Memorandum

To:	Planning Commission Members
From:	Elizabeth J Corwin, PE, AIPC; Planning Director
Date:	January 23, 2025
Re:	URSA 24-06 Applicant: Skilken/Gold and Property Owner: Hannah &Hannah Investments, LLC Vacant W Highland Road PIN 11-22-352-005, -006, -010, and -011,

You are asked to review applications for Special Approval of Land Use to establish a gas station at the SW Corner of M-59 and Milford Road (former site of Highland Lumber, NAPA and other businesses) as well as Site Plan Review. The site covers the entire block bounded by M-59. Milford Road, Ruggles Road and John Street. The parcels are in the Highland Station Business Zoning District and identified in the Highland Station Master Plan as Highway Oriented Commercial.

As you are aware, Highland Station is a unique zoning district that permits greater flexibility in dealing with the challenges of preserving the character of the existing neighborhoods, while accommodating new growth. As you approach your review, I remind you to consult with the Highland Station Master Plan and Highland Station Design Guidelines, in addition to the intent statements in Section 9.05 of the Zoning Ordinance, which is District Specific Standards for the Highland Station. And as we have discussed in the past, the Standards of Approval in Section 6.03.H should be fully evaluated as part of your recommendation to the Board.

Your packet includes the applications, copy of the public notice for the public hearing for Special Use Approval, and review letters from the Township Engineer, Fire Marshal, Highland Downtown Development Authority and Township Planning Consultant.

I am also aware that the Road Commission for Oakland County and the Michigan Department of Transportation have completed conceptual reviews of the site and have provided guidance to the site designers as to acceptable location for driveways.

There are a few unique circumstances that arise from the development of this site. First, you will find that the septic system is not actually located on this site, but rather in a land lease on the west side of John Street on the HVSD property. The Oakland County Health Division has witnessed soils borings and is working with the applicant on permits.

In exchange for the land lease, the project will include a public watermain extension along Ruggles Road, and a private water service extension across school property to Highland Elementary School. Highland Township has not sought a water extension to serve Township Hall. The 8-inch watermain is sized in conformance with the Township Master Water System Plan.

Since the watermain will be extended along Ruggles Street, the project will also include providing a connection for adjacent properties, which include the Legacy Credit Union and a couple single family homes.

Another element specific to development of this site involves the demolition of the existing Highland Station "Ticket Station". The Board of Trustees negotiated to deed over the park area in exchange for the replication of the ticket station at the Veteran's Park. The lamp posts will be salvaged and delivered to the Township for use elsewhere, and the brick pavers will also be salvaged. This agreement is between the Board and the property owner and is independent of the Sheetz proposal.

Because the Township has transferred the corner parcel, Sheetz has agreed to allow space on their monument sign to accommodate our changeable message sign and a Township logo. The Township will operate the sign under an easement agreement and will continue to manage the messaging. Due to the public benefit afforded by this arrangement, the sign is larger than would otherwise be allowed for a commercial property. The Planning Commission may consider the appropriateness of the scale and location of the sign, but is not strictly constrained by the standards of the ordinance.

The HDDA continues to negotiate an entrance treatment to the downtown area that might be incorporated into the landscape design in the NE corner of the site.

Also, as you review the plans, you'll find they include a landscape plan that appears to satisfy Township standards as outlined in Article 12 of the Zoning Ordinance. However, in the HDDA Design Committee review, the density of the trees and the choices of planting materials was found to be not quite in the spirit of the Highland Station Master Plan. Supervisor Hamill is working on specific landscape recommendations for the site, and that portion of the site design (Sheets L1.0 and L1.1) will be replaced.

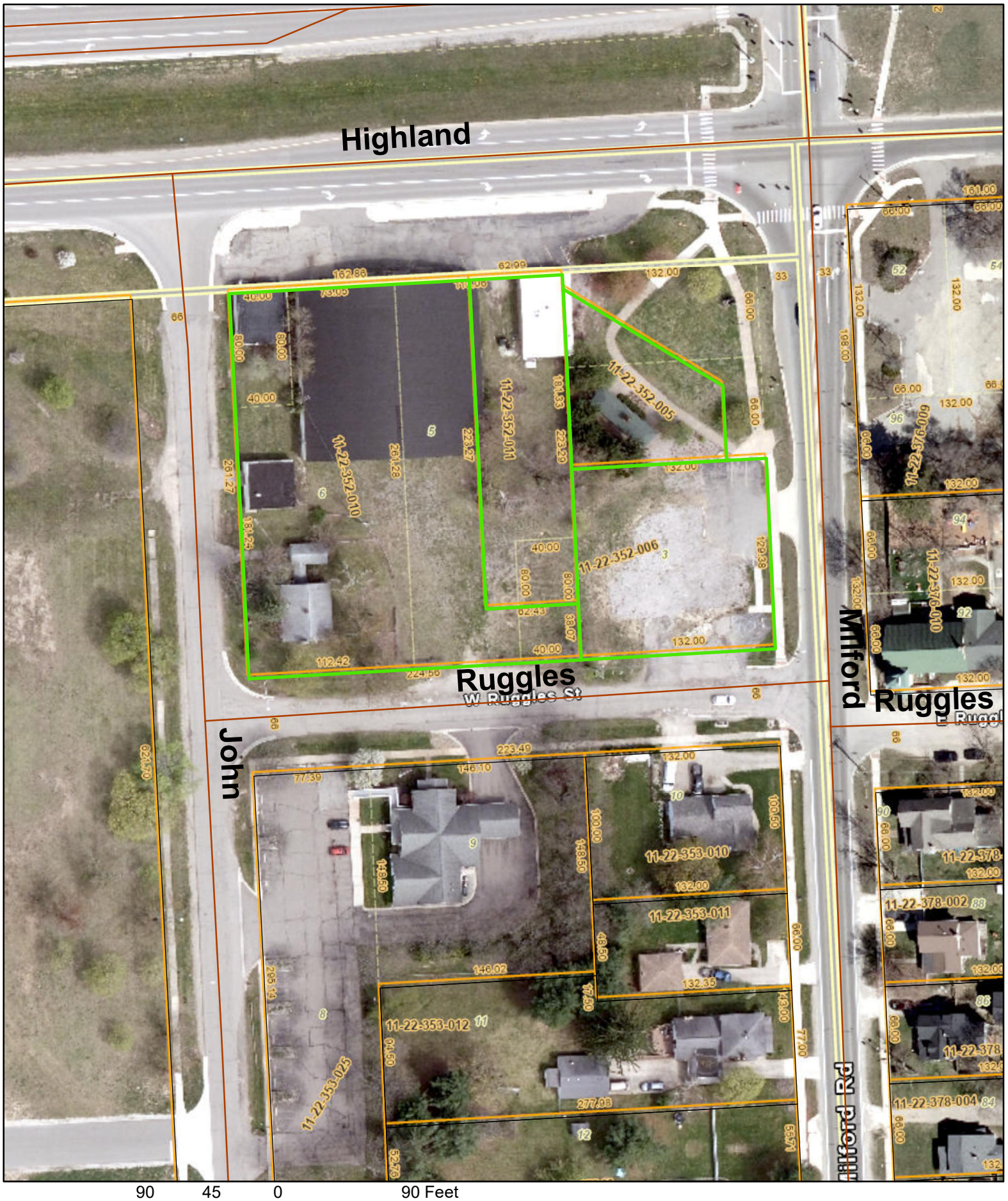
I would also like to take a moment to remind you that in the Highland Station, setbacks are determined by the Planning Commission through evaluation of the site plan and site surroundings. I also note that this site technically has four front yards. There are some features, such as the dumpster enclosure, loading/unloading zones and drive thru that will technically be in a front yard. If the Planning Commission determines that these features are appropriate for the site and the design is consistent with the Highland Station Master Plan, it will not be necessary to obtain variance approvals from the Zoning Board of Appeals.

Another thing to remember as you review the plans, there have been two recent zoning ordinance text amendments that impact this site design. Z-031 and Z-032 that deal with issues specifically impacting gas station standards (lighting, parking, canopy design, etc). If you refer to the Zoning Ordinance as published at Municode.com, those amendments are not yet codified, and must be viewed in the .pdf files published at the Home button of the Highland Township Ordinance.

Another design element I think you should be aware of as your review the land use is the unique nature of the drive-thru ordering system. This is a touch screen kiosk—not the traditional "squawk box" you would find at most drive-thru restaurants. The drive-thru is open when the store is open, which a 24-hour daily operation with breakfast, lunch and dinner offerings. I'll leave further explanation to the applicants.

This report is meant to provide a framework of information that will not necessarily come across in site plans and transmittal letters. The Planners report should dig deeper into issues related to the design and its conformance with ordinance regulations. I understand that the applicant and their representatives will be present to address your questions and explain the proposal in greater detail.

SHEETZ GAS STATION
Vacant East Highland Road



PUBLIC HEARING
CHARTER TOWNSHIP OF HIGHLAND
PLANNING COMMISSION
January 23, 2025
7:30 P.M.

NOTICE IS HEREBY GIVEN that a public hearing will be held at the Highland Township Hall, 205 N. John St. on Thursday, January 23, 2025, at 7:30 p.m.

Notice is further given that all interested parties are invited to review the request and offer comment through the internet or mail. The application may be viewed at http:\\highlandtwp.net under the Planning Commission meeting page. Comments may be submitted to planning@highlandtwp.org, mailed to the Township offices or dropped in our secure drop box at the Township Offices, 205 N. John St. If you have any questions, please call 248-887-3791, ext. 2.

