 15 | 4 | 0 | 0 | 6 | 0 | 4 | 4 | 246 | 877 | 0.89 |
| 5:30 | 68 | 4 | 2 | 135 | 20 | 9 | 1 | 1 | 3 | 0 | 2 | 2 | 247 | | |
| 5:45 | 36 | 3 | 2 | 131 | 20 | 8 | 0 | 1 | 8 | 0 | 1 | 5 | 215 | | |
| 6:00 | 47 | 1 | 3 | 91 | 19 | 3 | 0 | 2 | 2 | 0 | 0 | 1 | 169 | | |
| 2019 PM Hourly Sum | 228 | 17 | 6 | 536 | 59 | 20 | 1 | 2 | 17 | 0 | 10 | 10 | | | |
| **2045 PM Hourly Sum** | **300** | **20** | **10** | **705** | **75** | **25** | **5**** | **5** | **15**** | **5*** | **15** | **15** | | | |

**Override to get delay operations*

***Override w/ new ninebark connection to Lacy*

## APPENDIX B

**McCoy Road and S Syene Road**

MPO Growth Factor = **1.18%** ---> average of site 003 and 004

McCOY @ SYENE 4.09.2019 A.M.

| Interval End Time | NBT | NBR | NBL | EBT | EBR | EBL | WBT | WBR | WBL | SBT | SBR | SBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6:15 | 31 | | 7 | | 2 | 5 | | | | 15 | 19 | | 79 | 548 | 0.69 |
| 6:30 | 35 | | 20 | | 2 | 2 | | | | 17 | 18 | | 94 | 674 | 0.82 |
| 6:45 | 56 | | 32 | | 8 | 8 | | | | 33 | 38 | | 175 | 836 | 0.82 |
| 7:00 | 72 | | 30 | | 5 | 8 | | | | 50 | 35 | | 200 | 974 | 0.78 |
| 7:15 | 68 | | 42 | | 4 | 10 | | | | 48 | 33 | | 205 | 1115 | 0.82 |
| 7:30 | 83 | | 44 | | 9 | 12 | | | | 51 | 57 | | 256 | 1214 | **0.89** |
| 7:45 | 86 | | 75 | | 8 | 9 | | | | 72 | 63 | | 313 | 1206 | 0.88 |
| 8:00 | 58 | | 81 | | 6 | 15 | | | | 74 | 107 | | 341 | 1136 | 0.83 |
| 8:15 | 49 | | 49 | | 8 | 11 | | | | 112 | 75 | | 304 | 978 | 0.80 |
| 8:30 | 58 | | 38 | | 10 | 9 | | | | 55 | 78 | | 248 | | |
| 8:45 | 51 | | 27 | | 10 | 15 | | | | 74 | 66 | | 243 | | |
| 9:00 | 49 | | 18 | | 10 | 9 | | | | 44 | 53 | | 183 | | |
| 2019 AM Hourly Sum | 276 | | 249 | | 31 | 47 | | | | 309 | 302 | | | | |
| **2045 AM Hourly Sum** | **360** | | **325** | | **40** | **60** | | | | **405** | **395** | | | | |

McCOY @ SYENE 4.9.2019 P.M.

| Interval End Time | NBT | NBR | NBL | EBT | EBR | EBL | WBT | WBR | WBL | SBT | SBR | SBL | 15-min Totals | Hourly Sum | PHF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3:15 | 39 | | 15 | | 21 | 45 | | | | 40 | 27 | | 187 | 820 | 0.86 |
| 3:30 | 39 | | 12 | | 14 | 35 | | | | 60 | 19 | | 179 | 919 | 0.80 |
| 3:45 | 62 | | 9 | | 25 | 46 | | | | 52 | 21 | | 215 | 1024 | 0.90 |
| 4:00 | 39 | | 8 | | 26 | 54 | | | | 80 | 32 | | 239 | 1109 | 0.92 |
| 4:15 | 57 | | 10 | | 55 | 60 | | | | 71 | 33 | | 286 | 1129 | 0.94 |
| 4:30 | 55 | | 10 | | 25 | 72 | | | | 94 | 28 | | 284 | 1165 | 0.90 |
| 4:45 | 56 | | 14 | | 54 | 71 | | | | 77 | 28 | | 300 | 1179 | **0.92** |
| 5:00 | 38 | | 10 | | 31 | 42 | | | | 102 | 36 | | 259 | 1148 | 0.89 |
| 5:15 | 50 | | 17 | | 55 | 62 | | | | 106 | 32 | | 322 | 1101 | 0.85 |
| 5:30 | 47 | | 20 | | 38 | 52 | | | | 110 | 31 | | 298 | | |
| 5:45 | 31 | | 15 | | 40 | 47 | | | | 109 | 27 | | 269 | | |
| 6:00 | 32 | | 18 | | 27 | 32 | | | | 82 | 21 | | 212 | | |
| 2019 PM Hourly Sum | 191 | | 61 | | 178 | 227 | | | | 395 | 127 | | | | |
| **2045 PM Hourly Sum** | **250** | | **80** | | **230** | **295** | | | | **515** | **165** | | | | |

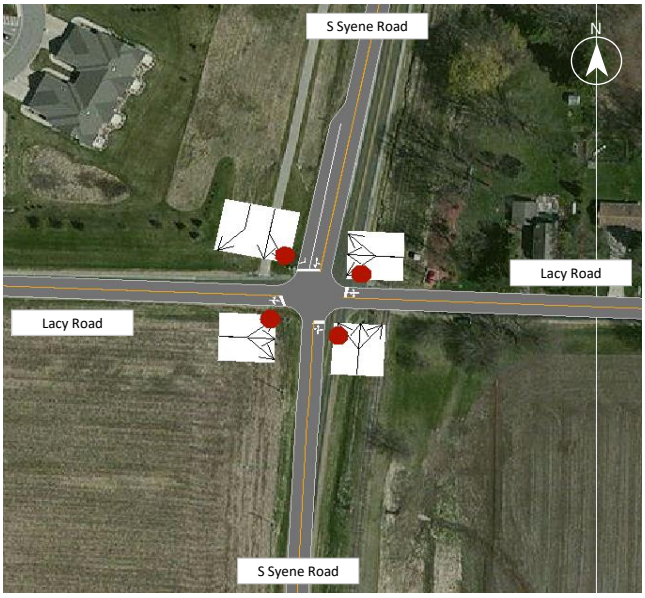
# APPENDIX C
# TRAFFIC OPERATIONS SUMMARY

## APPENDIX C - TRAFFIC OPERATIONS SUMMARY

### S Syene Road and Lacy Road

**Alternative 1: AWSC 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 11.1 | B | 0.30 | 35 | 11.4 |
| Eastbound | EBT/R/L | 12.9 | B | 0.45 | 60 | Intersection LOS |
| Southbound | SBT/L | 10.2 | B | 0.15 | 25 | B |
| | SBR | 9.6 | A | 0.19 | 25 | |
| Westbound | WBT/R/L | 11.2 | B | 0.33 | 35 | Max Movement V/C |
| | | | | | Operations: | 0.45 |
| | | | | | | HCM 6 |

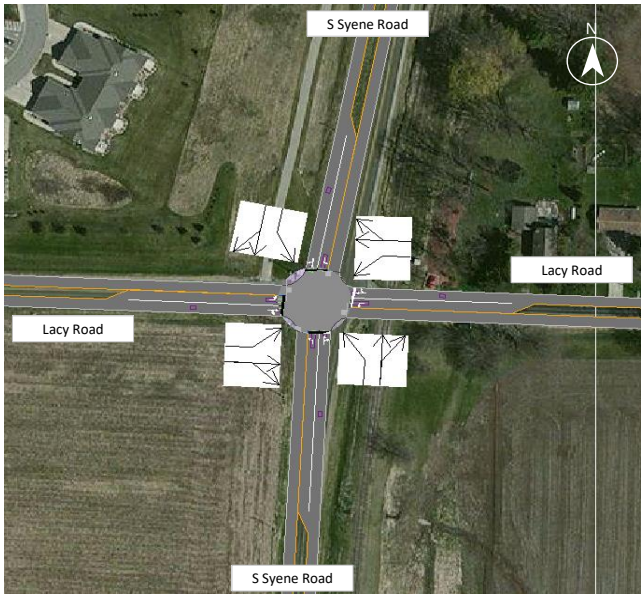



**Alternative 1: AWSC 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 10.8 | B | 0.16 | 25 | 14.3 |
| Eastbound | EBT/R/L | 18.2 | C | 0.63 | 115 | Intersection LOS |
| Southbound | SBT/L | 13.4 | B | 0.39 | 45 | B |
| | SBR | 10.8 | B | 0.28 | 30 | |
| Westbound | WBT/R/L | 12.5 | B | 0.37 | 40 | Max Movement V/C |
| | | | | | Operations: | 0.63 |
| | | | | | | HCM 6 |

**Alternative 2: Signal 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 8.5 | A | 0.02 | 25 | 10.1 |
| | NBT/R | 7.5 | A | 0.25 | 25 | |
| Eastbound | EBL | 14.2 | B | 0.31 | 40 | Intersection LOS |
| | EBT/R | 11.2 | B | 0.33 | 25 | B |
| Southbound | SBL | 8.2 | A | 0.02 | 25 | |
| | SBT/R | 7.6 | A | 0.29 | 25 | |
| Westbound | WBL | 12.1 | B | 0.05 | 25 | Max Movement V/C |
| | WBT/R | 11.5 | B | 0.39 | 25 | 0.39 |
| | | | | | Operations: | HCM 6 |




**Alternative 2: Signal 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 10.5 | B | 0.01 | 25 | 10.8 |
| | NBT/R | 6.9 | A | 0.12 | 25 | |
| Eastbound | EBL | 13.4 | B | 0.23 | 30 | Intersection LOS |
| | EBT/R | 13.0 | B | 0.60 | 25 | B |
| Southbound | SBL | 7.4 | A | 0.04 | 25 | |
| | SBT/R | 8.8 | A | 0.51 | 25 | |
| Westbound | WBL | 14.8 | B | 0.13 | 25 | Max Movement V/C |
| | WBT/R | 11.3 | B | 0.35 | 25 | 0.60 |
| | | | | | Operations: | HCM 6 |

## APPENDIX C - TRAFFIC OPERATIONS SUMMARY

### S Syene Road and Cheryl Parkway

**Alternative 1: AWSC 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 64.5 | F | 0.93 | 250 | 36.7 |
| Eastbound | EBL | 23.0 | C | 0.46 | 60 | |
| | EBT | 17.9 | C | 0.31 | 35 | Intersection LOS |
| | EBR | 12.9 | B | 0.05 | 25 | |
| Southbound | SBT/L | 33.6 | D | 0.71 | 135 | E |
| | SBR | 28.0 | D | 0.67 | 120 | |
| Westbound | WBT/L | 41.1 | E | 0.78 | 165 | Max Movement V/C |
| | WBR | 18.4 | C | 0.42 | 50 | 0.93 |
| | | | | | Operations: | HCM 6 |

**Alternative 1: AWSC 2045 PM Peak Hour**

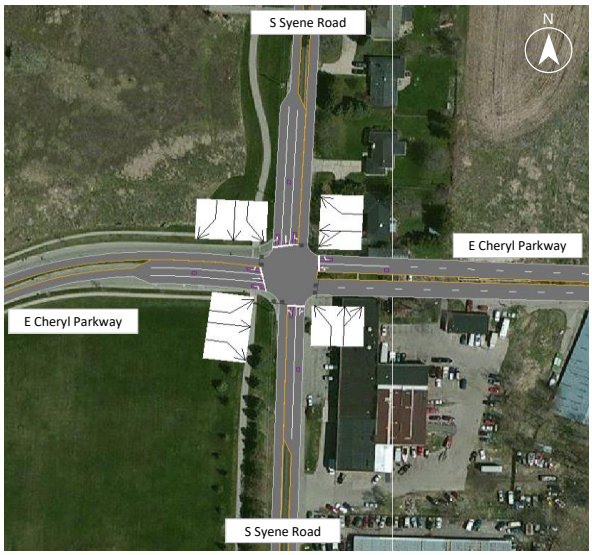
| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 23.2 | C | 0.56 | 75 | 84.3 |
| Eastbound | EBL | 18.2 | C | 0.40 | 45 | |
| | EBT | 36.2 | E | 0.81 | 160 | Intersection LOS |
| | EBR | 12.1 | B | 0.10 | 25 | |
| Southbound | SBT/L | 202.8 | F | 1.35 | 690 | F |
| | SBR | 19.0 | C | 0.54 | 80 | |
| Westbound | WBT/L | 19.0 | C | 0.39 | 40 | Max Movement V/C |
| | WBR | 13.4 | B | 0.11 | 25 | 1.35 |
| | | | | | Operations: | HCM 6 |


**Alternative 2: Signal 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 11.4 | B | 0.13 | 25 | 10.8 |
| | NBT/R | 10.1 | B | 0.42 | 25 | |
| Eastbound | EBL | 15.4 | B | 0.39 | 50 | |
| | EBT | 9.6 | A | 0.17 | 25 | Intersection LOS |
| | EBR | 9.0 | A | 0.03 | 25 | |
| Southbound | SBL | 12.1 | B | 0.10 | 25 | B |
| | SBT | 9.6 | A | 0.33 | 50 | |
| | SBR | 10.5 | B | 0.47 | 65 | |
| Westbound | WBT/L | 10.9 | A | 0.40 | 75 | Max Movement V/C |
| | WBR | 10.3 | B | 0.31 | 40 | 0.47 |
| | | | | | Operations: | HCM 6 |