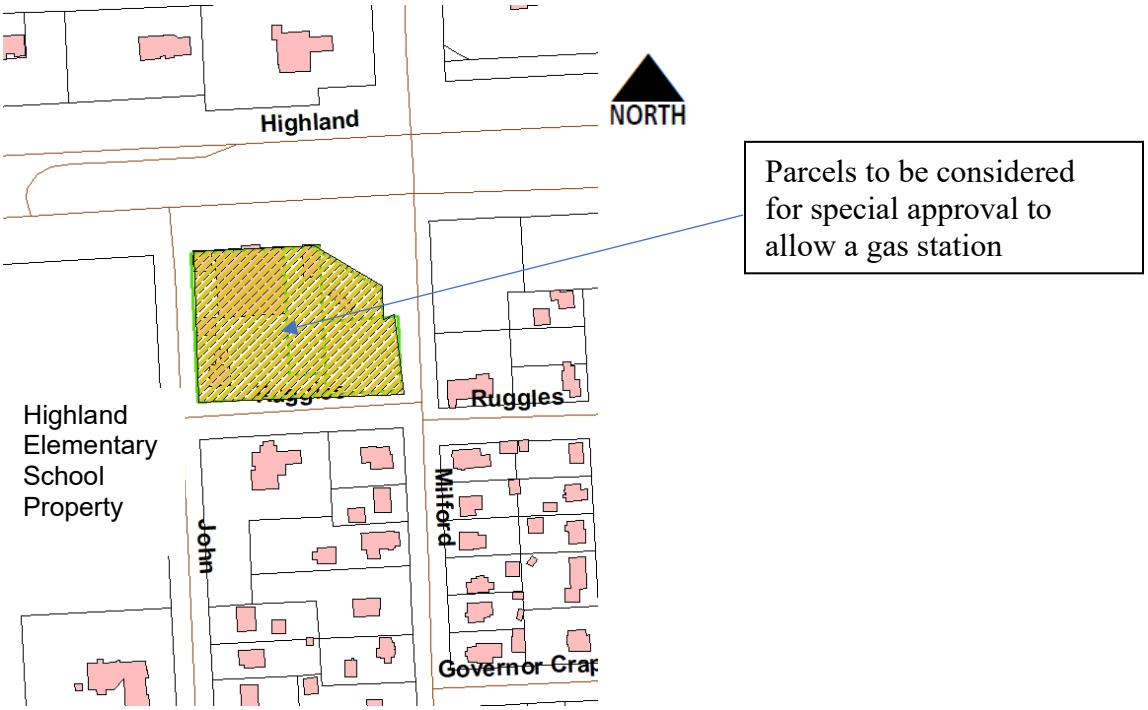
TO CONSIDER:

Request for Use Requiring Special Approval submitted by applicant Derick Riba, Skilken/Gold and property owner Hannah & Hannah Investments, LLC.

REQUEST:

Section 4.12. Highland Station Business District (HS) Subsection C.4 Gas Station and Article 6, Special Land Use Procedures and Standards.

LOCATION: Parcel 11-22-352-010, 11-22-352-011, 11-22-352-005; 11-22-352-006, vacant W Highland Road (M-59)



Kevin Curtis, Chairman
Highland Township Planning Commission

(Publish: on or before January 8, 2025)

Kimley»Horn
of Michigan, Inc.

December 18th, 2024

Ms. Beth Corwin, P.E., AICP
Planning Director
Highland Township
205 N. John Street
Highland, MI 48357

RE: Site Plan Submittal
Sheetz – Highland (M59 & Milford)
Highland, MI

Dear Ms. Corwin,

Please find enclosed site plans for the Sheetz Highland Project in Highland Township for your review and approval. This project is for the proposed construction of a Sheetz convenience store, drive thru restaurant, and gasoline fuel station. The project includes associated improvements for new pavement, parking, walk, utility, landscaping, building and stormwater management; also including a proposed public watermain extension to the nearby school and public sanitary sewer, and storm sewer service connections.

Please find the following documents attached for the submittal of the Sheetz Highland Site Plan:

- Twenty (20) sets of Site Plans dated 12/17/2024
  Site Plan Package Includes:
  - Civil Site Plans (Signed and Sealed), Photometric Plans, and Architectural Plans

Please let us know if you have any questions while performing your review. I can best be reached at 734-497-2272.

Sincerely,
KIMLEY HORN OF MICHIGAN, INC

Tyler Smith, P.E.
Project Manager

Cc: Alex Siwicki, Sheetz
David Bruckelmeyer, Sheetz
Yasmeena Krstovski, Sheetz
Derick Riba, Skilken Gold

Highland Township
Where inside. Great outdoors.

- [x] Site Plan Review
- [ ] Rezoning
- [x] Use Requiring Special Approval
- [ ] Land Division
- [ ] Land Division & Combination
- [ ] Road Profile
- [ ] Other

PLAN REVIEW APPLICATION

Highland Township Planning Department, 205 N. John St, Highland, Michigan 48357 (248) 887-3791 Ext. 2

Date Filed: _____ **Fee:** _____ **Escrow:** _____ **Case Number:** _____

NOTICE TO APPLICANT AND OWNER

BY SIGNING THIS APPLICATION, THE APPLICANT AND OWNER ACKNOWLEDGE ONE OR THE OTHER OR BOTH ARE RESPONSIBLE FOR ALL APPLICATION AND CONSULTANT FEES THAT ARISE OUT OF THE REVIEW OF THIS REQUEST THE OWNER ALSO AUTHORIZES THE TOWNSHIP TO PLACE A SIGN ON THE PROPERTY, IF NECESSARY, TO INFORM THE PUBLIC OF THE PENDING MATTER BEING REQUESTED.

REQUIRED COPIES OF PLANS

INITIAL REVIEW: 2 HARD COPIES OF PLANS AND .PDF COPY OF PLANS
CONSULTANTS REVIEW OF APPROVED PLANS SUBJECT TO CONDITIONS: 5 COPIES AND .PDF COPY

1. APPLICANT INFORMATION

NAME: Derick Riba
ADDRESS: 4270 Morse Rd
Columbus, OH 43230
PHONE: 419-799-7656
EMAIL: driba@skilkengold.com

OWNER INFORMATION

NAME: Isaac W. Hanna
ADDRESS: 32600 Stephenson Hwy
Madison Hights, mich. 48071
PHONE: 248 765-5700
EMAIL: Isaac@IWHCompanies.com

2. PROPERTY INFORMATION

ADDRESS OR ADJACENT STREETS: Highland Road (M59) between N. John Street & N. Milford Road
LOT WIDTH: ±356' LOT DEPTH: ±261' LOT AREA: 1.94 acres (net & gross)
PARCEL IDENTIFICATION NUMBER(S): Parcel 1: 11-22-352-010, Parcel 2: 11-22-352-011, Parcel 3: 11-22-352-005, Parcel 4: 11-22-352-006

3. PROJECT INFORMATION

PROJECT NAME: Sheetz Highland
PRESENT ZONING: HS (Highland Station) PROPOSED ZONING: HS w/ Special Use *
PRESENT USE: Highland Station Depot (Park) PROPOSED USE: Convenience, Drive Thru Restaurant, Fuel Station

APPLICANT

SIGNATURE: _____
PRINT NAME: Derick Riba

On the ____day of _____,_____ before me, a Notary Public, personally appeared the above named person whose signature appears above, and who executed the foregoing instrument, and he/she acknowledged to me that he/she executed the same.

State Of Michigan
County Of Oakland

Notary Public: _____

OWNER

SIGNATURE: _____
PRINT NAME: Isaac W. Hanna

On the 18th day of December, 2024 before me, a Notary Public, personally appeared the above named person whose signature appears above, and who executed the foregoing instrument, and he/she acknowledged to me that he/she executed the same.

State Of Michigan
County Of Oakland

Notary Public: _____

IRA LEE BOROWSKI
County of Macomb
NOTARY PUBLIC
Expires 03-04-2027
STATE OF MICHIGAN

- If there are Co-Applicants and/or Co-Owners associated with this property(ies) to be acted upon, please submit a Notarized Co-Applicant's and/or Co-owner's "Interest in Property Certificate" with this application. The person signing this cover sheet will be considered the official designee for the group and all correspondence will be addressed to this person.

- A notarized letter giving the Applicant authorization to represent the Owner is also permitted in lieu of a signature on this application. The person signing this cover sheet, however, will be considered the official designee for the Owner and all correspondence will be addressed to this person.

Highland Township

Warm inside. Great outdoors.

- [x] Site Plan Review
- [ ] Rezoning
- [x] Use Requiring Special Approval
- [ ] Land Division
- [ ] Land Division & Combination
- [ ] Road Profile
- [ ] Other

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PHONE: 419-799-7656
EMAIL: driba@skilkengold.com

OWNER INFORMATION

NAME: Isaac W. Hanna
ADDRESS: 32600 Stephenson Hwy
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PRESENT USE: Highland Station Depot (Park) PROPOSED USE: Convenience, Drive Thru Restaurant, Fuel Station

APPLICANT

SIGNATURE: _____
PRINT NAME: Derick Riba

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State Of Michigan
County Of Oakland
Notary Public: _____

ASHLEY NATHAN
Notary Public - State of Michigan
County of Oakland
My Commission Expires Feb 10, 2028
Acting in the County of Oakland

OWNER

SIGNATURE: _____
PRINT NAME: Isaac W. Hanna

On the ____day of _____,_____ before me, a Notary Public, personally appeared the above named person whose signature appears above, and who executed the foregoing instrument, and he/she acknowledged to me that he/she executed the same.

State Of Michigan
County Of Oakland

Notary Public: _____

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Carlisle | Wortman
ASSOCIATES, INC.
117 NORTH FIRST STREET SUITE 70 ANN ARBOR, MI 48104 734.662.2200 734.662.1935 FAX

Date: January 20, 2025

Special Land Use Review
For
Highland Township, Michigan

Applicant:	David Bruckelmeyer
Project Name:	Sheetz, Gas Station
Plan Date:	December 18, 2024
Location:	Parcels #11-22-352-010, #11-22-352-011, #11-22-352-005, & #11-22-352-006 Intersection of Highland Road (M-59) & N Milford Road
Zoning:	Highland Station District (HS)
Action Requested:	Special Land Use Preliminary Site Plan Approval

PROJECT AND SITE DESCRIPTION

The applicant has submitted a preliminary site plan for a 6,139-square-foot, one-story building with a drive-through lane and an approximately 5,216 square foot canopy covering seven (7) fuel pumps on three (3) vacant parcels on the southwest corner of Highland Road (M-59) & N Milford Road.

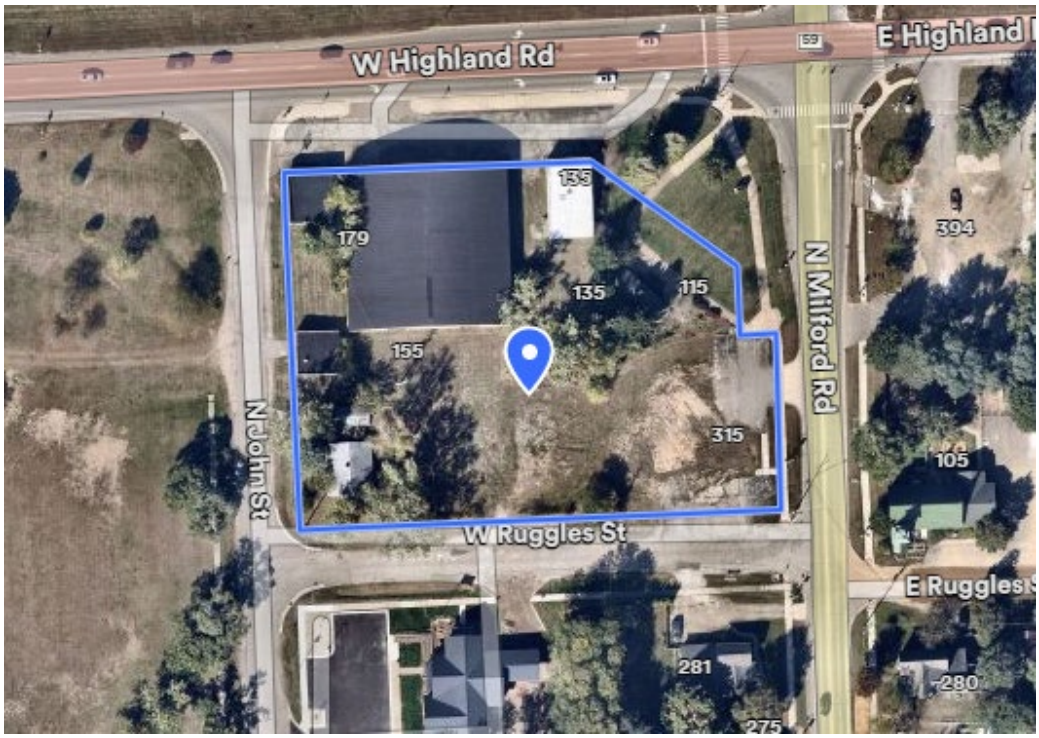
On July 1, 2024, the Township Board adopted a zoning ordinance amendment allowing gas stations to be approved as a special land use, with drive-through facilities permitted for associated food services if explicitly included in the special use approval.

Benjamin R. Carlisle, *President* John L. Enos, *Vice President* Douglas J. Lewan, *Principal*
David Scurto, *Principal* Sally M. Elmiger, *Principal* R. Donald Wortman, *Principal* Craig Strong, *Principal*
Paul Montagno, *Principal* Megan Masson-Minock, *Principal* Laura Kreps, *Principal*
Richard K. Carlisle, *Past President/Senior Principal*

The Planning Commission is responsible for making a recommendation on a special land use application, while the Township Board makes the final decision. Once approved, a special land use runs with the land and is transferable to future property owners. Per the Zoning Ordinance, special land use approvals do not expire over time.

Figure 1 provides an aerial image of the currently vacant site, outlined in blue.

Figure 1. Aerial Image of Subject Site and Vicinity



Source: NearMap October 6, 2024

Items to be Addressed: *None.*

NEIGHBORING ZONING, LAND USE AND MASTER PLAN

Table 1 lists the existing land use, zoning, and master plan future land use designations of the subject site and neighboring properties.

Table 1. Existing Land Use, Zoning Districts, and Future Land Use Designations

	Existing Land Use	Zoning	Future Land Use
Subject Site	Vacant	Highland Station (HS)	Highland Station
North	Vacant	Commercial (C-1)	Office and Low Intensity Commercial
South	Commercial (Credit Union)	Highland Station (HS)	Highland Station

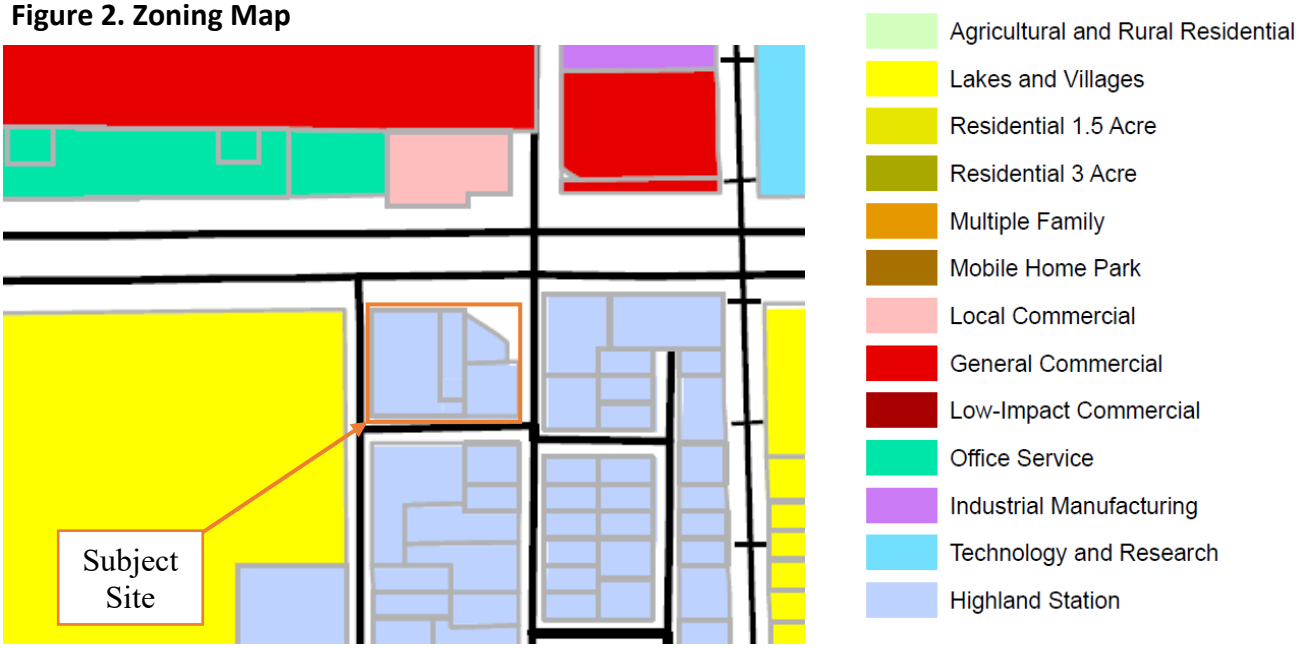
	Existing Land Use	Zoning	Future Land Use
East	Vacant	Highland Station (HS)	Highland Station
West	John Street Field	Lakes and Villages Residential (LV)	Small Lot Single Family Residential

The subject site is zoned Highland Station District. The intent of the Highland Station District is:

The intent of the HS Highland Station District is to provide a lively, inviting and identifiable community core in Highland Township. It is envisioned that this zoning district would permit residential, commercial and public land uses in a walkable environment. Other elements are intended to further enhance the district such as streetscape features, public open space amenities and architectural character.

Figure 2 shows the zoning of the subject site and surrounding properties.

Figure 2. Zoning Map



The subject site is designated as Highland Station in the Future Land Use Map of the Master Plan. The site is in the Highland Station Core Area, as outlined in the Historic Highland Station Master Plan of 2008. That plan highlights the strategic importance of this site as a gateway to Highland Station and its role in connecting the community to M-59. Intersections along M-59, such as this one, are preferred for businesses due to their high visibility and accessibility. However, the plan also cautions against overdevelopment at these intersections, as it can lead to unattractive and unsafe conditions for both vehicles and pedestrians. The plan has a recurring theme of enhancing pedestrian safety and connectivity, with recommendations to redesign the hazardous at-grade crossing at M-59 and consider features like a pedestrian bridge, distinctive crosswalk striping,

and landscape improvements to better integrate the area with the broader community. Site specific recommendations from this plan are further detailed in the section on "Historic Highland Station Plan and Design Guidelines," later in this review.

Figure 3 shows the land use designations for the subject site and surrounding properties from the Future Land Use Map last updated on September, 9, 2021.

Figure 3. Future Land Use Map

Items to be Addressed: *None.*

HISTORIC HIGHLAND STATION PLAN AND DESIGN GUIDELINES

The Historic Highland Station Master Plan envisions this site as maintaining the corner as a green and inviting entryway into the village center. The goal is to create a space that fosters community interest while preserving its charm and historical character.

The Planning Commission should consider whether the proposed gas station use, site layout, and design at this location aligns with the goals of the Highland Station Master Plan. We recommend that the Planning Commission consider the following:

- The depot building, currently on the site, is noted in the plan for its potential to serve as a focal point or trailhead in a more accessible location, such as Livingston Road near the railroad tracks. Per a separate agreement with the Board, the depot is proposed to be demolished, and a replica constructed at a different location. Salvageable materials will be retained by the owner, and elements such as the brick sidewalk and lighting will be repurposed. The proposed relocation aligns with the Master Plan's vision of creating a more accessible and functional space for the depot while freeing the prominent corner at

M-59 and N Milford Road for redevelopment that maintains a green, welcoming gateway into Highland Station.

- Figure 4 shows the site's designation with recommended improvements for pedestrian access as shown in the Highland Station Core Area Master Plan Initiative (2008). The plan notes that preserving green space at the intersection while introducing features that attract visitors and enhance accessibility is critical. The plan also emphasized creating a safe crosswalk on the west side of the intersection of M-59 and Milford Road.

  The site plan proposes green space and pedestrian facilities similar in size and location to the plan's recommendations. The site plan also preserves the existing the concrete sidewalks along M-59 and N. Milford Road and the ADA compliant ramps at that intersection.

Figure 4. Connections to M-59

Source: Historic Highland Station Master Plan of 2008

- The Historic Highland Station Master Plan calls for landscaping locations include the entries of buildings, along long runs of walls and edges or corners, along pedestrian connections and thoroughfares, and as screening of utilities and trash enclosures. The

site plan proposed landscaping along pedestrian connections and thoroughfares and screening of the utilities and trash enclosures but does not propose landscaping at the entrance to the building.

- The Highland Station Core Area Master Plan recommends that commercial sites avoid using bollard lights, colored floodlights and tree lights outside of holiday season, and lights as an attractive feature on the structure. The site plan proposes flood lights and street wrap lighting on the building that could be a variety of colors. In our opinion, colored lighting does not meet the recommendations of the Core Area Master Plan.

Items to be Addressed: *Planning Commission input as to whether lighting should be updated to match recommendations of the Highland Station Core Area Master Plan.*

AREA, WIDTH, HEIGHT, SETBACKS

The following table summarizes the Coverage, Placement, and Height Regulations for the site plan associated with the use. The proposed structures appear to meet all dimensional regulations of the zoning ordinance.