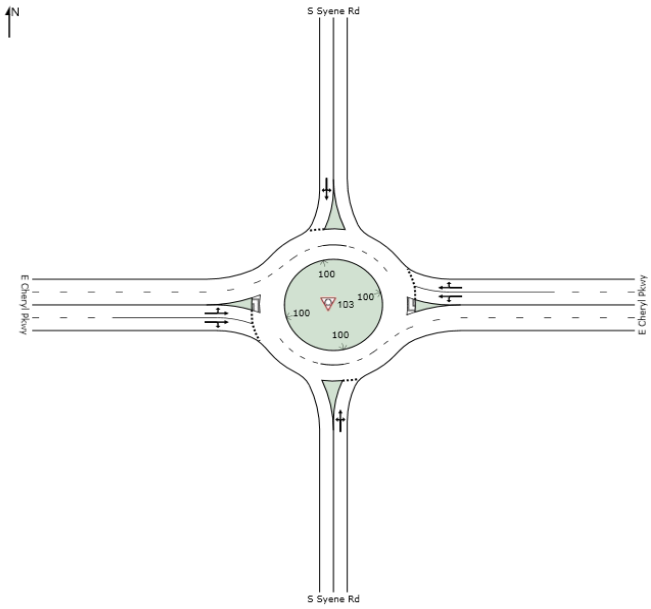
**Alternative 2: Signal 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 12.5 | B | 0.07 | 25 | 10.8 |
| | NBT/R | 8.1 | A | 0.26 | 25 | |
| Eastbound | EBL | 16.1 | B | 0.39 | 50 | |
| | EBT | 12.5 | B | 0.59 | 85 | Intersection LOS |
| | EBR | 9.9 | A | 0.09 | 25 | |
| Southbound | SBL | 10.1 | B | 0.24 | 30 | B |
| | SBT | 10.2 | B | 0.62 | 100 | |
| | SBR | 9.0 | A | 0.42 | 50 | |
| Westbound | WBT/L | 10.4 | A | 0.21 | 30 | Max Movement V/C |
| | WBR | 9.8 | A | 0.08 | 25 | 0.62 |
| | | | | | Operations: | HCM 6 |




**Alternative 3: Roundabout 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 6.7 | A | 0.32 | 35 | 7.5 |
| Eastbound | EBT/L | 4.8 | A | 0.15 | 25 | |
| | EBT/R | 4.6 | A | 0.12 | 25 | Intersection LOS |
| Southbound | SBT/R/L | 10.0 | B | 0.53 | 100 | A |
| Westbound | WBT/L | 6.7 | A | 0.25 | 30 | Max Movement V/C |
| | WBT/R | 6.7 | A | 0.25 | 30 | 0.53 |
| | | | | | Operations: | HCM 6 |




**Alternative 3: Roundabout 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 7.2 | A | 0.26 | 25 | 10.3 |
| Eastbound | EBT/L | 8.6 | A | 0.33 | 35 | |
| | EBT/R | 8.6 | A | 0.33 | 35 | Intersection LOS |
| Southbound | SBT/R/L | 13.4 | B | 0.71 | 180 | B |
| Westbound | WBT/L | 4.3 | A | 0.08 | 25 | Max Movement V/C |
| | WBT/R | 4.3 | A | 0.08 | 25 | 0.71 |
| | | | | | Operations: | HCM 6 |

## APPENDIX C - TRAFFIC OPERATIONS SUMMARY

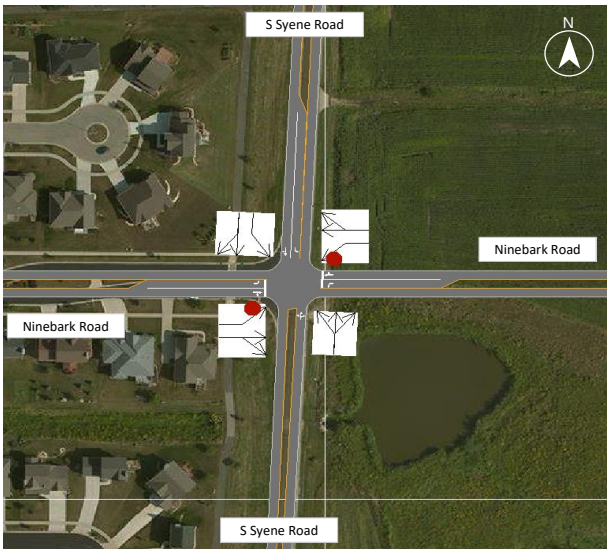
### S Syene Road and Ninebark Drive

**Alternative 1: TWSC 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 8.3 | A | 0.01 | 25 | 56.5 |
| Eastbound | EBL | 56.5 | F | 0.57 | 75 | |
| | EBT/R | 19.0 | C | 0.08 | 25 | Intersection LOS |
| Southbound | SBL | 9.0 | A | 0.04 | 25 | F |
| | SBT/R | -- | -- | -- | -- | |
| Westbound | WBL | 33.2 | D | 0.14 | 25 | Max Movement V/C |
| | WBT/R | 16.5 | C | 0.06 | 25 | 0.57 |
| | | | | | Operations: | HCM 6 |

**Alternative 1: TWSC 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 9.7 | A | 0.01 | 25 | 33.8 |
| Eastbound | EBL | 33.8 | D | 0.12 | 25 | |
| | EBT/R | 21.1 | C | 0.05 | 25 | Intersection LOS |
| Southbound | SBL | 8.1 | A | 0.02 | 25 | D |
| | SBT/R | -- | -- | -- | -- | |
| Westbound | WBL | 32.9 | D | 0.11 | 25 | Max Movement V/C |
| | WBT/R | 15.0 | B | 0.06 | 25 | 0.12 |
| | | | | | Operations: | HCM 6 |

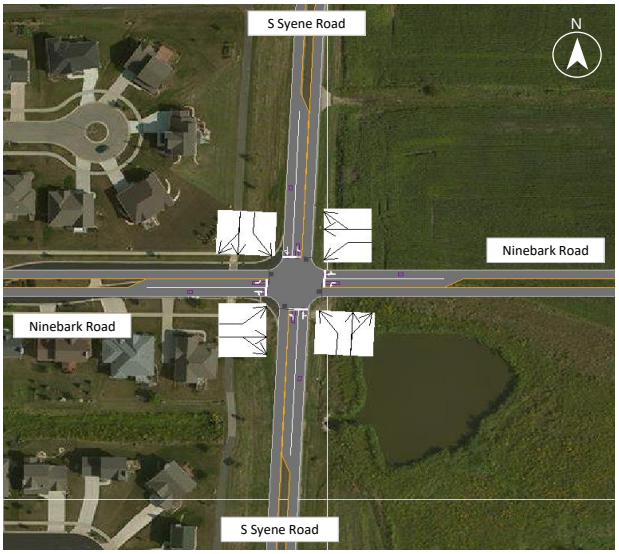



**Alternative 2: Signal 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 9.4 | A | 0.01 | 25 | 9.3 |
| | NBT/R | 9.6 | A | 0.76 | 25 | |
| Eastbound | EBL | 12.9 | B | 0.18 | 25 | |
| | EBT/R | 11.8 | B | 0.06 | 25 | Intersection LOS |
| Southbound | SBL | 13.4 | B | 0.10 | 25 | A |
| | SBT/R | 7.6 | A | 0.53 | 25 | |
| Westbound | WBL | 12.1 | B | 0.05 | 25 | Max Movement V/C |
| | WBT/R | 11.8 | B | 0.06 | 25 | 0.76 |
| | | | | | Operations: | HCM 6 |

**Alternative 2: Signal 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 12.9 | B | 0.04 | 25 | 7.9 |
| | NBT/R | 4.7 | A | 0.33 | 25 | |
| Eastbound | EBL | 15.9 | B | 0.05 | 25 | |
| | EBT/R | 15.5 | B | 0.05 | 25 | Intersection LOS |
| Southbound | SBL | 5.7 | A | 0.04 | 25 | A |
| | SBT/R | 8.7 | A | 0.81 | 25 | |
| Westbound | WBL | 15.7 | B | 0.05 | 25 | Max Movement V/C |
| | WBT/R | 15.7 | B | 0.10 | 25 | 0.81 |
| | | | | | Operations: | HCM 6 |

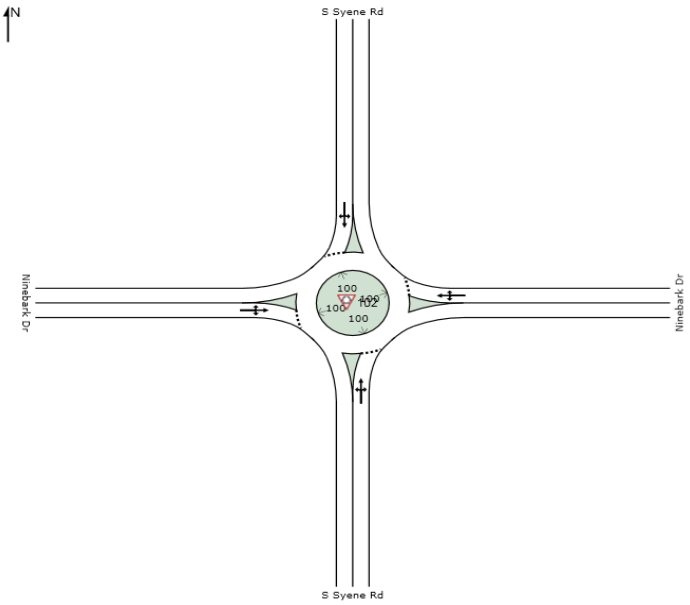



**Alternative 3: Roundabout 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 9.8 | A | 0.57 | 110 | 8.1 |
| Eastbound | EBT/R/L | 5.9 | A | 0.38 | 160 | Intersection LOS |
| Southbound | SBT/R/L | 6.3 | A | 0.38 | 60 | A |
| Westbound | WBT/R/L | 6.6 | A | 0.30 | 170 | Max Movement V/C |
| | | | | | | 0.57 |
| | | | | | Operations: | HCM 6 |

**Alternative 3: Roundabout 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/R/L | 5.3 | A | 0.28 | 40 | 9.7 |
| Eastbound | SBT/R/L | 6.8 | A | 0.05 | 25 | Intersection LOS |
| Southbound | SBT/R/L | 11.7 | B | 0.68 | 190 | A |
| Westbound | WBT/R/L | 4.3 | A | 0.04 | 25 | Max Movement V/C |
| | | | | | | 0.68 |
| | | | | | Operations: | HCM 6 |



## APPENDIX C - TRAFFIC OPERATIONS SUMMARY

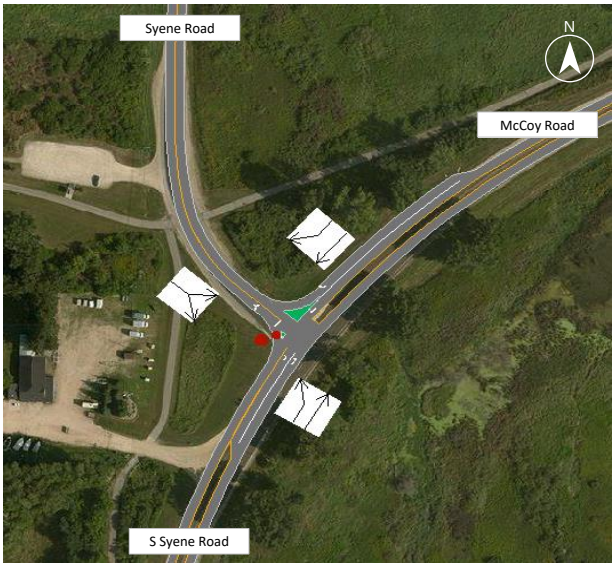
### S Syene Road and McCoy Road

**Alternative 1: OWSC 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 9.9 | A | 0.33 | 40 | 116.8 |
| | NBT | -- | -- | -- | -- | |
| Eastbound | EBL/R | 116.8 | F | 0.89 | 140 | Intersection LOS |
| Southbound | SBT | -- | -- | -- | -- | F |
| | SBR | -- | -- | -- | -- | |
| Westbound | -- | -- | -- | -- | -- | Max Movement V/C |
| | | | | | Operations: | 0.89 |
| | | | | | | HCM 6 |

**Alternative 1: OWSC 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 8.9 | A | 0.09 | 25 | 370.6 |
| | NBT | -- | -- | -- | -- | |
| Eastbound | EBL/R | 370.6 | F | 1.74 | 905 | Intersection LOS |
| Southbound | SBT | -- | -- | -- | -- | F |
| | SBR | -- | -- | -- | -- | |
| Westbound | -- | -- | -- | -- | -- | Max Movement V/C |
| | | | | | Operations: | 1.74 |
| | | | | | | HCM 6 |

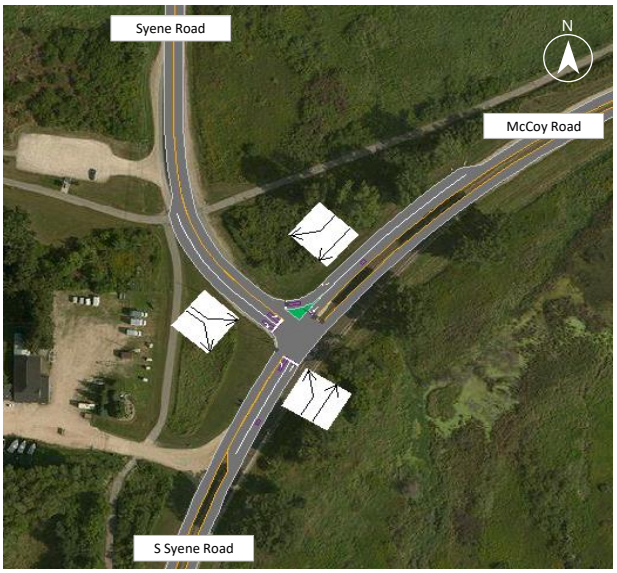



**Alternative 2: Signal 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 12.4 | B | 0.70 | 100 | 12.0 |
| | NBT | 5.0 | A | 0.35 | 25 | |
| Eastbound | EBL | 20.5 | C | 0.25 | 30 | |
| | EBT/R | 20.2 | C | 0.19 | 25 | Intersection LOS |
| Southbound | SBT | 17.3 | A | 0.73 | 185 | B |
| | SBR | 10.5 | B | 0.58 | 385 | |
| Westbound | -- | -- | -- | -- | -- | Max Movement V/C |
| | | | | | Operations: | 0.73 |
| | | | | | | HCM 6 |