Table 2. Coverage, Placement, and Height Regulations

	Required	Provided	Complies
Maximum Lot Coverage	20 %	7.2%	Complies
Minimum Front Setback	Planning Commission to Determine from Criteria in Section 9.05(B)(6)	N (Highland Rd) 9.5 feet E (N Milford Rd) 140.2 feet S (Ruggles St) 44.7 feet W (N John St) 61 feet	To be determined
Minimum Side Setback	Planning Commission to Determine from Criteria in Section 9.05(B)(6)	N/A	N/A
Maximum Building Height	2 Stories or 28 Feet	1 story, 23 feet 6 inches	Complies
Maximum Canopy Height	18 Feet	21 feet 7 ½ inches	Does not comply

Section 9.05(B)(4)(a) requires that the maximum height of a gas station canopy be eighteen (18) feet unless the Planning Commission determines that the architectural elements of the roof justify a greater height in order to complement the primary structure. The expectation is that the canopy shall be designed to match the character of the primary structure and comply with the Highland Station design guidelines.

Items to be Addressed: *Planning Commission to determine if the architectural elements of the roof justify a greater height to complement the primary structure.*

BUILDING LOCATION AND SITE ARRANGEMENT

The proposed vehicle gas filling station fronts Highland Road with access points on the east side from North Milford Road and on the west side from North John Street. The primary building is located at the southern end of the site with the canopy covered fuel pumps fronting Highland Road.

A trash receptacle enclosure is provided in the southeast corner of North Milford Road and Ruggles Street behind the primary building. An underground detention system is proposed in the parking area in the southeast corner of the site. A drive-through is proposed fronting Ruggles Street with access from North John Street.

Items to be Addressed: *None.*

PARKING, LOADING

The required parking for vehicle gas filling stations per Section 11.02 of the Highland Township Zoning Ordinance is show in Table 2. The applicant is providing forty-one (41) spaces in compliance with the required spaces for the drive-through and gas station. However, the required stacking spaces for the drive-through and the required longer parking spaces for recreational vehicles, buses and semi-trucks have not been shown.

Table 2. Parking Requirements

	Required	Provided	Complies
Drive - Through	1 space per 70 square feet (450 / 70 = 7 spaces)	7 spaces	Complies
	10 stacking spaces	Not provided	Need more information
	2 longer parking spaces	Not provided	Need more information
Gas Station	1 space per 125 square feet (450 / 125 = 4 spaces)	32 spaces	Complies
	2 spaces per fueling station (2 * 7 = 14 spaces)		Complies
Accessible Spaces	2	2	Complies

The proposed loading space meet the size and number requirements per Section 11.06: size of at least ten (10) feet by fifty (50) feet or five hundred (500) square feet in area, with a clearance of at least fourteen (14) feet in height; and at least one (1) loading space. A five hundred (500) square foot loading zone space is provided in the southeast corner of the lot near the waste receptacles.

Section 11.06(B) states that loading and unloading areas and docks shall not be provided in the front yard and loading area do not interfere with required parking spaces, maneuvering aisles, or traffic flow. Since the site has four (4) front yards, locating the loading area in the side or rear yard is not feasible. The proposed location blocks access to the trash enclosure. We recommend the applicant move the loading space or provide details on how loading and trash pick will not conflict. If the loading space does not block use of the trash enclosure, we feel that the design meets the modification standards in Section 9.05.D.

Items to be Addressed: *1) Applicant to display the required 10 stacking spaces at the drive-through. 2) Applicant to provide 2 longer parking spaces able to accommodate recreational vehicles as noted in Section 11.02. 3) Planning Commission to determine if modification for loading space location meets the standards in Section 9.05.D.*

SITE ACCESS AND CIRCULATION

The proposed facility will be accessible from North Milford Road and North John Street. Sheet C1.1 includes a semi-truck turning plan. However, we note that the plan does not illustrate circulation routes for refuse vehicles, delivery truck access to the proposed loading space, or drive-through traffic patterns.

The driveway locations have been determined in coordination with the Road Commission for Oakland County (RCOC) and the Michigan Department of Transportation (MDOT). The RCOC has stated that no driveway access will be permitted from Ruggles Street.

We defer to the RCOC, the Township Engineering Department, and the Fire Chief for further review and consideration of access and circulation concerns.

Items to be Addressed: *Applicant to provide circulation plan which displays a refuse vehicle route, how the loading space will be accessed, and the route for drive-through traffic.*

FENCING AND SCREENING

The applicant is proposing a variety of trees and shrubbery landscaping as screening for the site, along Highland Road, John Street, Ruggles Street, and North Milford Road. Forty-two (42) deciduous trees, thirty-two (32) deciduous shrubs, and one-hundred forty-eight (148) evergreen shrubs are provided along the property lines. Currently, no fencing or wall screening is proposed.

Items to be Addressed: *None.*

NATURAL FEATURES

The parcel is currently vacant but contains several structures with the following sizes: 1,223 square feet, 1,913 square feet, 1,028 square feet, and a structure measuring 14,232 square feet.

A grouping of three (3) trees is located in the southwest corner of the lot, which are proposed to remain.

The applicant has provided a draft tree survey on V1.1 noting the tag number, common name and DBH of each tree. This table should be updated to include each tree's scientific name and what trees are to be removed during construction.

The applicant has provided a draft topographic survey on Sheet V1.0 showing that the parcel has a flat topography. The topographic survey should be certified. The site is not located within any wetlands identified by EGLE. The main hydraulic soil group of the site is urban land-spinks complex.

Items to be Addressed: *Applicant to provide certified topographic survey on Sheets V1.0 & V1.1.*

LANDSCAPING

The applicant has provided a landscape plan which meets the Zoning Ordinance requirements with approval and determinations by the Planning Commission, as shown in Table 3.

Table 3. Landscaping Requirements

Landscaping Requirement	Required	Provided	Complies
Screening Between Land Uses	6 ft visual screen (Section 12.04)	Evergreen hedge screening less than 6 ft high	Planning Commission to determine type conifer hedge, solid wall, or decorative fence
Landscaping Adjacent to Public Rights-of-Way	Landscaped berm, wall, or sufficient plantings (3 ft height) Section 12.05 (B)	Evergreen & deciduous shrubs between 18" & 6'	Complies
Greenbelts	Planning Commission to determine width	Not provided	Planning Commission to decide
	Highland Rd: 358 LF / 30 = 12 trees	13 trees	Complies

Landscaping Requirement	Required	Provided	Complies
	N Milford Rd: 219 LF /30 = 7 trees	5 trees	Does not comply
	Ruggles St: 358 LF / 30 = 12 trees	12 trees	Complies
	N John St: 209 LF / 30 = 7 trees	7 trees	Complies
Site Landscaping	15% of site area (84,664 * .15 = 12,700 sq ft) (Section 12.07)	9,109 square feet	Appears it does not comply. More information needed.
Parking Lot	1 tree and 3 shrubs per 8 spaces (41/8 = 5 trees, 15 shrubs)	5 trees 5 shrubs	Planning Commission to approve layout and location
Screening of Trash Containers	All sides screened with at least 6 ft opaque fence or wall and gate (Section 12.09)	7'4" brick wall	Complies

Per Section 12.04, the Planning Commission shall determine whether the visual screen between land uses should consist of a landscape buffer, solid wall, or fence, based on the surrounding and proposed uses. Additionally, if a land use generates noise, light, dust, or other nuisances that cannot be effectively mitigated by a landscape buffer, the Planning Commission may require a solid wall or fence. In the HS (Highland Station) District, visual screening between land uses must utilize a solid screen composed of an evergreen landscape hedge, a decorative masonry wall, or decorative wood fencing. The maximum height for such screening shall not exceed six (6) feet.

The proposed site plan currently relies on a landscape buffer for screening. We recommend the Planning Commission consider requiring a knee wall or decorative fence along the east, south, and west lot lines, which border residential districts, to ensure adequate screening between uses.

We note the submitted landscaping plan on Sheet L1.1 describes site landscaping to have 9,109 additional square feet of landscaping. The applicant should revise the landscaping plans to reflect the entirety of the site.

Items to be Addressed: *1) Planning Commission to determine type conifer hedge, solid wall, or decorative fence. 2) Planning Commission to determine appropriate greenbelt width. 3) Applicant to provide 2 additional trees along N Milford Rd. 4) Applicant to provide an additional 3,591*

square feet of landscaping. 5) Planning Commission to approve parking lot landscaping layout and location.

FLOOR PLAN AND ELEVATIONS

Per Section 9.05(C), all new buildings, additions and exterior renovations shall be consistent with the architectural style of the Highland Station concepts as contained in the Highland Station Master Plan Initiative, the Historic Highland Station Design Guidelines, and other guidance documents that might be adopted by resolution of the Planning Commission. In making this determination, the Planning Commission shall consider the following factors:

1. The material for any exterior finish shall be, constructed of wood or synthetic materials fabricated to have the appearance and durability of clapboard wood siding. Other acceptable finish materials include brick, cut stone, field stone, cast stone, or wood shakes with an opaque stain. The use of vinyl siding is prohibited.

   The proposed materials for the exterior finish of the principal building include brick veneer and cast stone.

2. The overall design of the building is consistent with the design intent of Highland Station District.

   We believe this standard is met as it meets the following points of intent listed below:

   a. *Provide for site design flexibility to encourage shared site improvements and cross access through a series of marginal access driveways and pathways.*

   b. *Provide pathways for pedestrians, cyclists and equestrians that include linkages to neighborhoods and developments outside the core area of Highland Station.*

3. The roof design shall be consistent with the architectural style of the building. Buildings shall be designed with pitched roofs or a decorative cornice. Rooftop mechanical equipment shall be screened from all views with screening features that are consistent with the architectural style of the main building.

   This criteria have been met for the principal building. The building is designed with a mansard roof and decorative cupola. Any rooftop mechanical equipment is appropriately screened.

   We note that the canopy proposed does not have any architectural characteristics of Highland Station. However, the canopy does include materials used with the principal building such as the brick columns. The canopy also incorporates colors which match the primary building.

4. Meter boxes, transformers, waste receptacles, mechanical equipment and accessory structures on or adjacent to buildings shall be enclosed with walls or landscape features that are similar to the architectural features of the principal building.

   All meter boxes, transformers, waste receptacles, mechanical equipment and accessory structures are enclosed by appropriate screening walls, bollards, or landscape features.

5. Elevations may include awnings made of opaque materials. Translucent or internally lit awnings shall not be permitted.

   No translucent or internally lit awnings are proposed.

6. Sites shall be designed for pedestrians at a scale relative to street access, sidewalks, or an internal circulation network. Convenient and safe pedestrian access shall be provided between the public sidewalk and all building entrances.

   The site is primarily designed to accommodate motor vehicles. However, the site does provide safe pedestrian access between the public sidewalk and the building entrances.

7. Rear and side entrances should be provided where parking is in the rear or on the side of the building.

   Entrances are provided on three (3) sides of the building. Public entrances are available on two (2) sides of the building.

The applicant has not provided dimensional floor plans for the primary building.

Items to be Addressed: *1) Planning Commission to determine whether the proposal meets the Historic Highland Station Design Guidelines. 2) Applicant to provide dimensional floor plans.*

TRASH ENCLOSURE

A trash enclosure with a 35.5’ x 15’ concrete pad is located at the southeast corner of the site near the intersection of Ruggles Street and North Milford Road. The enclosure is 19’2” x 38’2” with two (2) gates allowing separate access to the eight (8) cubic yard trash container and the drum storage container, tech shed and recycle storage container.

The enclosure provided is seven (7) feet four (4) inches in height. The proposed material to be used for the enclosure is brick to match the primary building and materials of the gates is composite boards.

Items to be Addressed: *None.*

EXTERIOR LIGHTING

A lighting plan has been provided on Sheets A1.1-A1.5. A photometric plan indicates that the light levels at property lines are acceptable. Planned lighting includes downlighting, street wrap flex lighting, LED area luminaire lights, LED floodlights, and recessed LED canopy/ceiling lighting.

Per Section 9.05(G) of the Zoning Ordinance outdoor lighting standards in the Historic Highland Station District shall comply with the following:

1. Wall mounted light fixtures shall be coach-light type fixtures located at each entrance to the building. High-intensity, wall-pak style fixtures are not permitted.

   Outdoor recessed fixed downlighting is provided at each entrance to the building.

2. Recessed soffit or porch ceiling light fixtures may be permitted subject to a lighting and illumination level study that shall be approved by the Planning Commission.

   The applicant has proposed RCNY LED recessed canopy/ceiling lighting for the fuel station canopy. We note that this is typical for vehicle fuel stations. Also, the proposed street wrap lighting on the building could be a variety of colors and brighter than typical recessed soffit lighting.

3. Pole-mounted lighting intended for illumination of pedestrian pathways and on street parking shall be not more than twelve (12) feet high and shall provide ambient, indirect, shielded lighting and illumination levels meeting the standards set forth in Article 13, Lighting.

   The proposed D-Series Size 0 LED Area Luminaire lighting proposed meets these criteria.

4. Pole-mounted lighting intended for illumination of parking areas shall be not more than eighteen (18) feet high and shall provide ambient, indirect, shielded lighting and illumination levels meeting the standards set forth in Article 13, Lighting.

   The proposed D-Series Size 0 LED Area Luminaire lighting proposed meets these criteria.

5. An applicant shall prepare and submit a night lighting schedule describing the hours of operation for both business hours and non-business hours, intensity of the illumination, and lighting levels at the property line for Planning Commission review and approval.

   The applicant has provided a night lighting plan on Sheet A1.5. However, the hours of operation for both business hours and non-business hours have not been provided.

The applicant should provide the planned lighting color for each type of lighting fixture. The lighting should be clearly shown on the architectural plans.

Items to be Addressed: *1) Planning Commission to determine if the proposed recessed light fixtures and street wrap lighting are appropriate. 2) Applicant to provide the hours of operation for both business hours and non-business hours on Sheet A1.5. 3) Applicant to provided planned lighting color for each type of lighting fixture. 4) Depict lighting on architectural plans.*

SIGNS

The proposed signage has been reviewed for compliance with Section 9.05(H) of the Township Zoning Ordinance. Additional clarification and adjustments are necessary to ensure full compliance. Below is a summary of the review findings.

The submitted plans include a monument sign constructed from salvaged stone of the existing building with two (2) additional signs attached, a menu board, clearance bar noting the drive-through, a canopy mounted sign, and two (2) wall mounted signs located on the primary structure.

Architectural Integration and Pedestrian Scale

The proposed signs preserve the architectural and historical character of the area, meeting Section 9.05(H)(1). The monument sign incorporates salvaged stone from the existing building, creating a unique and complementary aesthetic. However, pedestrian-scaled signage (Section 9.05(H)(2)) is not fully addressed due to the automobile-oriented nature of the site. While this is understandable given the use, further efforts to incorporate pedestrian-friendly design elements could improve alignment with this standard.

Creative Design and Safety Compliance

The signage matches the proposed structures, aligning with Section 9.05(H)(3). The materials and illumination proposed do not pose safety concerns, fulfilling Sections 9.05(H)(4) and (5). However, we recommend the Planning Commission consider the impact of the lighting intensity and color on surrounding lots. Signs are appropriately scaled to the building, meeting Section 9.05(H)(6).

Dimensional, Material, and Illumination Regulations

Compliance with dimensional standards for sign area is not confirmed, as lineal building frontage measurements have not been provided for the wall-mounted signs and monument sign. See dimensional tables below. The freestanding sign exceeds the allowable height and area, requiring modification to meet ordinance requirements. The proposed illumination is compliant, and materials for the monument sign align with architectural standards.

Table 4. Wall Mounted Sign Requirements

Sign	Street Fronted	Lineal Feet of Frontage	Sign Square Feet	Complies
Sheetz Sign	Highland Road	Not Provided	16.55	Need More Information
MTO (Made to Order) Sign	Highland Road	Not Provided	21.44	Need More Information
Sheetz Sign	N Milford Road	Not Provided	16.55	Need More Information

Table 5. Wall Mounted Sign Height Requirements

Sign	Public Sidewalk or Public Thoroughfare	Height Provided	Complies
Sheetz Sign	Public Thoroughfare	Not Provided	More Information Needed
MTO (Made to Order) Sign	Public Sidewalk	9’ 2 5/8”	Complies
Sheetz Sign	Public Thoroughfare	Not Provided	More Information Needed

Table 6. Post and Arm Sign Height Requirements

Sign	Location	Height	Complies
Drive-Thru Clearance Bar & Sign	Drive-Thru Entrance	18 feet	Does not Comply
Drive-Thru Speaker Sign	Order point west of parking lot	13 feet	Does not Comply

Table 7. Post and Arm Sign Face Requirements

Sign	Location	Square Feet	Height	Complies
Drive-Thru Clearance Bar & Sign	Drive-Thru Entrance	6.36 sq. ft.	1’8”	Does not Comply
Drive-Thru Speaker Sign	Order point west of parking lot	4.69 sq. ft.	1’6”	Complies

Awning/Canopy and Wall-Mounted Signs

Canopy signage complies with placement and area limitations under Section 9.05(H)(7). Wall-mounted signs meet placement and proportionality standards; however, height details for some signs are incomplete. Additional information on building frontage and sign dimensions is necessary to confirm compliance with allowable sign area.

Freestanding and Post-and-Arm Signs

The proposed freestanding sign does not meet the height and area limitations outlined in Section 9.05(H)(7)(h). Similarly, the drive-through clearance bar and speaker post-and-arm signs exceed height and area limits, requiring revision. Planning Commission approval will be needed to determine compliance with setback requirements for these elements.

We recommend the applicant consider incorporating pedestrian-friendly signage elements where feasible to enhance adherence to the Highland Station Historical District.

Items to be Addressed: *1) Applicant to provided lineal footage of building frontage for all applicable signs. 2) Modify the freestanding and post-and-arm signs to meet height and area limitations.*

SPECIAL LAND USE STANDARDS

Section 6.03(H) lists the standards for all special land uses. Prior to making a recommendation to the Township Board, the Planning Commission must make a determination on the special land use based on these standards.

1. **All special land uses shall be designed, located, planned and operated so that the public health, safety and welfare will be protected.**

CWA COMMENTS: This standard can be met as a gas station is an automobile-intensive use that is oriented towards M-59, provided the Planning Commission feels the site lends to the town's spirit and differentiates from other developments along the M-59. However, additional measures should be taken to ensure that the surrounding properties are not negatively impacted. Specifically, the intensity of proposed lighting throughout the site raises concerns regarding potential light spillover and glare onto adjacent properties, which could negatively affect neighboring residents or businesses. Additionally, appropriate screening should be provided to mitigate the impact of vehicle headlights on surrounding properties, ensuring that the development is compatible with the character of the area and minimizes disruptions to its surroundings.

2. **The Special Land Use will be consistent with the stated intent of the zoning district.**

CWA COMMENT: The standard is met if the Planning Commission feels that construction of the gas station is compatible with the less intensive surrounding land uses.

Vehicular fueling stations are allowed as a special land use in the HSC zoning district along M-59, with the assumption that they could be compatible with the surrounding uses.

3. **The proposed special land use shall be in general agreement with the Master Plan designation for the area where the use is proposed.**

CWA COMMENTS: The standard is met if the Planning Commission finds that the proposed construction along M-59 is in line with the Highland Station Guidelines and is unique in design.

4. **All special land uses shall provide facilities for safe and convenient vehicular and pedestrian traffic, including but not limited to: turning movements, traffic flow, proximity and relationship to intersections, adequacy of sight distances, location and access of off-street parking, and provisions for pedestrian traffic.**

CWA COMMENTS: The standard can be met. We defer to Township staff, engineering, and Fire Department for comments. However, we note that the applicant has provided a vehicular traffic plan and has proposed a potential sidewalk extension.

5. **All special land uses shall be designed, constructed and operated in a manner that prevents detrimental impacts to surrounding properties such as noise, dust, fumes, smoke, air, water, odor, light and/or vibration, etc. The special land use shall be designed, constructed and operated in a manner that does not detract from area aesthetics.**

CWA COMMENTS: The standard can be met with recommendations from the Planning Commission on appropriate screening between uses and layout of the site. The applicant should provide additional lighting details to ensure that excessive lighting does not spill onto neighboring properties.

6. **The proposed special land use shall not unreasonably burden the capacity of public services and/or facilities.**

CWA COMMENTS: We defer to Township staff and engineering.

7. **The proposed special land use shall comply with any specific standards set forth in Article 10, Supplemental Use Regulations, that are applicable to the use.**

CWA COMMENTS: Vehicular fueling stations are not listed in Article 10.