**Alternative 2: Signal 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBL | 11.8 | B | 0.24 | 25 | 18.2 |
| | NBT | 6.7 | A | 0.26 | 25 | |
| Eastbound | EBL | 25.2 | C | 0.79 | 185 | |
| | EBT/R | 23.6 | C | 0.69 | 25 | Intersection LOS |
| Southbound | SBT | 19.7 | A | 0.82 | 255 | B |
| | SBR | 13.9 | B | 0.31 | 65 | |
| Westbound | -- | -- | -- | -- | -- | Max Movement V/C |
| | | | | | Operations: | 0.82 |
| | | | | | | HCM 6 |

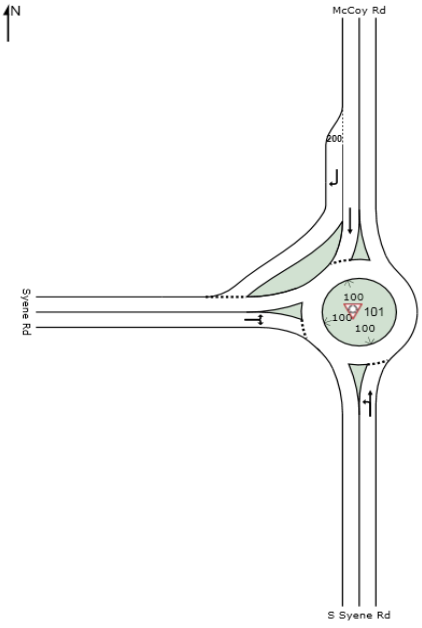



**Alternative 3: Roundabout 2045 AM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/L | 10.5 | B | 0.62 | 140 | 9.5 |
| Eastbound | EBL/R | 5.7 | A | 0.14 | 145 | Intersection LOS |
| Southbound | SBT | 9.2 | A | 0.47 | 70 | A |
| | SBR | 9.0 | A | 0.45 | 65 | |
| Westbound | -- | -- | -- | -- | -- | Max Movement V/C |
| | | | | | Operations: | 0.62 |
| | | | | | | HCM 6 |

**Alternative 3: Roundabout 2045 PM Peak Hour**

| Approach | Movement | Delay (s) | LOS | V/C | 95th Queue (ft) | Intersection Delay (s) |
|---|---|---|---|---|---|---|
| Northbound | NBT/L | 7.9 | A | 0.38 | 50 | 12.3 |
| Eastbound | EBL/R | 22.7 | C | 0.77 | 250 | Intersection LOS |
| Southbound | SBT | 7.2 | A | 0.44 | 70 | B |
| | SBR | 4.0 | A | 0.14 | 25 | |
| Westbound | -- | -- | -- | -- | -- | Max Movement V/C |
| | | | | | Operations: | 0.77 |
| | | | | | | HCM 6 |



# APPENDIX C-1
# LACY ROAD OPERATIONS

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 11.4 |
| Intersection LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 115 | 135 | 10 | 20 | 150 | 20 | 10 | 110 | 50 | 10 | 65 | 110 |
| Future Vol, veh/h | 115 | 135 | 10 | 20 | 150 | 20 | 10 | 110 | 50 | 10 | 65 | 110 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 129 | 152 | 11 | 22 | 169 | 22 | 11 | 124 | 56 | 11 | 73 | 124 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 1 | 1 | 2 | 1 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 1 | 1 | 1 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 1 | 2 | 1 | 1 |
| HCM Control Delay | 12.9 | 11.2 | 11.1 | 9.8 |
| HCM LOS | B | B | B | A |

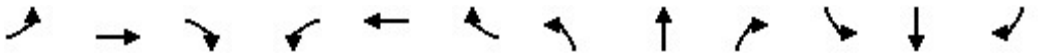
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|
| Vol Left, % | 6% | 44% | 11% | 13% | 0% |
| Vol Thru, % | 65% | 52% | 79% | 87% | 0% |
| Vol Right, % | 29% | 4% | 11% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 170 | 260 | 190 | 75 | 110 |
| LT Vol | 10 | 115 | 20 | 10 | 0 |
| Through Vol | 110 | 135 | 150 | 65 | 0 |
| RT Vol | 50 | 10 | 20 | 0 | 110 |
| Lane Flow Rate | 191 | 292 | 213 | 84 | 124 |
| Geometry Grp | 5 | 2 | 2 | 7 | 7 |
| Degree of Util (X) | 0.3 | 0.445 | 0.327 | 0.148 | 0.191 |
| Departure Headway (Hd) | 5.662 | 5.487 | 5.514 | 6.328 | 5.549 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes |
| Cap | 632 | 654 | 651 | 565 | 645 |
| Service Time | 3.714 | 3.532 | 3.565 | 4.079 | 3.3 |
| HCM Lane V/C Ratio | 0.302 | 0.446 | 0.327 | 0.149 | 0.192 |
| HCM Control Delay | 11.1 | 12.9 | 11.2 | 10.2 | 9.6 |
| HCM Lane LOS | B | B | B | B | A |
| HCM 95th-tile Q | 1.3 | 2.3 | 1.4 | 0.5 | 0.7 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 14.3 |
| Intersection LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 90 | 260 | 10 | 40 | 150 | 5 | 5 | 55 | 20 | 25 | 165 | 155 |
| Future Vol, veh/h | 90 | 260 | 10 | 40 | 150 | 5 | 5 | 55 | 20 | 25 | 165 | 155 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 100 | 289 | 11 | 44 | 167 | 6 | 6 | 61 | 22 | 28 | 183 | 172 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 1 | 1 | 2 | 1 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 1 | 1 | 1 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 1 | 2 | 1 | 1 |
| HCM Control Delay | 18.2 | 12.5 | 10.8 | 12.2 |
| HCM LOS | C | B | B | B |

| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|
| Vol Left, % | 6% | 25% | 21% | 13% | 0% |
| Vol Thru, % | 69% | 72% | 77% | 87% | 0% |
| Vol Right, % | 25% | 3% | 3% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 80 | 360 | 195 | 190 | 155 |
| LT Vol | 5 | 90 | 40 | 25 | 0 |
| Through Vol | 55 | 260 | 150 | 165 | 0 |
| RT Vol | 20 | 10 | 5 | 0 | 155 |
| Lane Flow Rate | 89 | 400 | 217 | 211 | 172 |
| Geometry Grp | 5 | 2 | 2 | 7 | 7 |
| Degree of Util (X) | 0.159 | 0.633 | 0.362 | 0.385 | 0.277 |
| Departure Headway (Hd) | 6.447 | 5.697 | 6.014 | 6.559 | 5.78 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes |
| Cap | 551 | 632 | 594 | 547 | 618 |
| Service Time | 4.544 | 3.761 | 4.09 | 4.329 | 3.549 |
| HCM Lane V/C Ratio | 0.162 | 0.633 | 0.365 | 0.386 | 0.278 |
| HCM Control Delay | 10.8 | 18.2 | 12.5 | 13.4 | 10.8 |
| HCM Lane LOS | B | C | B | B | B |
| HCM 95th-tile Q | 0.6 | 4.5 | 1.6 | 1.8 | 1.1 |



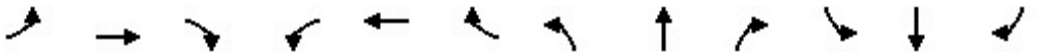
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 115 | 135 | 10 | 20 | 150 | 20 | 10 | 110 | 50 | 10 | 65 | 110 |
| Future Volume (veh/h) | 115 | 135 | 10 | 20 | 150 | 20 | 10 | 110 | 50 | 10 | 65 | 110 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 129 | 152 | 11 | 22 | 169 | 22 | 11 | 124 | 56 | 11 | 73 | 124 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 412 | 461 | 33 | 436 | 434 | 57 | 578 | 491 | 222 | 598 | 251 | 426 |
| Arrive On Green | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 |
| Sat Flow, veh/h | 1183 | 1710 | 124 | 1213 | 1608 | 209 | 1176 | 1210 | 547 | 1195 | 618 | 1049 |
| Grp Volume(v), veh/h | 129 | 0 | 163 | 22 | 0 | 191 | 11 | 0 | 180 | 11 | 0 | 197 |
| Grp Sat Flow(s),veh/h/ln | 1183 | 0 | 1833 | 1213 | 0 | 1818 | 1176 | 0 | 1757 | 1195 | 0 | 1667 |
| Q Serve(g_s), s | 3.7 | 0.0 | 2.6 | 0.5 | 0.0 | 3.2 | 0.2 | 0.0 | 2.5 | 0.2 | 0.0 | 2.9 |
| Cycle Q Clear(g_c), s | 6.9 | 0.0 | 2.6 | 3.2 | 0.0 | 3.2 | 3.2 | 0.0 | 2.5 | 2.7 | 0.0 | 2.9 |
| Prop In Lane | 1.00 | | 0.07 | 1.00 | | 0.12 | 1.00 | | 0.31 | 1.00 | | 0.63 |
| Lane Grp Cap(c), veh/h | 412 | 0 | 495 | 436 | 0 | 491 | 578 | 0 | 713 | 598 | 0 | 676 |
| V/C Ratio(X) | 0.31 | 0.00 | 0.33 | 0.05 | 0.00 | 0.39 | 0.02 | 0.00 | 0.25 | 0.02 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 893 | 0 | 1239 | 928 | 0 | 1229 | 1214 | 0 | 1663 | 1244 | 0 | 1577 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.8 | 0.0 | 10.8 | 12.1 | 0.0 | 11.0 | 8.5 | 0.0 | 7.3 | 8.2 | 0.0 | 7.4 |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.4 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 1.5 | 0.0 | 1.5 | 0.2 | 0.0 | 1.8 | 0.1 | 0.0 | 1.1 | 0.1 | 0.0 | 1.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 14.2 | 0.0 | 11.2 | 12.1 | 0.0 | 11.5 | 8.5 | 0.0 | 7.5 | 8.2 | 0.0 | 7.6 |
| LnGrp LOS | B | A | B | B | A | B | A | A | A | A | A | A |
| Approach Vol, veh/h | | 292 | | | 213 | | | 191 | | | 208 | |
| Approach Delay, s/veh | | 12.5 | | | 11.6 | | | 7.5 | | | 7.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 21.0 | | 16.0 | | 21.0 | | 16.0 | | | | |
| Change Period (Y+Rc), s | | 6.0 | | 6.0 | | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 35.0 | | 25.0 | | 35.0 | | 25.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 5.2 | | 8.9 | | 4.9 | | 5.2 | | | | |
| Green Ext Time (p_c), s | | 1.1 | | 1.2 | | 1.2 | | 1.0 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 10.1 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |

**Notes**

User approved pedestrian interval to be less than phase max green.



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 90 | 260 | 10 | 40 | 150 | 5 | 5 | 55 | 20 | 25 | 165 | 155 |
| Future Volume (veh/h) | 90 | 260 | 10 | 40 | 150 | 5 | 5 | 55 | 20 | 25 | 165 | 155 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 100 | 289 | 11 | 44 | 167 | 6 | 6 | 61 | 22 | 28 | 183 | 172 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 428 | 479 | 18 | 332 | 480 | 17 | 449 | 528 | 190 | 686 | 357 | 335 |
| Arrive On Green | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 |
| Sat Flow, veh/h | 1202 | 1776 | 68 | 1071 | 1780 | 64 | 1018 | 1302 | 469 | 1305 | 880 | 827 |
| Grp Volume(v), veh/h | 100 | 0 | 300 | 44 | 0 | 173 | 6 | 0 | 83 | 28 | 0 | 355 |
| Grp Sat Flow(s),veh/h/ln | 1202 | 0 | 1843 | 1071 | 0 | 1844 | 1018 | 0 | 1771 | 1305 | 0 | 1707 |
| Q Serve(g_s), s | 2.7 | 0.0 | 5.2 | 1.4 | 0.0 | 2.8 | 0.2 | 0.0 | 1.1 | 0.5 | 0.0 | 5.8 |
| Cycle Q Clear(g_c), s | 5.5 | 0.0 | 5.2 | 6.6 | 0.0 | 2.8 | 5.9 | 0.0 | 1.1 | 1.6 | 0.0 | 5.8 |
| Prop In Lane | 1.00 | | 0.04 | 1.00 | | 0.03 | 1.00 | | 0.27 | 1.00 | | 0.48 |
| Lane Grp Cap(c), veh/h | 428 | 0 | 498 | 332 | 0 | 498 | 449 | 0 | 718 | 686 | 0 | 692 |
| V/C Ratio(X) | 0.23 | 0.00 | 0.60 | 0.13 | 0.00 | 0.35 | 0.01 | 0.00 | 0.12 | 0.04 | 0.00 | 0.51 |
| Avail Cap(c_a), veh/h | 917 | 0 | 1246 | 767 | 0 | 1247 | 999 | 0 | 1676 | 1391 | 0 | 1615 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.1 | 0.0 | 11.8 | 14.7 | 0.0 | 10.9 | 10.5 | 0.0 | 6.9 | 7.3 | 0.0 | 8.2 |
| Incr Delay (d2), s/veh | 0.3 | 0.0 | 1.2 | 0.2 | 0.0 | 0.4 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 1.1 | 0.0 | 3.1 | 0.5 | 0.0 | 1.6 | 0.1 | 0.0 | 0.5 | 0.2 | 0.0 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 13.4 | 0.0 | 13.0 | 14.8 | 0.0 | 11.3 | 10.5 | 0.0 | 6.9 | 7.4 | 0.0 | 8.8 |
| LnGrp LOS | B | A | B | B | A | B | B | A | A | A | A | A |
| Approach Vol, veh/h | | 400 | | | 217 | | | 89 | | | 383 | |
| Approach Delay, s/veh | | 13.1 | | | 12.0 | | | 7.2 | | | 8.7 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 21.0 | | 16.0 | | 21.0 | | 16.0 | | | | |
| Change Period (Y+Rc), s | | 6.0 | | 6.0 | | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 35.0 | | 25.0 | | 35.0 | | 25.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.9 | | 7.5 | | 7.8 | | 8.6 | | | | |
| Green Ext Time (p_c), s | | 0.4 | | 1.9 | | 2.4 | | 0.9 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 10.8 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# APPENDIX C-2
# CHERYL PARKWAY OPERATIONS