Items to be Addressed: *Planning Commission determination on whether the proposal meets the Special Land Use standards.*

RECOMMENDATIONS

We recommend the following items be addressed by the applicant before the Planning Commission takes action:

1. *Provide lineal footage of building frontage for all applicable signs.*

2. *Modify the freestanding and post-and-arm signs to meet height and area limitations.*

3. *Provide planned lighting color for each type of lighting fixture.*

4. *Depict lighting on architectural plans.*

5. *Provide certified topographic survey on Sheets V1.0 & V1.1.*

6. *Include a graphic scale on all sheets throughout the submitted plans.*

7. *Show the required 10 stacking spaces at the drive-through.*

8. *Provide 2 longer parking spaces able to accommodate recreational vehicles as noted in Section 11.02.*

9. *Provide circulation plan which displays a refuse vehicle route, how the loading space will be accessed, and the route for drive-through traffic.*

10. *Provide an additional 3,591 square feet of landscaping.*

11. *Provide the hours of operation for both business hours and non-business hours on Sheet A1.5.*

12. *Provide the material proposed for the enclosure gates.*

13. *Provide dimensional floor plans.*

The Planning Commission should make the following decisions as part of their recommendation:

1. *Planning Commission to determine if the architectural elements of the roof justify a greater height to complement the primary structure.*

2. *Planning Commission to determine appropriate setbacks and landscape buffers following review of surrounding neighborhoods.*

3. *Planning Commission to consider location of the proposed loading/unloading zone.*

4. *Planning Commission to consider the Highland DDA's review of the landscaping plan. Further comment is deferred to the HDDA. The Planning Commission should take their recommendations into account when making the final determination on the suitability of any landscape plan for this site.*

5. *Planning Commission to determine whether the proposal meets the Historic Highland Station Design Guidelines. Further comments should be directed to the HDDA, and*

recommendations from the HDDA should be considered in the Planning Commission's final determination of the suitability of any landscape plan for this site.

6. *Planning Commission to determine if the proposed recessed light fixtures are appropriate.*

7. *Planning Commission determination on whether the proposal meets the Special Land Use standards.*

Respectfully submitted,

CARLISLE/WORTMAN ASSOC., INC.
Megan Masson-Minock, AICP
Principal

CARLISLE/WORTMAN ASSOC., INC.
Grayson Moore
Community Planner

Memo: To Highland Township Planning Commission

From: Cassie Blascyk - HDDA Design Committee Chairperson

Date: January 23, 2025

Re: Sheetz Site Review

The Highland DDA Design Committee convened on January 14th to review the proposed Sheetz development at the intersection of Highland Road and Milford Road. The committee utilized the Highland Station Design Guide to evaluate the property and identified several positive aspects of the design, as well as areas of concern.

Positive Aspects:

- **Monument Signage:** The design integrates the existing historic stone from the on-site home into the new signage, preserving a connection to the area's history and heritage.
- **Pedestrian Accessibility:** The inclusion of awnings, attractive entryways, facade and eave lighting, and outdoor cafes fosters walkability and creates a welcoming atmosphere.
- **Screening and Utilities:** Thoughtful consideration has been given to the screening of trash and utility areas.
- **Sidewalks and Building Accessibility:** Brick paver walkways enhance pedestrian access and connectivity.
- **Timeless, High-Quality Building Materials:** The use of brick, stone, and metal contributes to a durable and visually appealing structure.
- **Proper Scale and Massing of Design:** The design appropriately considers the surrounding structures' materials, mass, and scale, while incorporating historic influences such as a mansard roof and cupola.
- **Gas Pumps and Awning:** The gas pump area features carefully designed details, such as trusses and stone column bases, contributing to the aesthetic appeal.

Concerns:

- **Landscape Design:** The current landscape plan lacks seasonal variety and contributes to a somewhat closed-off, fortress-like feel around the site. The committee is drafting recommendations to address this by introducing different plant species to enhance the overall aesthetic and openness of the site.

Recommendations:

1. Revise the landscape design to include plants that offer year-round interest, creating a more open and inviting entry into Highland Station.
2. Introduce character and accent fencing in strategic locations within the landscape.
3. Install gateway signage along the northeast property line to create a "Welcome to Highland Station" effect, enhancing the sense of arrival.
4. The township should consider purchasing a new, larger digital sign to be placed on the monument to better utilize available space and replace the current "seal."

We look forward to discussing these suggestions further with the Planning Commission and refining the design to better align with the vision for the Highland Station area.

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

105 W Grand River Avenue
Howell, MI 48843

517-552-9199

www.hrcengr.com

January 10, 2025

Highland Township
205 North John Street
Highland, MI 48357

Attn: Ms. Beth Corwin, P.E.
Planning & Development Director

Re: Site Plan Review
Sheetz Highland
Sidwell Nos. 11-22-352-010, 11-22-352-011, 11-22-352-005 & 11-22-352-006

HRC Job No. 20240432.02

Dear Ms. Corwin:

As requested, this office has reviewed the plans for the above-mentioned project as prepared by Kimly Horn (dated December 18, 2024). The proposed improvements include a new fuel station on existing properties at the northeast corner of Highland Road and N. John Street. We have the following comments:

Water Supply

1. A water main extension from the water main on the east side of N. Milford Road is proposed along Ruggles Street, John Street and on the property of Highland Elementary. The proposed water main will be required to be designed in accordance with Highland Township Engineering Design Standards and will require the review and approval of the Oakland County Water Resources Commissioner's Office (WRC). Additional hydrants and valves will be needed once the water main route has been finalized.

2. The water main connection at N Milford Road should connect to the existing 8 inch stub and the crossing of N Milford Road will need to be jack and bored.

Wastewater Disposal

1. The plans indicate that a proposed septic system will provide wastewater disposal for this site on the vacant lot on the west side of N. John Street. This will require the review and approval of the Oakland County Department of Environmental Health and will require easements shown on the plans.

Storm Water Management

1. All proposed storm sewer improvements will need to be designed in accordance with Highland Township Engineering Design Standards.

2. Storm water detention will be provided in an underground detention system which outlets to N Milford Road. The underground detention system will be required to meet the design requirements of the Oakland County WRC. Soil boring info showing the ground water level will need to be added to the plans.

Paving and Grading Improvements

1. The proposed paving and grading improvements will need to be designed in accordance with Highland Township Engineering Design Standards.

2. A permit from the Road Commission for Oakland County (RCOC) will be required for the proposed work within the rights-of-way on N. Milford Road, Ruggles Street and N. John Street.

3. Site circulation will need to be reviewed and approved by the Township Planner and Fire Department.

Soil Erosion Control

1. The Soil Erosion and sediment control plans will require the review and permitting of the Oakland County Water Resources Commission.

Summary

Subject to the above items being addressed in construction drawings, this office does not object to the proposed site plan. This office is available to discuss any of these comments with the applicant prior to submittal of the construction drawings. If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Michael P. Darga, P.E.

MPD/mpd

pc: Highland Township; R. Hamill
HRC; R. Alix, File

Charter Township of Highland - Fire Department

1600 W. Highland Rd.
Highland, MI 48357
(248)887-9050

Re: 155 Highland Rd.
Highland, MI 48357**

January 16, 2025

To Whom It May Concern:

**Project Overview: Proposed site plan for a Sheetz Convenience store/ restaurant and gas station at 155 Highland Rd.

I have reviewed the site plan for the proposed project at the above location, and I am pleased to approve the submitted plans.

Please note that review and approval by the Authority Having Jurisdiction does not relieve the applicant of their responsibility to comply with all applicable codes.

If you have any questions regarding this plan review report, please do not hesitate to contact me.

Respectfully submitted,

Shawn Bell
Fire Marshal
Highland Township Fire Department

SHEETZ

TRAFFIC IMPACT STUDY

Highland Charter Township, Oakland County, MI

Cincar Consulting Group, LLC

17199 N. Laurel Park Drive, Suite 204
Livonia, MI 48152

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1.0 Introduction

This study summarizes the methodologies and results of the Traffic Impact Study (TIS) conducted for a proposed Sheetz store in Highland Charter Township, Oakland County, Michigan. The project site is on the southwest corner of the M-59 (Highland Road) and N Milford Road intersection. Critical intersections within a one-mile radius of the proposed development are listed below and shown in **Figure 1**.

1. N Milford Road & E Wardlow Road/Apollo Center Driveway
2. M-59 (Highland Road) & N Milford Road
3. N Milford Road/S Milford Road & W Livingston Road/E Livingston Road
4. M-59 WB & M-59 EB Crossover
5. M-59 EB & M-59 WB Crossover

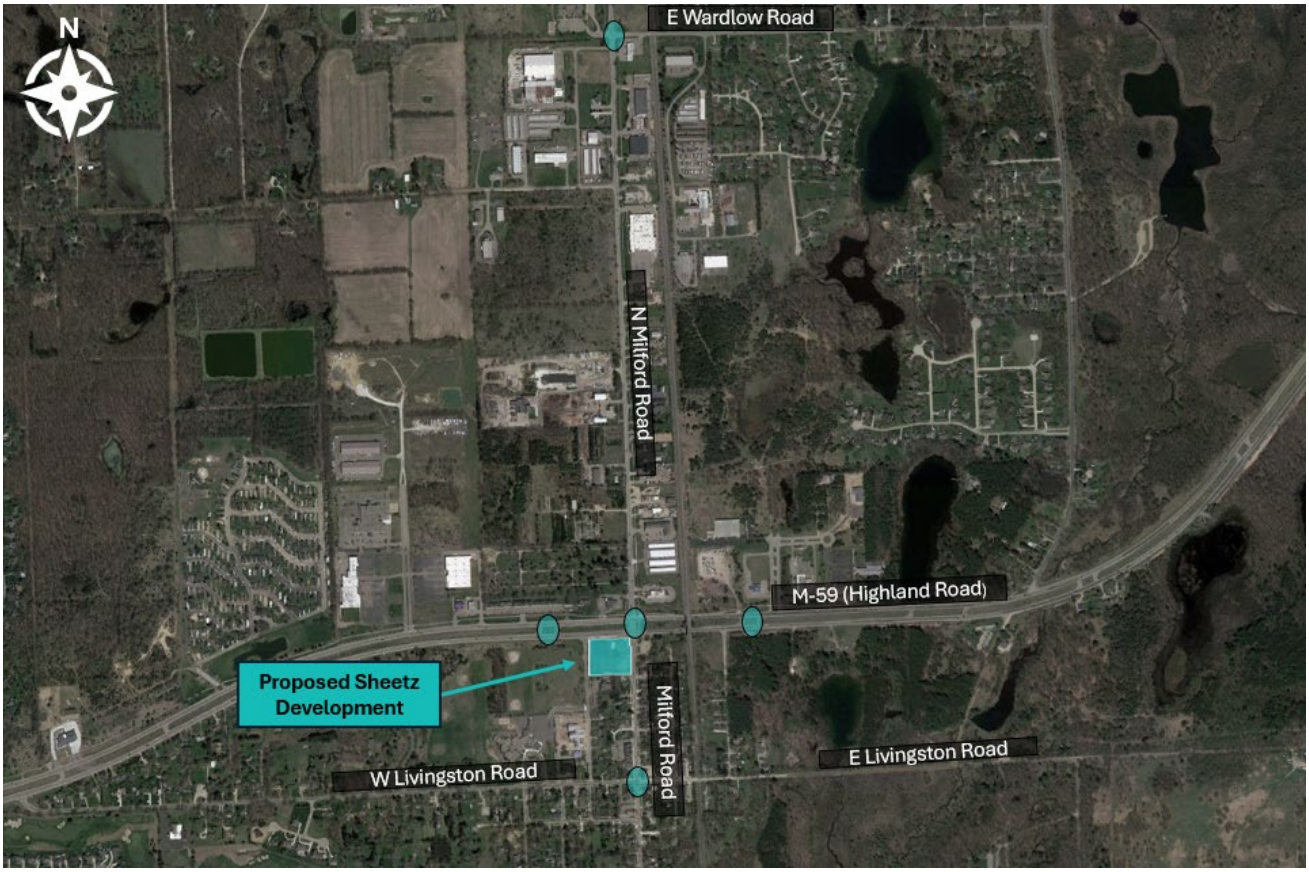


Figure 1: Study Area Intersections

The proposed development will contain a Sheetz Gas Station with 14 vehicle fueling stations, a retail store (6,139 sq. ft.), and a fast-food restaurant with a single drive-through lane and no indoor seating. A total of 41 parking spots are proposed for the site. The proposed development site currently houses an unoccupied lumber company and a cell phone store. The proposed development is expected to be completed and open for business in 2026. The proposed site will

have two access points. One to the east of the project site on N Milford Road and one to the west on N John Street. All access points will allow unrestricted inbound and outbound access via left and right turns. The proposed development will feature a dedicated one-way circulation infrastructure for the restaurant drive-through lane, and a bidirectional circulation network for other portions of the site.

The proposed concept for this development is provided in **Appendix A**.

2.0 Background Information

This section of the study reviews existing roadways, intersections, volumes, and levels of service.

2.1 Roadways

SEMCOG's national functional classification of roads map shows M-59 (Highland Road) is classified as a principal arterial. N Milford Road/S Milford Road are classified as minor arterials. E Wardlow Road is classified as a major collector. W Livingston Road/E Livingston Road is an uncertified roadway. The functional classification of all streets within the study area is shown in **Figure 2**. Roadway features are summarized in **Table 1**.

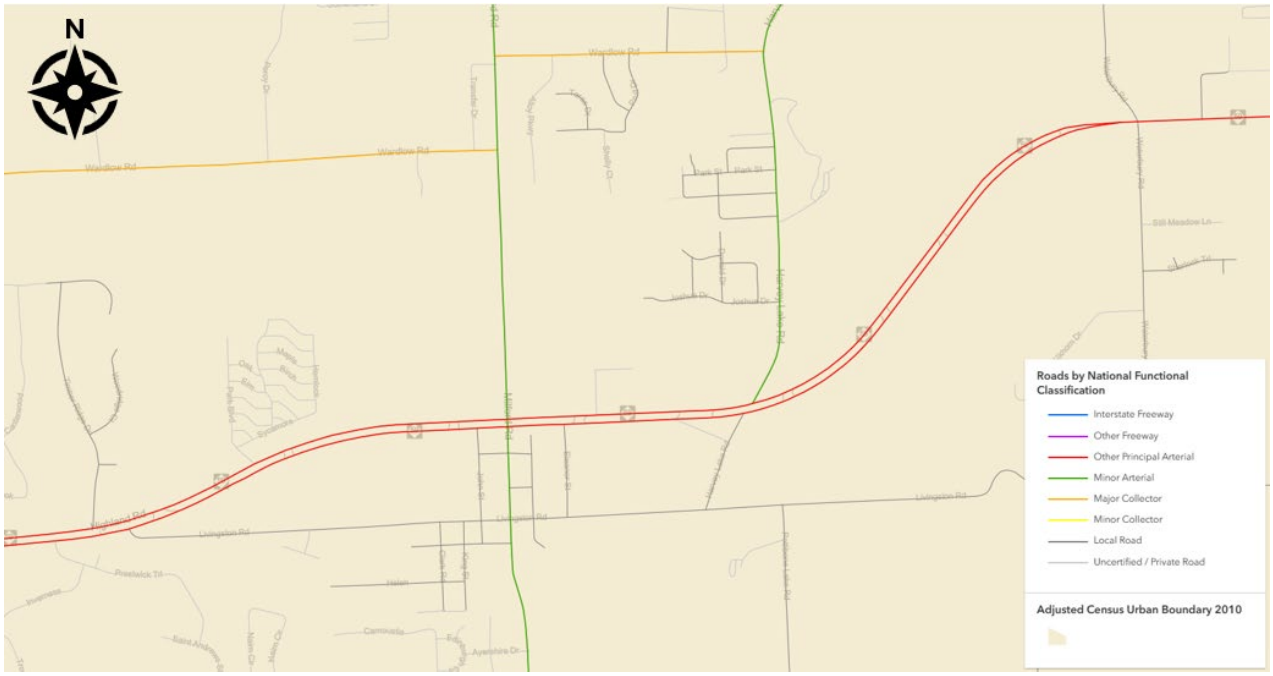


Figure 2: Functional Classification Map for Streets in the Study Area

Table 1: Existing Roadway Conditions

Roadway	Functional Class	Orientation (Study Area)	No. Travel Lanes	Median Type	Speed Limit (mph)	Non-Motorized Accommodations		Adjacent Land Uses		
						Pedestrian	Bicycle	Commercial	Residential	Institutional
M-59 (Highland Road)	Principal Arterial	East/West	4	Grass	55	●		●		●
N Milford Road	Principal Arterial	North/South	2	N/A	45	●		●	●	●
S Milford Road	Minor Arterial	North/South	2	N/A	35	●		●	●	●
E Wardlow Road	Principal Arterial	East/West	2	N/A	35	●		●	●	
E Livingston Road	Local	East/West	2	N/A	35	●		●	●	
W Livingston Road	Local	East/West	2	N/A	35	●			●	●

2.2 Intersections

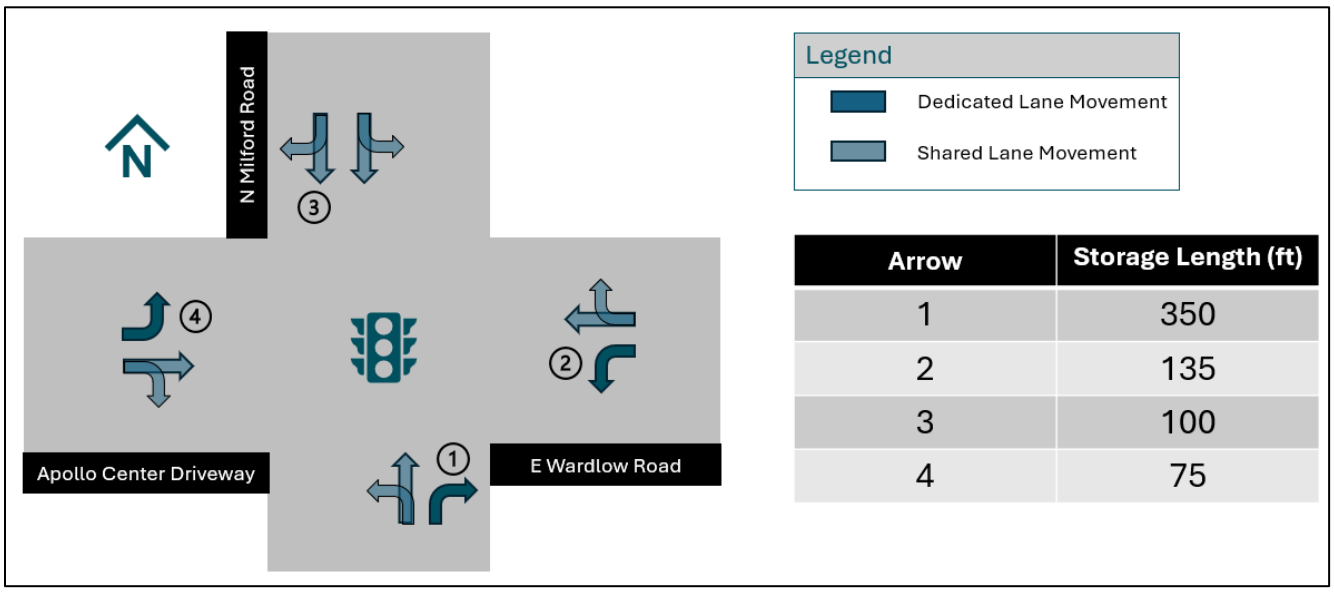
Of the five intersections that were analyzed in this traffic impact study four are signalized. Intersection attributes, including signal heads, coordination, crosswalks, pedestrian facilities, and curb ramps designed to conform to American with Disabilities Act (ADA) guidelines are discussed below.

1. N Milford Road and E Wardlow Road

a. The intersection at N Milford Road and E Wardlow Road is signal controlled. The intersection has span-wire mounted signals. All signal heads are three-section vertical heads with solid indications. **Figure 3** illustrates the geometry of the intersection.

b. The intersection is not located within a SCATS (Sydney Coordinated Adaptive Traffic System) corridor system.

c. There is a marked crosswalks on the south and west legs of the intersection with pedestrian countdown signal heads in the northwest, southwest, and southeast corners. There are no pedestrian pushbuttons within the intersection. The curb ramps are missing the detectable warning surface.