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 36.7 |
| Intersection LOS | E |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 135 | 95 | 15 | 35 | 215 | 145 | 50 | 230 | 20 | 40 | 195 | 240 |
| Future Vol, veh/h | 135 | 95 | 15 | 35 | 215 | 145 | 50 | 230 | 20 | 40 | 195 | 240 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 153 | 108 | 17 | 40 | 244 | 165 | 57 | 261 | 23 | 45 | 222 | 273 |
| Number of Lanes | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 3 | 2 | 1 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 1 | 3 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 1 | 2 | 2 | 3 |
| HCM Control Delay | 20.4 | 32.8 | 64.5 | 30.8 |
| HCM LOS | C | D | F | D |

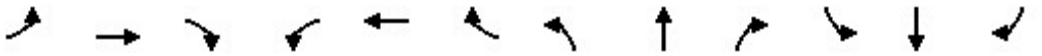
| Lane | NBLn1 | EBLn1 | EBLn2 | EBLn3 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 17% | 100% | 0% | 0% | 14% | 0% | 17% | 0% |
| Vol Thru, % | 77% | 0% | 100% | 0% | 86% | 0% | 83% | 0% |
| Vol Right, % | 7% | 0% | 0% | 100% | 0% | 100% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 300 | 135 | 95 | 15 | 250 | 145 | 235 | 240 |
| LT Vol | 50 | 135 | 0 | 0 | 35 | 0 | 40 | 0 |
| Through Vol | 230 | 0 | 95 | 0 | 215 | 0 | 195 | 0 |
| RT Vol | 20 | 0 | 0 | 15 | 0 | 145 | 0 | 240 |
| Lane Flow Rate | 341 | 153 | 108 | 17 | 284 | 165 | 267 | 273 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0.936 | 0.466 | 0.312 | 0.046 | 0.786 | 0.419 | 0.717 | 0.671 |
| Departure Headway (Hd) | 9.888 | 10.942 | 10.417 | 9.682 | 9.961 | 9.148 | 9.672 | 8.856 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 368 | 330 | 345 | 370 | 364 | 394 | 374 | 409 |
| Service Time | 7.643 | 8.705 | 8.179 | 7.444 | 7.715 | 6.902 | 7.428 | 6.611 |
| HCM Lane V/C Ratio | 0.927 | 0.464 | 0.313 | 0.046 | 0.78 | 0.419 | 0.714 | 0.667 |
| HCM Control Delay | 64.5 | 23 | 17.9 | 12.9 | 41.1 | 18.4 | 33.6 | 28 |
| HCM Lane LOS | F | C | C | B | E | C | D | D |
| HCM 95th-tile Q | 9.9 | 2.4 | 1.3 | 0.1 | 6.6 | 2 | 5.4 | 4.8 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 84.3 |
| Intersection LOS | F |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 135 | 290 | 40 | 20 | 100 | 35 | 20 | 130 | 35 | 125 | 405 | 235 |
| Future Vol, veh/h | 135 | 290 | 40 | 20 | 100 | 35 | 20 | 130 | 35 | 125 | 405 | 235 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 150 | 322 | 44 | 22 | 111 | 39 | 22 | 144 | 39 | 139 | 450 | 261 |
| Number of Lanes | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 3 | 2 | 1 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 1 | 3 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 1 | 2 | 2 | 3 |
| HCM Control Delay | 28.9 | 17.7 | 23.2 | 146.3 |
| HCM LOS | D | C | C | F |

| Lane | NBLn1 | EBLn1 | EBLn2 | EBLn3 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 11% | 100% | 0% | 0% | 17% | 0% | 24% | 0% |
| Vol Thru, % | 70% | 0% | 100% | 0% | 83% | 0% | 76% | 0% |
| Vol Right, % | 19% | 0% | 0% | 100% | 0% | 100% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 185 | 135 | 290 | 40 | 120 | 35 | 530 | 235 |
| LT Vol | 20 | 135 | 0 | 0 | 20 | 0 | 125 | 0 |
| Through Vol | 130 | 0 | 290 | 0 | 100 | 0 | 405 | 0 |
| RT Vol | 35 | 0 | 0 | 40 | 0 | 35 | 0 | 235 |
| Lane Flow Rate | 206 | 150 | 322 | 44 | 133 | 39 | 589 | 261 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0.529 | 0.376 | 0.764 | 0.097 | 0.358 | 0.096 | 1.366 | 0.545 |
| Departure Headway (Hd) | 9.911 | 9.743 | 9.223 | 8.497 | 10.541 | 9.711 | 8.348 | 7.511 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 366 | 372 | 396 | 424 | 344 | 371 | 436 | 480 |
| Service Time | 7.611 | 7.443 | 6.923 | 6.197 | 8.241 | 7.411 | 6.105 | 5.268 |
| HCM Lane V/C Ratio | 0.563 | 0.403 | 0.813 | 0.104 | 0.387 | 0.105 | 1.351 | 0.544 |
| HCM Control Delay | 23.2 | 18.2 | 36.2 | 12.1 | 19 | 13.4 | 202.8 | 19 |
| HCM Lane LOS | C | C | E | B | C | B | F | C |
| HCM 95th-tile Q | 3 | 1.7 | 6.3 | 0.3 | 1.6 | 0.3 | 27.6 | 3.2 |



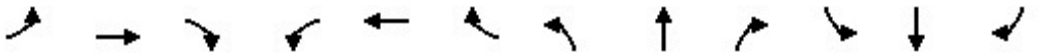
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 135 | 95 | 15 | 35 | 215 | 145 | 50 | 230 | 20 | 40 | 195 | 240 |
| Future Volume (veh/h) | 135 | 95 | 15 | 35 | 215 | 145 | 50 | 230 | 20 | 40 | 195 | 240 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 153 | 108 | 17 | 40 | 244 | 165 | 57 | 261 | 23 | 45 | 222 | 273 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 390 | 630 | 534 | 145 | 564 | 534 | 427 | 616 | 54 | 448 | 681 | 577 |
| Arrive On Green | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Sat Flow, veh/h | 969 | 1856 | 1572 | 132 | 1661 | 1572 | 895 | 1681 | 148 | 1086 | 1856 | 1572 |
| Grp Volume(v), veh/h | 153 | 108 | 17 | 284 | 0 | 165 | 57 | 0 | 284 | 45 | 222 | 273 |
| Grp Sat Flow(s),veh/h/ln | 969 | 1856 | 1572 | 1793 | 0 | 1572 | 895 | 0 | 1829 | 1086 | 1856 | 1572 |
| Q Serve(g_s), s | 6.0 | 1.7 | 0.3 | 0.0 | 0.0 | 3.2 | 2.0 | 0.0 | 4.8 | 1.3 | 3.5 | 5.4 |
| Cycle Q Clear(g_c), s | 10.9 | 1.7 | 0.3 | 4.9 | 0.0 | 3.2 | 5.5 | 0.0 | 4.8 | 6.1 | 3.5 | 5.4 |
| Prop In Lane | 1.00 | | 1.00 | 0.14 | | 1.00 | 1.00 | | 0.08 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 390 | 630 | 534 | 710 | 0 | 534 | 427 | 0 | 671 | 448 | 681 | 577 |
| V/C Ratio(X) | 0.39 | 0.17 | 0.03 | 0.40 | 0.00 | 0.31 | 0.13 | 0.00 | 0.42 | 0.10 | 0.33 | 0.47 |
| Avail Cap(c_a), veh/h | 653 | 1134 | 961 | 1182 | 0 | 961 | 865 | 0 | 1565 | 979 | 1588 | 1346 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 14.8 | 9.5 | 9.0 | 10.5 | 0.0 | 10.0 | 11.3 | 0.0 | 9.7 | 12.0 | 9.3 | 9.9 |
| Incr Delay (d2), s/veh | 0.6 | 0.1 | 0.0 | 0.4 | 0.0 | 0.3 | 0.1 | 0.0 | 0.4 | 0.1 | 0.3 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 2.0 | 0.9 | 0.1 | 2.9 | 0.0 | 1.6 | 0.6 | 0.0 | 2.6 | 0.5 | 1.9 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 15.4 | 9.6 | 9.0 | 10.9 | 0.0 | 10.3 | 11.4 | 0.0 | 10.1 | 12.1 | 9.6 | 10.5 |
| LnGrp LOS | B | A | A | B | A | B | B | A | B | B | A | B |
| Approach Vol, veh/h | | 278 | | | 449 | | | 341 | | | 540 | |
| Approach Delay, s/veh | | 12.8 | | | 10.7 | | | 10.3 | | | 10.3 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 21.0 | | 19.9 | | 21.0 | | 19.9 | | | | |
| Change Period (Y+Rc), s | | 6.0 | | 6.0 | | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 35.0 | | 25.0 | | 35.0 | | 25.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.5 | | 12.9 | | 8.1 | | 6.9 | | | | |
| Green Ext Time (p_c), s | | 2.0 | | 1.0 | | 2.4 | | 2.1 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 10.8 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |

**Notes**

User approved pedestrian interval to be less than phase max green.



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 135 | 290 | 40 | 20 | 100 | 35 | 20 | 130 | 35 | 125 | 405 | 235 |
| Future Volume (veh/h) | 135 | 290 | 40 | 20 | 100 | 35 | 20 | 130 | 35 | 125 | 405 | 235 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 150 | 322 | 44 | 22 | 111 | 39 | 22 | 144 | 39 | 139 | 450 | 261 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 381 | 548 | 464 | 145 | 483 | 464 | 338 | 551 | 149 | 575 | 727 | 616 |
| Arrive On Green | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 |
| Sat Flow, veh/h | 1228 | 1856 | 1572 | 120 | 1635 | 1572 | 733 | 1406 | 381 | 1191 | 1856 | 1572 |
| Grp Volume(v), veh/h | 150 | 322 | 44 | 133 | 0 | 39 | 22 | 0 | 183 | 139 | 450 | 261 |
| Grp Sat Flow(s),veh/h/ln | 1228 | 1856 | 1572 | 1755 | 0 | 1572 | 733 | 0 | 1787 | 1191 | 1856 | 1572 |
| Q Serve(g_s), s | 4.5 | 5.7 | 0.8 | 0.0 | 0.0 | 0.7 | 0.9 | 0.0 | 2.7 | 3.4 | 7.5 | 4.6 |
| Cycle Q Clear(g_c), s | 9.8 | 5.7 | 0.8 | 2.1 | 0.0 | 0.7 | 8.1 | 0.0 | 2.7 | 6.0 | 7.5 | 4.6 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 1.00 | 1.00 | | 0.21 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 381 | 548 | 464 | 627 | 0 | 464 | 338 | 0 | 700 | 575 | 727 | 616 |
| V/C Ratio(X) | 0.39 | 0.59 | 0.09 | 0.21 | 0.00 | 0.08 | 0.07 | 0.00 | 0.26 | 0.24 | 0.62 | 0.42 |
| Avail Cap(c_a), veh/h | 820 | 1211 | 1026 | 1210 | 0 | 1026 | 721 | 0 | 1633 | 1197 | 1695 | 1437 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 15.5 | 11.5 | 9.8 | 10.2 | 0.0 | 9.8 | 12.5 | 0.0 | 7.9 | 9.9 | 9.4 | 8.5 |
| Incr Delay (d2), s/veh | 0.7 | 1.0 | 0.1 | 0.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.2 | 0.2 | 0.9 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 1.9 | 3.4 | 0.4 | 1.2 | 0.0 | 0.3 | 0.2 | 0.0 | 1.3 | 1.2 | 3.9 | 2.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 16.1 | 12.5 | 9.9 | 10.4 | 0.0 | 9.8 | 12.5 | 0.0 | 8.1 | 10.1 | 10.2 | 9.0 |
| LnGrp LOS | B | B | A | B | A | A | B | A | A | B | B | A |
| Approach Vol, veh/h | | 516 | | | 172 | | | 205 | | | 850 | |
| Approach Delay, s/veh | | 13.3 | | | 10.3 | | | 8.6 | | | 9.8 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 21.0 | | 18.6 | | 21.0 | | 18.6 | | | | |
| Change Period (Y+Rc), s | | 6.0 | | 6.0 | | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 35.0 | | 25.0 | | 35.0 | | 25.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 10.1 | | 11.8 | | 9.5 | | 4.1 | | | | |
| Green Ext Time (p_c), s | | 1.1 | | 2.1 | | 4.4 | | 0.8 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 10.8 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |

# LANE SUMMARY

## Site: 103 [2045 AM Syene - Cheryl]

Syene Rd and E Cheryl Pkwy
Roundabout

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist ft | Lane Config | Lane Length ft | Cap. Adj. % | Prob. Block. % |
| South: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 341 | 3.0 | 1054 | 0.323 | 100 | 6.7 | LOS A | 1.4 | 37.1 | Full | 1600 | 0.0 | 0.0 |
| Approach | 341 | 3.0 | | 0.323 | | 6.7 | LOS A | 1.4 | 37.1 | | | | |
| East: E Cheryl Pkwy | | | | | | | | | | | | | |
| Lane 1 | 224 | 3.0 | 886 | 0.253 | 100 | 6.7 | LOS A | 1.1 | 27.3 | Full | 1600 | 0.0 | 0.0 |
| Lane 2[d] | 224 | 3.0 | 886 | 0.253 | 100 | 6.7 | LOS A | 1.1 | 27.3 | Full | 1600 | 0.0 | 0.0 |
| Approach | 449 | 3.0 | | 0.253 | | 6.7 | LOS A | 1.1 | 27.3 | | | | |
| North: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 540 | 3.0 | 1023 | 0.528 | 100 | 10.0 | LOS B | 3.9 | 98.6 | Full | 1600 | 0.0 | 0.0 |
| Approach | 540 | 3.0 | | 0.528 | | 10.0 | LOS B | 3.9 | 98.6 | | | | |
| West: E Cheryl Pkwy | | | | | | | | | | | | | |
| Lane 1[d] | 153 | 3.0 | 1034 | 0.148 | 100 | 4.8 | LOS A | 0.6 | 15.4 | Full | 1600 | 0.0 | 0.0 |
| Lane 2 | 125 | 3.0 | 1034 | 0.121 | 81[5] | 4.6 | LOS A | 0.5 | 12.3 | Full | 1600 | 0.0 | 0.0 |
| Approach | 278 | 3.0 | | 0.148 | | 4.7 | LOS A | 0.6 | 15.4 | | | | |
| Intersection | 1608 | 3.0 | | 0.528 | | 7.5 | LOS A | 3.9 | 98.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

# LANE SUMMARY

## Site: 103 [2045 PM Syene - Cheryl]

Syene Rd and E Cheryl Pkwy
Roundabout

| Lane Use and Performance | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist ft | Lane Config | Lane Length ft | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 206 | 3.0 | 807 | 0.255 | 100 | 7.2 | LOS A | 1.0 | 25.2 | Full | 1600 | 0.0 | 0.0 |
| Approach | 206 | 3.0 | | 0.255 | | 7.2 | LOS A | 1.0 | 25.2 | | | | |
| East: E Cheryl Pkwy | | | | | | | | | | | | | |
| Lane 1 | 86 | 3.0 | 1025 | 0.084 | 100 | 4.3 | LOS A | 0.3 | 8.3 | Full | 1600 | 0.0 | 0.0 |
| Lane 2[d] | 86 | 3.0 | 1025 | 0.084 | 100 | 4.3 | LOS A | 0.3 | 8.3 | Full | 1600 | 0.0 | 0.0 |
| Approach | 172 | 3.0 | | 0.084 | | 4.3 | LOS A | 0.3 | 8.3 | | | | |
| North: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 850 | 3.0 | 1203 | 0.707 | 100 | 13.4 | LOS B | 7.2 | 183.8 | Full | 1600 | 0.0 | 0.0 |
| Approach | 850 | 3.0 | | 0.707 | | 13.4 | LOS B | 7.2 | 183.8 | | | | |
| West: E Cheryl Pkwy | | | | | | | | | | | | | |
| Lane 1 | 258 | 3.0 | 777 | 0.332 | 100 | 8.6 | LOS A | 1.4 | 36.3 | Full | 1600 | 0.0 | 0.0 |
| Lane 2[d] | 258 | 3.0 | 777 | 0.332 | 100 | 8.6 | LOS A | 1.4 | 36.3 | Full | 1600 | 0.0 | 0.0 |
| Approach | 517 | 3.0 | | 0.332 | | 8.6 | LOS A | 1.4 | 36.3 | | | | |
| Intersection | 1744 | 3.0 | | 0.707 | | 10.3 | LOS B | 7.2 | 183.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

# APPENDIX C-3
# NINEBARK DRIVE OPERATIONS

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 80 | 10 | 10 | 20 | 5 | 15 | 5 | 600 | 10 | 30 | 415 | 10 |
| Future Vol, veh/h | 80 | 10 | 10 | 20 | 5 | 15 | 5 | 600 | 10 | 30 | 415 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | - | - | - | 200 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 86 | 11 | 11 | 22 | 5 | 16 | 5 | 645 | 11 | 32 | 446 | 11 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1187 | 1182 | 452 | 1188 | 1182 | 651 | 457 | 0 | 0 | 656 | 0 | 0 |
| Stage 1 | 516 | 516 | - | 661 | 661 | - | - | - | - | - | - | - |
| Stage 2 | 671 | 666 | - | 527 | 521 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.13 | 6.53 | 6.23 | 7.13 | 6.53 | 6.23 | 4.13 | - | - | 4.13 | - | - |
| Critical Hdwy Stg 1 | 6.13 | 5.53 | - | 6.13 | 5.53 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.13 | 5.53 | - | 6.13 | 5.53 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.527 | 4.027 | 3.327 | 3.527 | 4.027 | 3.327 | 2.227 | - | - | 2.227 | - | - |
| Pot Cap-1 Maneuver | 165 | 189 | 605 | 164 | 189 | 467 | 1099 | - | - | 927 | - | - |
| Stage 1 | 540 | 533 | - | 450 | 458 | - | - | - | - | - | - | - |
| Stage 2 | 444 | 456 | - | 533 | 530 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 151 | 181 | 605 | 149 | 181 | 467 | 1099 | - | - | 927 | - | - |
| Mov Cap-2 Maneuver | 151 | 181 | - | 149 | 181 | - | - | - | - | - | - | - |
| Stage 1 | 536 | 514 | - | 447 | 455 | - | - | - | - | - | - | - |
| Stage 2 | 421 | 453 | - | 495 | 511 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 49 | 24.9 | 0.1 | 0.6 |
| HCM LOS | E | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1099 | - | - | 151 | 279 | 149 | 335 | 927 | - | - |
| HCM Lane V/C Ratio | 0.005 | - | - | 0.57 | 0.077 | 0.144 | 0.064 | 0.035 | - | - |
| HCM Control Delay (s) | 8.3 | 0 | - | 56.5 | 19 | 33.2 | 16.5 | 9 | - | - |
| HCM Lane LOS | A | A | - | F | C | D | C | A | - | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 2.9 | 0.2 | 0.5 | 0.2 | 0.1 | - | - |

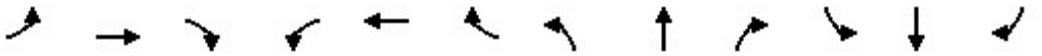
| Intersection | |
|---|---|
| Int Delay, s/veh | 1.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 15 | 5 | 5 | 15 | 5 | 15 | 10 | 300 | 20 | 25 | 705 | 75 |
| Future Vol, veh/h | 15 | 5 | 5 | 15 | 5 | 15 | 10 | 300 | 20 | 25 | 705 | 75 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | - | - | - | 200 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 16 | 5 | 5 | 16 | 5 | 16 | 11 | 326 | 22 | 27 | 766 | 82 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1231 | 1231 | 807 | 1225 | 1261 | 337 | 848 | 0 | 0 | 348 | 0 | 0 |
| Stage 1 | 861 | 861 | - | 359 | 359 | - | - | - | - | - | - | - |
| Stage 2 | 370 | 370 | - | 866 | 902 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.13 | 6.53 | 6.23 | 7.13 | 6.53 | 6.23 | 4.13 | - | - | 4.13 | - | - |
| Critical Hdwy Stg 1 | 6.13 | 5.53 | - | 6.13 | 5.53 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.13 | 5.53 | - | 6.13 | 5.53 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.527 | 4.027 | 3.327 | 3.527 | 4.027 | 3.327 | 2.227 | - | - | 2.227 | - | - |
| Pot Cap-1 Maneuver | 153 | 177 | 380 | 155 | 169 | 703 | 785 | - | - | 1205 | - | - |
| Stage 1 | 349 | 371 | - | 657 | 625 | - | - | - | - | - | - | - |
| Stage 2 | 648 | 618 | - | 347 | 355 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 141 | 170 | 380 | 145 | 162 | 703 | 785 | - | - | 1205 | - | - |
| Mov Cap-2 Maneuver | 141 | 170 | - | 145 | 162 | - | - | - | - | - | - | - |
| Stage 1 | 343 | 363 | - | 646 | 614 | - | - | - | - | - | - | - |
| Stage 2 | 617 | 607 | - | 329 | 347 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 28.7 | 22.7 | 0.3 | 0.3 |
| HCM LOS | D | C | | |

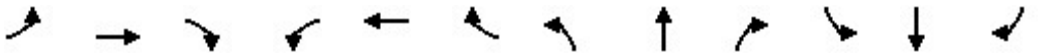
| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 785 | - | - | 141 | 235 | 145 | 383 | 1205 | - | - |
| HCM Lane V/C Ratio | 0.014 | - | - | 0.116 | 0.046 | 0.112 | 0.057 | 0.023 | - | - |
| HCM Control Delay (s) | 9.7 | 0 | - | 33.8 | 21.1 | 32.9 | 15 | 8.1 | - | - |
| HCM Lane LOS | A | A | - | D | C | D | C | A | - | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.4 | 0.1 | 0.4 | 0.2 | 0.1 | - | - |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 80 | 10 | 10 | 20 | 5 | 15 | 5 | 600 | 10 | 30 | 415 | 10 |
| Future Volume (veh/h) | 80 | 10 | 10 | 20 | 5 | 15 | 5 | 600 | 10 | 30 | 415 | 10 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 86 | 11 | 11 | 22 | 5 | 16 | 5 | 645 | 11 | 32 | 446 | 11 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 471 | 180 | 180 | 471 | 82 | 263 | 463 | 849 | 14 | 327 | 842 | 21 |
| Arrive On Green | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 |
| Sat Flow, veh/h | 1380 | 851 | 851 | 1379 | 389 | 1243 | 927 | 1819 | 31 | 771 | 1803 | 44 |
| Grp Volume(v), veh/h | 86 | 0 | 22 | 22 | 0 | 21 | 5 | 0 | 656 | 32 | 0 | 457 |
| Grp Sat Flow(s),veh/h/ln | 1380 | 0 | 1702 | 1379 | 0 | 1632 | 927 | 0 | 1850 | 771 | 0 | 1848 |
| Q Serve(g_s), s | 2.0 | 0.0 | 0.4 | 0.5 | 0.0 | 0.4 | 0.1 | 0.0 | 10.9 | 1.3 | 0.0 | 6.5 |
| Cycle Q Clear(g_c), s | 2.4 | 0.0 | 0.4 | 0.9 | 0.0 | 0.4 | 6.7 | 0.0 | 10.9 | 12.3 | 0.0 | 6.5 |
| Prop In Lane | 1.00 | | 0.50 | 1.00 | | 0.76 | 1.00 | | 0.02 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 471 | 0 | 361 | 471 | 0 | 346 | 463 | 0 | 864 | 327 | 0 | 862 |
| V/C Ratio(X) | 0.18 | 0.00 | 0.06 | 0.05 | 0.00 | 0.06 | 0.01 | 0.00 | 0.76 | 0.10 | 0.00 | 0.53 |
| Avail Cap(c_a), veh/h | 1102 | 0 | 1140 | 1101 | 0 | 1092 | 899 | 0 | 1734 | 690 | 0 | 1731 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 12.7 | 0.0 | 11.8 | 12.1 | 0.0 | 11.8 | 9.4 | 0.0 | 8.2 | 13.3 | 0.0 | 7.1 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 1.4 | 0.1 | 0.0 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 0.9 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 5.1 | 0.3 | 0.0 | 2.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 12.9 | 0.0 | 11.8 | 12.1 | 0.0 | 11.8 | 9.4 | 0.0 | 9.6 | 13.4 | 0.0 | 7.6 |
| LnGrp LOS | B | A | B | B | A | B | A | A | A | B | A | A |
| Approach Vol, veh/h | | 108 | | | 43 | | | 661 | | | 489 | |
| Approach Delay, s/veh | | 12.7 | | | 12.0 | | | 9.6 | | | 7.9 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 23.4 | | 13.9 | | 23.4 | | 13.9 | | | | |
| Change Period (Y+Rc), s | | 6.0 | | 6.0 | | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 35.0 | | 25.0 | | 35.0 | | 25.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 12.9 | | 4.4 | | 14.3 | | 2.9 | | | | |
| Green Ext Time (p_c), s | | 4.5 | | 0.3 | | 3.0 | | 0.1 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 9.3 | | | | | | | | | |
| HCM 6th LOS | | | A | | | | | | | | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 15 | 5 | 5 | 15 | 5 | 15 | 10 | 300 | 20 | 25 | 705 | 75 |
| Future Volume (veh/h) | 15 | 5 | 5 | 15 | 5 | 15 | 10 | 300 | 20 | 25 | 705 | 75 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 16 | 5 | 5 | 16 | 5 | 16 | 11 | 326 | 22 | 27 | 766 | 82 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 338 | 107 | 107 | 348 | 49 | 156 | 312 | 987 | 67 | 666 | 946 | 101 |
| Arrive On Green | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 |
| Sat Flow, veh/h | 1380 | 851 | 851 | 1394 | 389 | 1243 | 645 | 1719 | 116 | 1025 | 1647 | 176 |
| Grp Volume(v), veh/h | 16 | 0 | 10 | 16 | 0 | 21 | 11 | 0 | 348 | 27 | 0 | 848 |
| Grp Sat Flow(s),veh/h/ln | 1380 | 0 | 1702 | 1394 | 0 | 1632 | 645 | 0 | 1835 | 1025 | 0 | 1824 |
| Q Serve(g_s), s | 0.4 | 0.0 | 0.2 | 0.4 | 0.0 | 0.5 | 0.6 | 0.0 | 4.0 | 0.6 | 0.0 | 14.8 |
| Cycle Q Clear(g_c), s | 0.9 | 0.0 | 0.2 | 0.6 | 0.0 | 0.5 | 15.4 | 0.0 | 4.0 | 4.6 | 0.0 | 14.8 |
| Prop In Lane | 1.00 | | 0.50 | 1.00 | | 0.76 | 1.00 | | 0.06 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 338 | 0 | 214 | 348 | 0 | 205 | 312 | 0 | 1054 | 666 | 0 | 1047 |
| V/C Ratio(X) | 0.05 | 0.00 | 0.05 | 0.05 | 0.00 | 0.10 | 0.04 | 0.00 | 0.33 | 0.04 | 0.00 | 0.81 |
| Avail Cap(c_a), veh/h | 1026 | 0 | 1064 | 1044 | 0 | 1020 | 505 | 0 | 1605 | 974 | 0 | 1595 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 15.9 | 0.0 | 15.4 | 15.6 | 0.0 | 15.5 | 12.9 | 0.0 | 4.5 | 5.7 | 0.0 | 6.8 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 1.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 0.2 | 0.0 | 0.1 | 0.2 | 0.0 | 0.3 | 0.1 | 0.0 | 1.3 | 0.1 | 0.0 | 5.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 15.9 | 0.0 | 15.5 | 15.7 | 0.0 | 15.7 | 12.9 | 0.0 | 4.7 | 5.7 | 0.0 | 8.7 |
| LnGrp LOS | B | A | B | B | A | B | B | A | A | A | A | A |
| Approach Vol, veh/h | | 26 | | | 37 | | | 359 | | | 875 | |
| Approach Delay, s/veh | | 15.8 | | | 15.7 | | | 4.9 | | | 8.6 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer - Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 29.0 | | 11.0 | | 29.0 | | 11.0 | | | | |
| Change Period (Y+Rc), s | | 6.0 | | 6.0 | | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 35.0 | | 25.0 | | 35.0 | | 25.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 17.4 | | 2.9 | | 16.8 | | 2.6 | | | | |
| Green Ext Time (p_c), s | | 1.9 | | 0.0 | | 6.2 | | 0.1 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 7.9 | | | | | | | | | |
| HCM 6th LOS | | | A | | | | | | | | | |

# LANE SUMMARY

## Site: 102 [2045 AM Syene - Ninebark]

Syene Rd and Ninebark Dr
Roundabout

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist ft | Lane Config | Lane Length ft | Cap. Adj. % | Prob. Block. % |
| South: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 661 | 3.0 | 1170 | 0.565 | 100 | 9.8 | LOS A | 4.3 | 111.0 | Full | 1600 | 0.0 | 0.0 |
| Approach | 661 | 3.0 | | 0.565 | | 9.8 | LOS A | 4.3 | 111.0 | | | | |
| East: Ninebark Dr | | | | | | | | | | | | | |
| Lane 1[d] | 43 | 3.0 | 618 | 0.070 | 100 | 6.6 | LOS A | 0.3 | 6.7 | Full | 1600 | 0.0 | 0.0 |
| Approach | 43 | 3.0 | | 0.070 | | 6.6 | LOS A | 0.3 | 6.7 | | | | |
| North: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 489 | 3.0 | 1295 | 0.378 | 100 | 6.3 | LOS A | 2.4 | 60.8 | Full | 1600 | 0.0 | 0.0 |
| Approach | 489 | 3.0 | | 0.378 | | 6.3 | LOS A | 2.4 | 60.8 | | | | |
| West: Ninebark Dr | | | | | | | | | | | | | |
| Lane 1[d] | 108 | 3.0 | 792 | 0.136 | 100 | 5.9 | LOS A | 0.6 | 14.2 | Full | 1600 | 0.0 | 0.0 |
| Approach | 108 | 3.0 | | 0.136 | | 5.9 | LOS A | 0.6 | 14.2 | | | | |
| Intersection | 1301 | 3.0 | | 0.565 | | 8.1 | LOS A | 4.3 | 111.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

# LANE SUMMARY

## Site: 102 [2045 PM Syene - Ninebark]

Syene Rd and Ninebark Dr
Roundabout

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist ft | Lane Config | Lane Length ft | Cap. Adj. % | Prob. Block. % |
| South: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 359 | 3.0 | 1273 | 0.282 | 100 | 5.3 | LOS A | 1.5 | 39.4 | Full | 1600 | 0.0 | 0.0 |
| Approach | 359 | 3.0 | | 0.282 | | 5.3 | LOS A | 1.5 | 39.4 | | | | |
| East: Ninebark Dr | | | | | | | | | | | | | |
| Lane 1[d] | 38 | 3.0 | 924 | 0.041 | 100 | 4.3 | LOS A | 0.2 | 4.2 | Full | 1600 | 0.0 | 0.0 |
| Approach | 38 | 3.0 | | 0.041 | | 4.3 | LOS A | 0.2 | 4.2 | | | | |
| North: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 875 | 3.0 | 1295 | 0.676 | 100 | 11.7 | LOS B | 7.5 | 191.7 | Full | 1600 | 0.0 | 0.0 |
| Approach | 875 | 3.0 | | 0.676 | | 11.7 | LOS B | 7.5 | 191.7 | | | | |
| West: Ninebark Dr | | | | | | | | | | | | | |
| Lane 1[d] | 27 | 3.0 | 572 | 0.047 | 100 | 6.8 | LOS A | 0.2 | 4.4 | Full | 1600 | 0.0 | 0.0 |
| Approach | 27 | 3.0 | | 0.047 | | 6.8 | LOS A | 0.2 | 4.4 | | | | |
| Intersection | 1299 | 3.0 | | 0.676 | | 9.7 | LOS A | 7.5 | 191.7 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

# APPENDIX C-4
# MCCOY ROAD OPERATIONS

| Intersection | |
|---|---|
| Int Delay, s/veh | 12.5 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 60 | 40 | 325 | 360 | 405 | 395 |
| Future Vol, veh/h | 60 | 40 | 325 | 360 | 405 | 395 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | Stop | - | None | - | Free |
| Storage Length | 0 | - | 150 | - | - | 275 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 89 | 89 | 89 | 89 | 89 | 89 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 67 | 45 | 365 | 404 | 455 | 444 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1589 | 455 | 455 | 0 | - | 0 |
| Stage 1 | 455 | - | - | - | - | - |
| Stage 2 | 1134 | - | - | - | - | - |
| Critical Hdwy | 6.43 | 6.23 | 4.13 | - | - | - |
| Critical Hdwy Stg 1 | 5.43 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.43 | - | - | - | - | - |
| Follow-up Hdwy | 3.527 | 3.327 | 2.227 | - | - | - |
| Pot Cap-1 Maneuver | 118 | 603 | 1100 | - | - | 0 |
| Stage 1 | 637 | - | - | - | - | 0 |
| Stage 2 | 306 | - | - | - | - | 0 |
| Platoon blocked, % | | | | - | - | |
| Mov Cap-1 Maneuver | 79 | 603 | 1100 | - | - | - |
| Mov Cap-2 Maneuver | 79 | - | - | - | - | - |
| Stage 1 | 426 | - | - | - | - | - |
| Stage 2 | 306 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 116.8 | 4.7 | 0 |
| HCM LOS | F | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | 1100 | - | 127 | - |
| HCM Lane V/C Ratio | 0.332 | - | 0.885 | - |
| HCM Control Delay (s) | 9.9 | - | 116.8 | - |
| HCM Lane LOS | A | - | F | - |
| HCM 95th %tile Q(veh) | 1.5 | - | 5.6 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 142.5 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 295 | 230 | 80 | 250 | 515 | 165 |
| Future Vol, veh/h | 295 | 230 | 80 | 250 | 515 | 165 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | Stop | - | None | - | Free |
| Storage Length | 0 | - | 150 | - | - | 275 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 321 | 250 | 87 | 272 | 560 | 179 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1006 | 560 | 560 | 0 | - | 0 |
| Stage 1 | 560 | - | - | - | - | - |
| Stage 2 | 446 | - | - | - | - | - |
| Critical Hdwy | 6.43 | 6.23 | 4.13 | - | - | - |
| Critical Hdwy Stg 1 | 5.43 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.43 | - | - | - | - | - |
| Follow-up Hdwy | 3.527 | 3.327 | 2.227 | - | - | - |
| Pot Cap-1 Maneuver | ~ 266 | 526 | 1006 | - | - | 0 |
| Stage 1 | 570 | - | - | - | - | 0 |
| Stage 2 | 643 | - | - | - | - | 0 |
| Platoon blocked, % | | | | - | - | |
| Mov Cap-1 Maneuver | ~ 243 | 526 | 1006 | - | - | - |
| Mov Cap-2 Maneuver | ~ 243 | - | - | - | - | - |
| Stage 1 | 521 | - | - | - | - | - |
| Stage 2 | 643 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | $ 370.6 | 2.2 | 0 |
| HCM LOS | F | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | 1006 | - | 329 | - |
| HCM Lane V/C Ratio | 0.086 | - | 1.735 | - |
| HCM Control Delay (s) | 8.9 | - | $ 370.6 | - |
| HCM Lane LOS | A | - | F | - |
| HCM 95th %tile Q(veh) | 0.3 | - | 36.1 | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 60 | 40 | 325 | 360 | 405 | 395 |
| Future Volume (veh/h) | 60 | 40 | 325 | 360 | 405 | 395 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 67 | 45 | 365 | 404 | 455 | 444 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 268 | 238 | 520 | 1159 | 625 | 768 |
| Arrive On Green | 0.15 | 0.15 | 0.18 | 0.62 | 0.34 | 0.34 |
| Sat Flow, veh/h | 1767 | 1572 | 1767 | 1856 | 1856 | 1572 |
| Grp Volume(v), veh/h | 67 | 45 | 365 | 404 | 455 | 444 |
| Grp Sat Flow(s),veh/h/ln | 1767 | 1572 | 1767 | 1856 | 1856 | 1572 |
| Q Serve(g_s), s | 1.8 | 1.3 | 6.8 | 5.6 | 11.5 | 10.8 |
| Cycle Q Clear(g_c), s | 1.8 | 1.3 | 6.8 | 5.6 | 11.5 | 10.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 268 | 238 | 520 | 1159 | 625 | 768 |
| V/C Ratio(X) | 0.25 | 0.19 | 0.70 | 0.35 | 0.73 | 0.58 |
| Avail Cap(c_a), veh/h | 825 | 734 | 704 | 1559 | 1559 | 1559 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 20.0 | 19.9 | 10.4 | 4.8 | 15.6 | 9.8 |
| Incr Delay (d2), s/veh | 0.5 | 0.4 | 2.0 | 0.2 | 1.6 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 1.2 | 2.3 | 3.9 | 2.4 | 7.4 | 15.3 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 20.5 | 20.2 | 12.4 | 5.0 | 17.3 | 10.5 |
| LnGrp LOS | C | C | B | A | B | B |
| Approach Vol, veh/h | 112 | | | 769 | 899 | |
| Approach Delay, s/veh | 20.4 | | | 8.5 | 13.9 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.4 | 24.0 | | 14.1 | | 39.5 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | | 6.0 |
| Max Green Setting (Gmax), s | 15.0 | 45.0 | | 25.0 | | 45.0 |
| Max Q Clear Time (g_c+I1), s | 8.8 | 13.5 | | 3.8 | | 7.6 |
| Green Ext Time (p_c), s | 0.6 | 4.5 | | 0.3 | | 2.6 |

| Intersection Summary | | |
|---|---|---|
| HCM 6th Ctrl Delay | | 12.0 |
| HCM 6th LOS | | B |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 295 | 230 | 80 | 250 | 515 | 165 |
| Future Volume (veh/h) | 295 | 230 | 80 | 250 | 515 | 165 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 321 | 250 | 87 | 272 | 560 | 179 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 409 | 364 | 368 | 1059 | 686 | 581 |
| Arrive On Green | 0.23 | 0.23 | 0.10 | 0.57 | 0.37 | 0.37 |
| Sat Flow, veh/h | 1767 | 1572 | 1767 | 1856 | 1856 | 1572 |
| Grp Volume(v), veh/h | 321 | 250 | 87 | 272 | 560 | 179 |
| Grp Sat Flow(s),veh/h/ln | 1767 | 1572 | 1767 | 1856 | 1856 | 1572 |
| Q Serve(g_s), s | 10.3 | 8.8 | 1.7 | 4.5 | 16.5 | 4.9 |
| Cycle Q Clear(g_c), s | 10.3 | 8.8 | 1.7 | 4.5 | 16.5 | 4.9 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 409 | 364 | 368 | 1059 | 686 | 581 |
| V/C Ratio(X) | 0.79 | 0.69 | 0.24 | 0.26 | 0.82 | 0.31 |
| Avail Cap(c_a), veh/h | 876 | 780 | 539 | 1227 | 1227 | 1040 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.9 | 21.3 | 11.5 | 6.5 | 17.2 | 13.6 |
| Incr Delay (d2), s/veh | 3.4 | 2.3 | 0.3 | 0.1 | 2.4 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%),veh/ln | 7.3 | 5.4 | 1.0 | 2.4 | 10.1 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 25.2 | 23.6 | 11.8 | 6.7 | 19.7 | 13.9 |
| LnGrp LOS | C | C | B | A | B | B |
| Approach Vol, veh/h | 571 | | | 359 | 739 | |
| Approach Delay, s/veh | 24.5 | | | 7.9 | 18.3 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.1 | 28.4 | | 20.0 | | 40.5 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | | 6.0 |
| Max Green Setting (Gmax), s | 12.0 | 40.0 | | 30.0 | | 40.0 |
| Max Q Clear Time (g_c+I1), s | 3.7 | 18.5 | | 12.3 | | 6.5 |
| Green Ext Time (p_c), s | 0.1 | 3.9 | | 1.7 | | 1.6 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 18.2 |
| HCM 6th LOS | B |

# LANE SUMMARY

## Site: 101 [2045 AM Syene - McCoy]

Syene Rd and McCoy Rd
Roundabout

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist ft | Lane Config | Lane Length ft | Cap. Adj. % | Prob. Block. % |
| South: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 770 | 3.0 | 1248 | 0.617 | 100 | 10.5 | LOS B | 5.6 | 144.0 | Full | 1600 | 0.0 | 0.0 |
| Approach | 770 | 3.0 | | 0.617 | | 10.5 | LOS B | 5.6 | 144.0 | | | | |
| North: McCoy Rd | | | | | | | | | | | | | |
| Lane 1[d] | 455 | 3.0 | 979 | 0.465 | 100 | 9.2 | LOS A | 2.8 | 70.7 | Full | 1600 | 0.0 | 0.0 |
| Lane 2 | 444 | 3.0 | 979 | 0.453 | 100 | 9.0 | LOS A | 2.6 | 65.7 | Short | 200 | 0.0 | NA |
| Approach | 899 | 3.0 | | 0.465 | | 9.1 | LOS A | 2.8 | 70.7 | | | | |
| West: Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 112 | 3.0 | 831 | 0.135 | 100 | 5.7 | LOS A | 0.6 | 14.3 | Full | 1600 | 0.0 | 0.0 |
| Approach | 112 | 3.0 | | 0.135 | | 5.7 | LOS A | 0.6 | 14.3 | | | | |
| Intersection | 1781 | 3.0 | | 0.617 | | 9.5 | LOS A | 5.6 | 144.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

# LANE SUMMARY

## Site: 101 [2045 PM Syene - McCoy]

Syene Rd and McCoy Rd
Roundabout

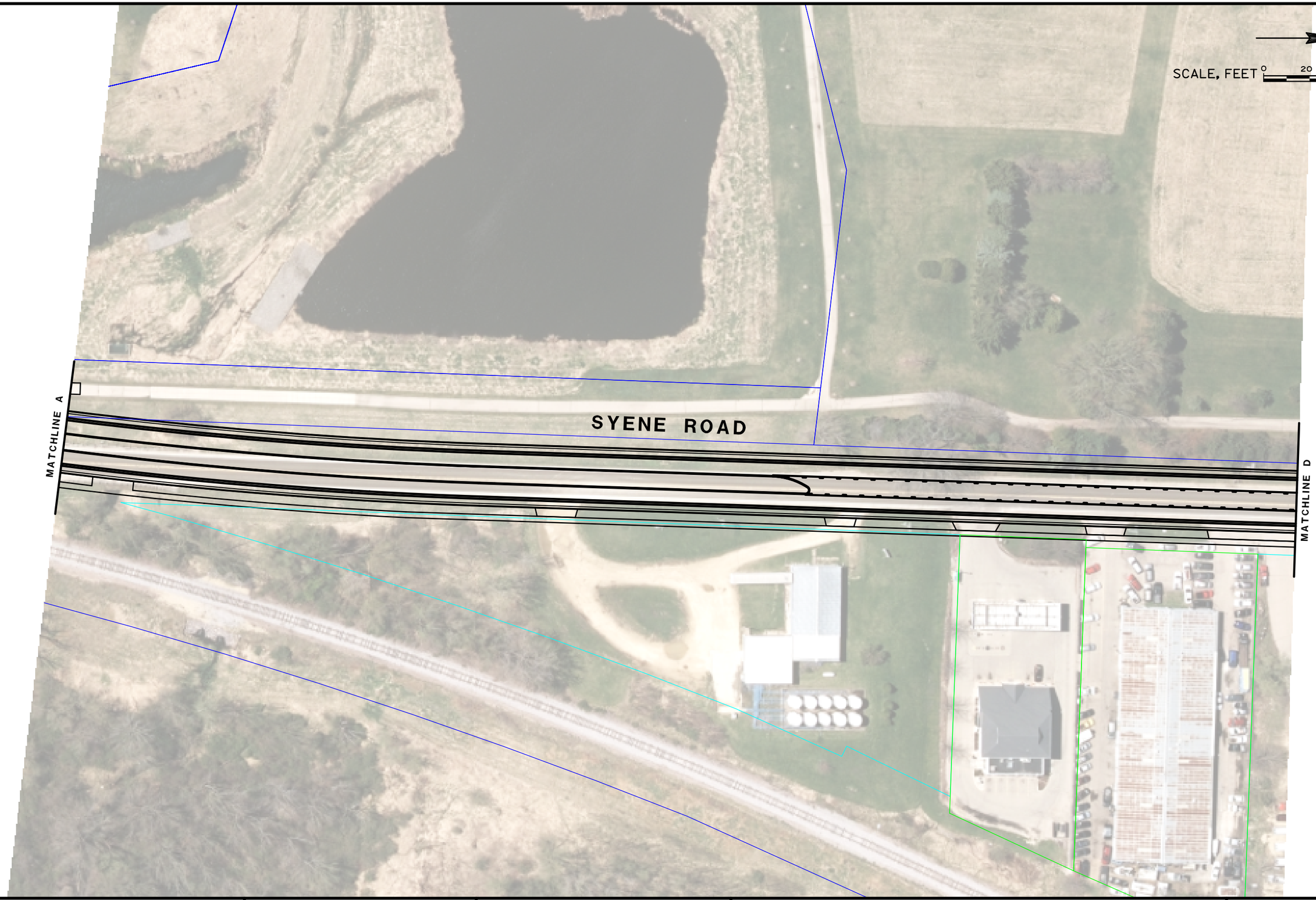
| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist ft | Lane Config | Lane Length ft | Cap. Adj. % | Prob. Block. % |
| South: S Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 359 | 3.0 | 957 | 0.375 | 100 | 7.9 | LOS A | 2.0 | 50.3 | Full | 1600 | 0.0 | 0.0 |
| Approach | 359 | 3.0 | | 0.375 | | 7.9 | LOS A | 2.0 | 50.3 | | | | |
| North: McCoy Rd | | | | | | | | | | | | | |
| Lane 1[d] | 560 | 3.0 | 1271 | 0.441 | 100 | 7.2 | LOS A | 2.7 | 69.0 | Full | 1600 | 0.0 | 0.0 |
| Lane 2 | 179 | 3.0 | 1271 | 0.141 | 100 | 4.0 | LOS A | 0.6 | 15.3 | Short | 200 | 0.0 | NA |
| Approach | 739 | 3.0 | | 0.441 | | 6.5 | LOS A | 2.7 | 69.0 | | | | |
| West: Syene Rd | | | | | | | | | | | | | |
| Lane 1[d] | 571 | 3.0 | 744 | 0.767 | 100 | 22.7 | LOS C | 10.0 | 256.8 | Full | 1600 | 0.0 | 0.0 |
| Approach | 571 | 3.0 | | 0.767 | | 22.7 | LOS C | 10.0 | 256.8 | | | | |
| Intersection | 1668 | 3.0 | | 0.767 | | 12.3 | LOS B | 10.0 | 256.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

# APPENDIX D
# PROPOSED ALTERNATIVE

2

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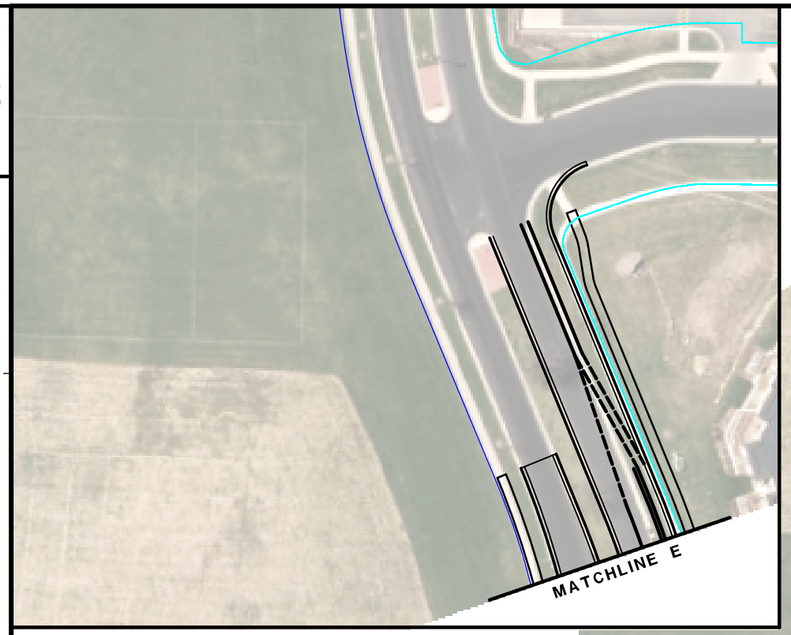
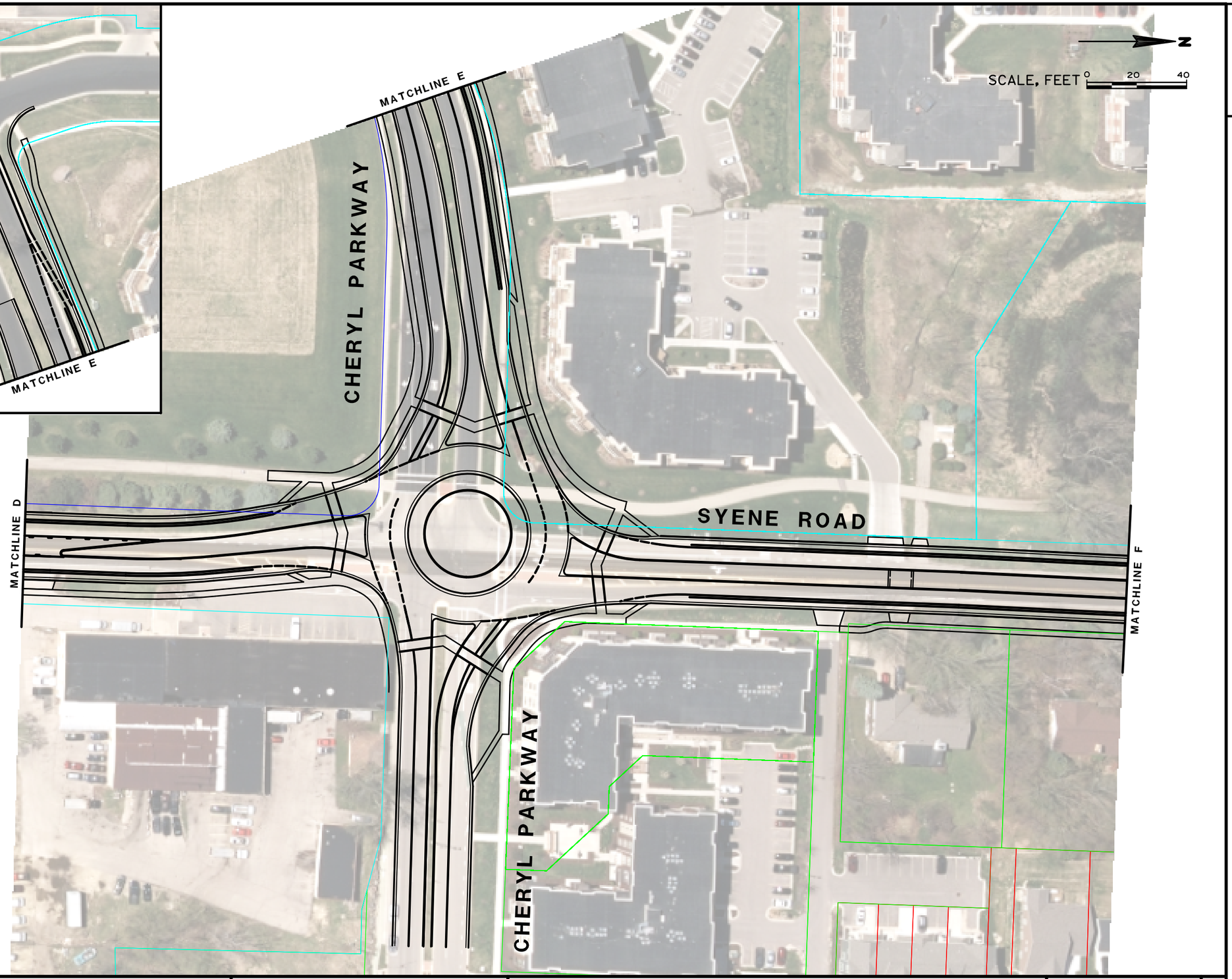
WISDOT/CADDS SHEET 42

2

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| PROJECT NO: | HWY: S SYENE ROAD | COUNTY: DANE | CORRIDOR OVERVIEW | SHEET | E |
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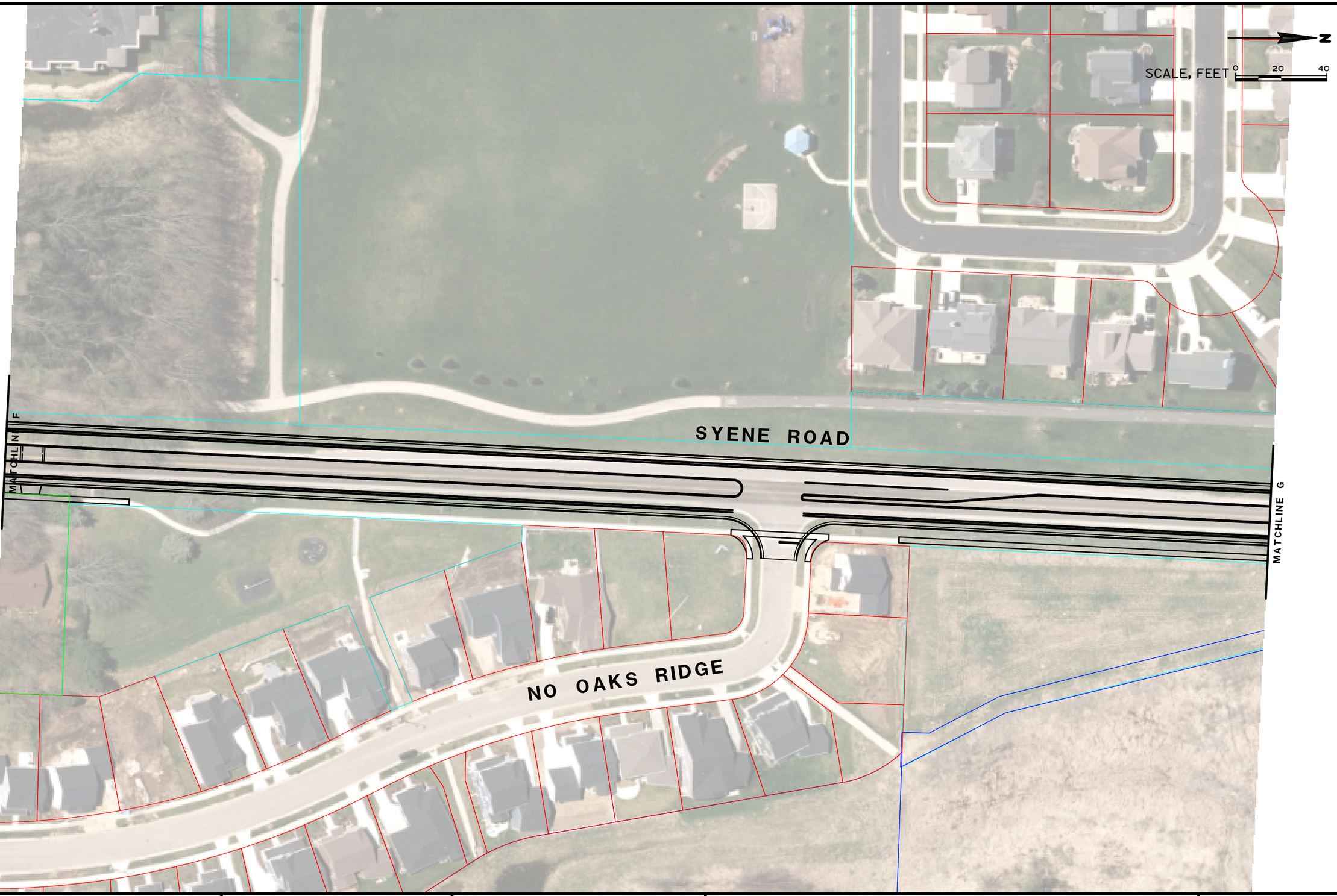


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| PROJECT NO: | HWY: S SYENE ROAD | COUNTY: DANE | CORRIDOR OVERVIEW | SHEET | E |
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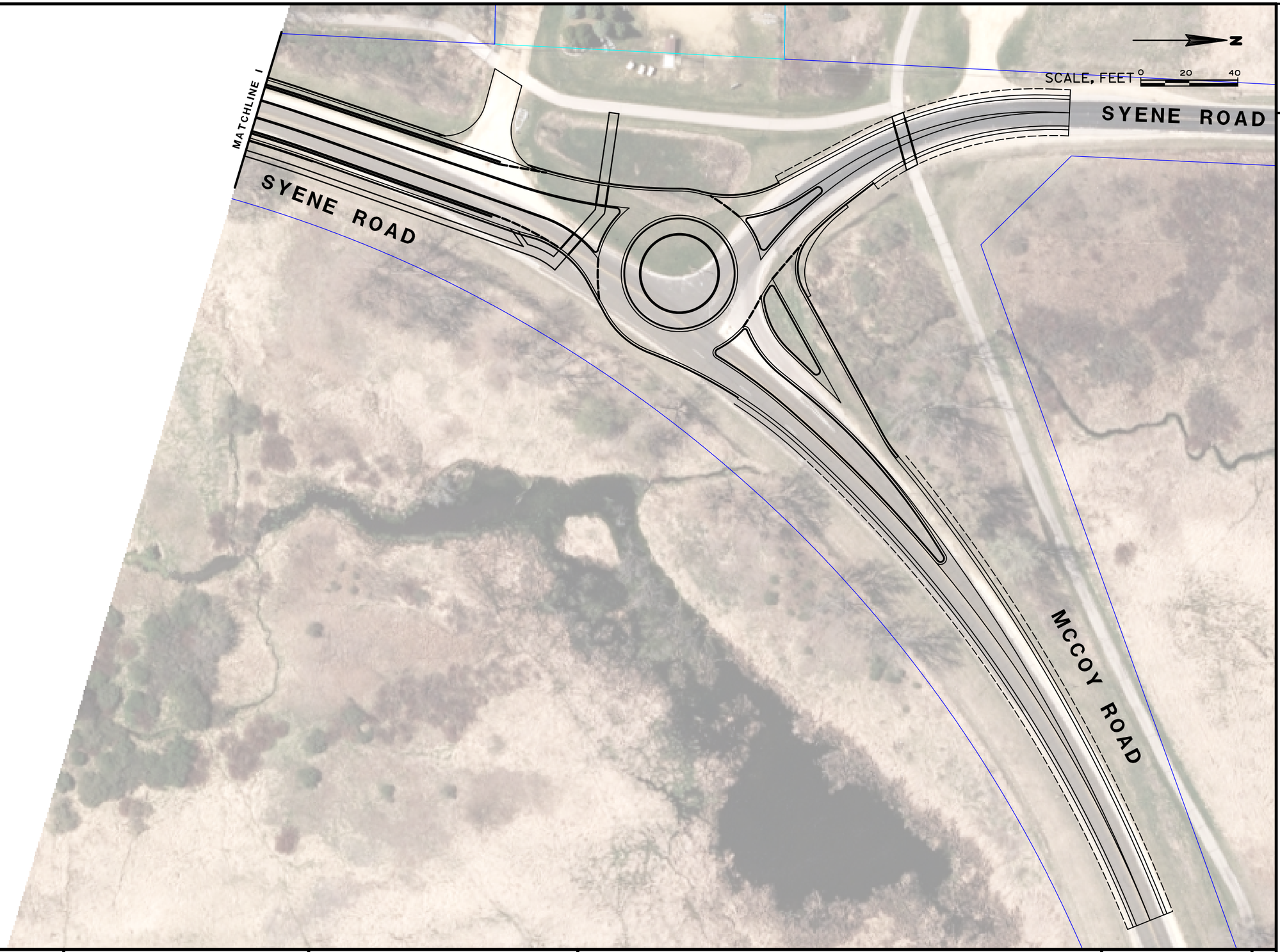


| PROJECT NO: | HWY: S SYENE ROAD | COUNTY: DANE | CORRIDOR OVERVIEW | SHEET | E |
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WISDOT/CADDS SHEET 42

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2

N

SCALE, FEET 0 20 40

MATCHLINE C

LACY ROAD

SYENE ROAD

SYENE ROAD

MATCHLINE A

LACY ROAD

MATCHLINE B

| PROJECT NO: | HWY: S SYENE ROAD | COUNTY: DANE | CORRIDOR OVERVIEW | SHEET | E |
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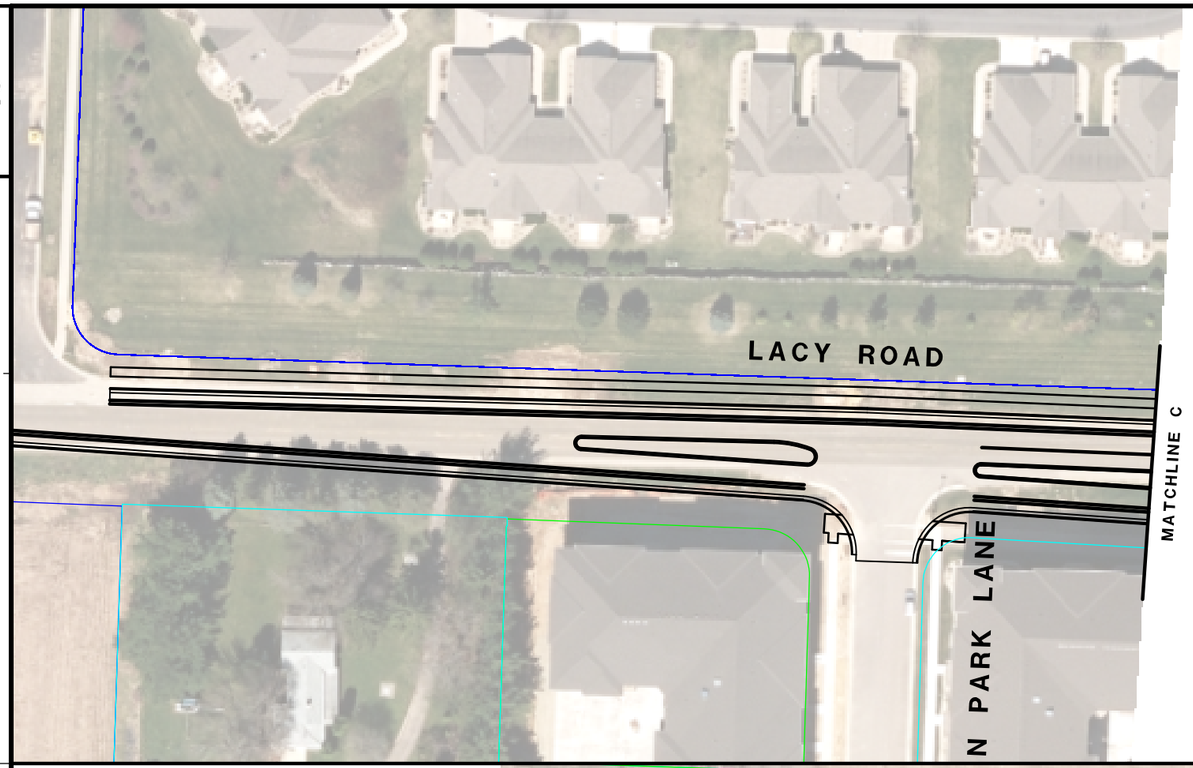
2




SCALE, FEET 0 20 40

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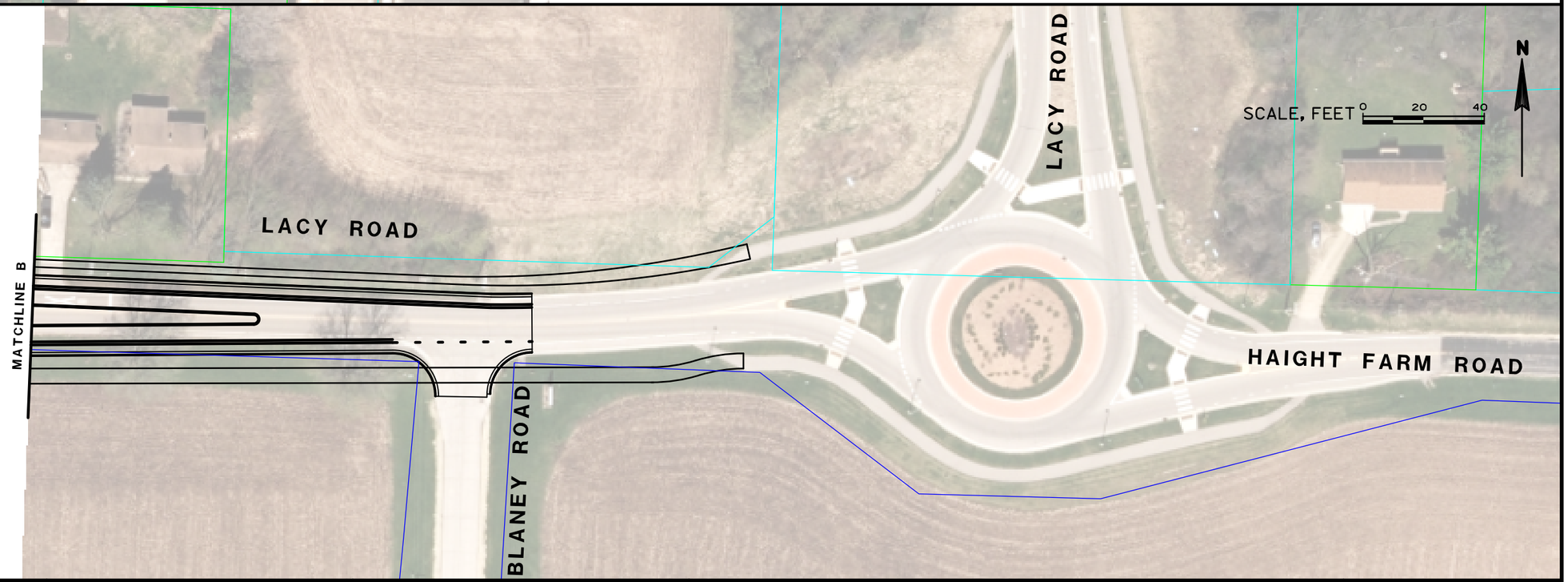


SCALE, FEET 0 20 40

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| PROJECT NO: | HWY: S SYENE ROAD | COUNTY: DANE | CORRIDOR OVERVIEW | SHEET | E |
|---|---|---|---|---|---|

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