Arrow	Storage Length (ft)
1	350
2	135
3	100
4	75

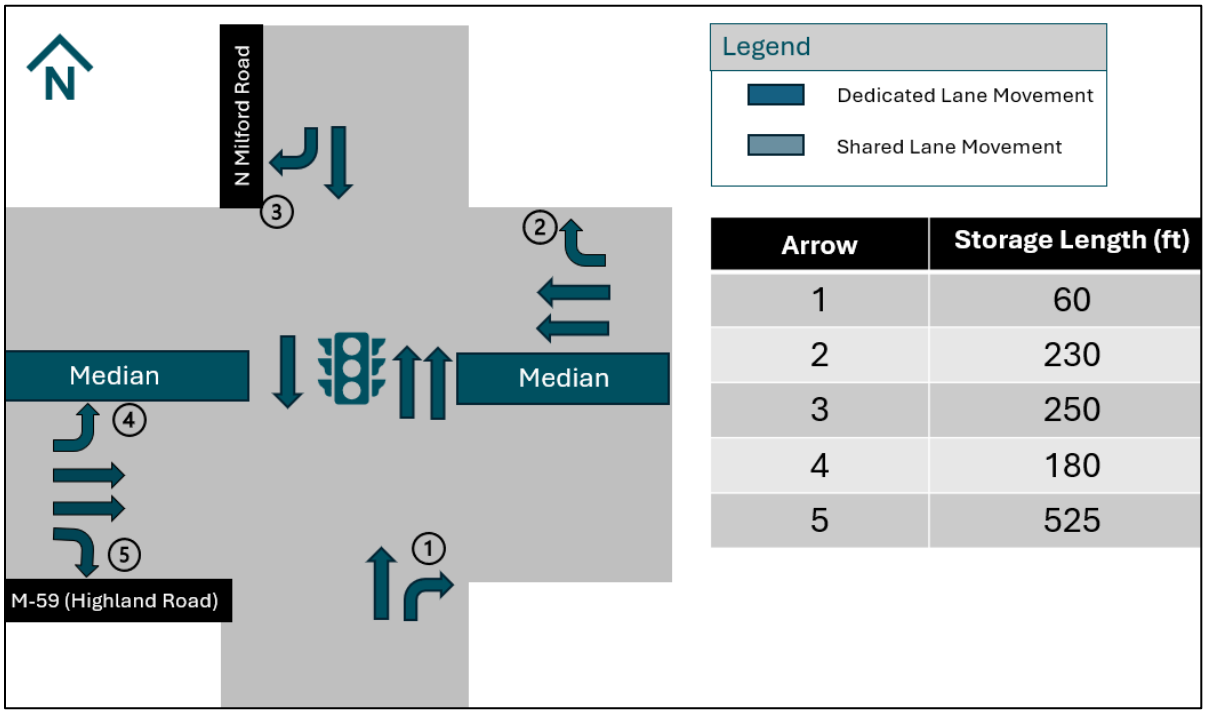
Figure 3: Intersection Lane Configuration (N Milford Road and E Wardlow Road)

2. M-59 (Highland Road) and N Milford Road

a. The intersection at M-59 (Highland Road) and N Milford Road is signal controlled. The intersection has span-wire mounted signals. All approaches have three-section vertical heads with solid indications. **Figure 4** illustrates the geometry of the intersection.

b. The intersection is not located within a SCATS corridor system.

c. There are marked crosswalks on each leg of the intersection with ADA curb ramps and pedestrian countdown signal heads in each quadrant. There are pedestrian pushbuttons adjacent to each crosswalk within the intersection.



Arrow	Storage Length (ft)
1	60
2	230
3	250
4	180
5	525

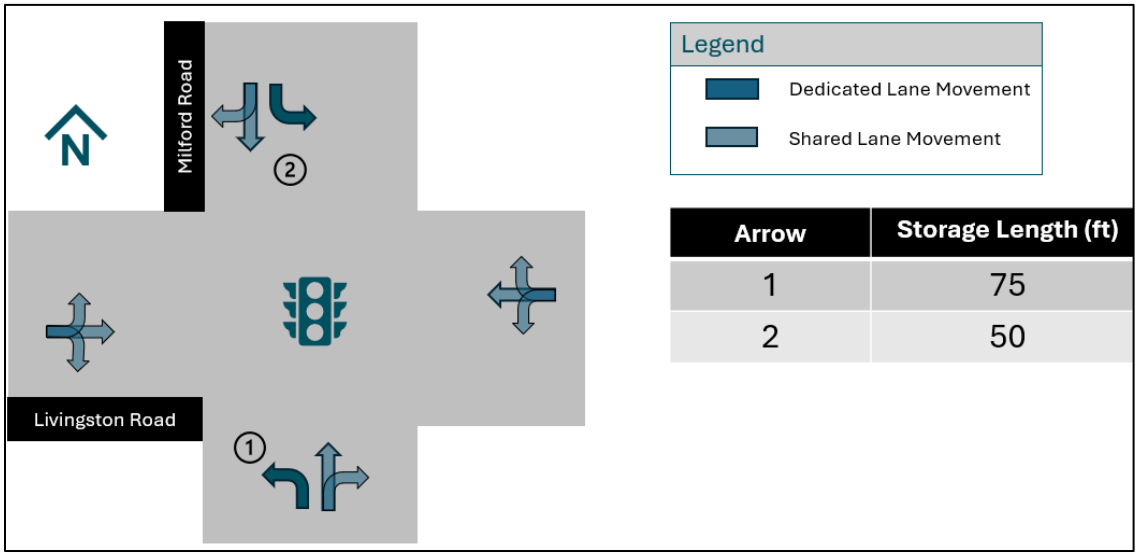
Figure 4: Intersection Lane Configuration (M-59 and N Milford Road)

3. N Milford Road/S Milford Road and W Livingston Road/E Livingston Road

a. The intersection at N Milford Road/S Milford Road and W Livingston Road/E Livingston Road is signal controlled. The intersection has span-wire mounted signals. All approaches have three-section vertical heads with solid indications. **Figure 5** illustrates the geometry of the intersection.

b. The intersection is not located within a SCATS corridor system.

c. There are marked crosswalks on each leg of the intersection. ADA curb ramps and pedestrian countdown signal heads facilitate pedestrian use on each leg of the intersection. There are no pedestrian pushbuttons within the intersection.



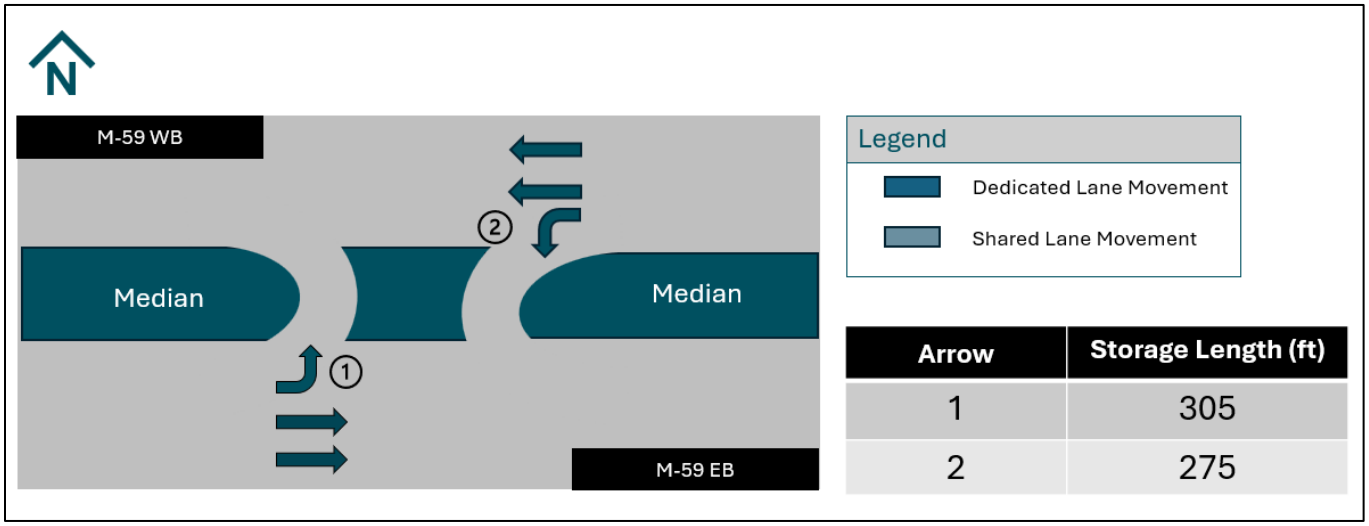
Arrow	Storage Length (ft)
1	75
2	50

Figure 5: Intersection Lane Configuration (N Milford Road/S Milford Road and W Livingston Road/E Livingston Road)

4. M-59 WB and M-59 EB Crossover

a. The M-59 WB and M-59 EB crossover is stop controlled with M-59 WB mainline running free. **Figure 6** illustrates the geometry of the intersection.

b. There are no pedestrian facilities located within the intersection.

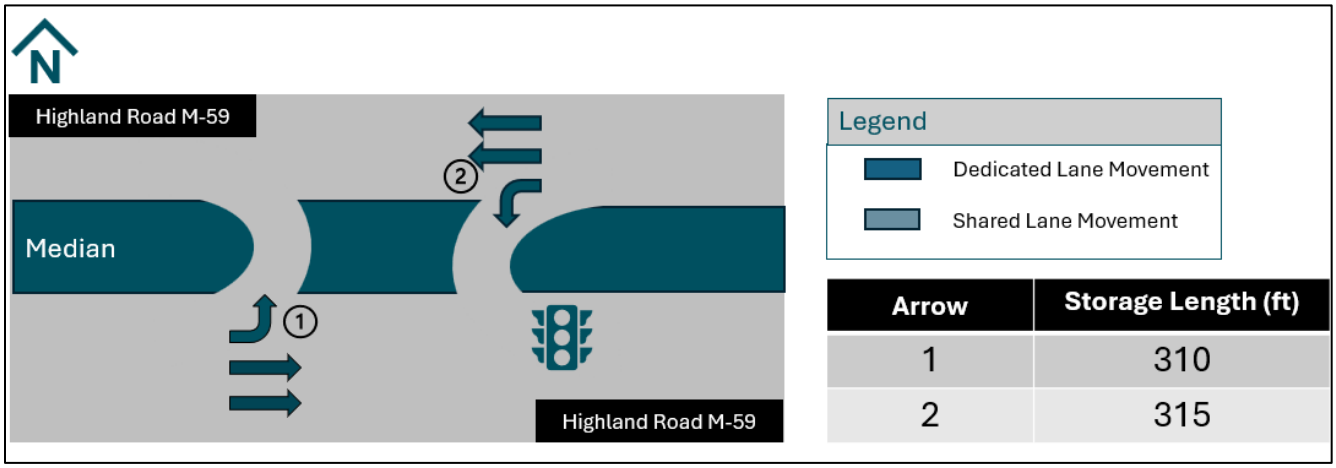


Arrow	Storage Length (ft)
1	305
2	275

Figure 6: Intersection Lane Configuration (M-59 WB and M-59 EB Crossover)

5. M-59 EB and M-59 WB Crossover

a. The M-59 EB and M-59 WB crossover is signal controlled. The intersection has span-wire mounted signals. All approaches have three-section vertical heads with solid indications. **Figure 7** illustrates the geometry of the intersection.
b. The intersection is not located within a SCATS corridor system.
c. There are no pedestrian facilities located within the intersection.



Arrow	Storage Length (ft)
1	310
2	315

Figure 7: Intersection Lane Configuration (M-59 EB and M-59 WB Crossover)

2.3 Land Use

The proposed development area is currently zoned under Commercial/Office and Public/Institutional. The proposed development site currently houses an unoccupied lumber company and a cell phone store. Land uses adjacent to the proposed development include Commercial/Office, Public/Institutional, and varying forms of single family. Zoning designations of the proposed site and surrounding areas are illustrated in **Figure 8.**

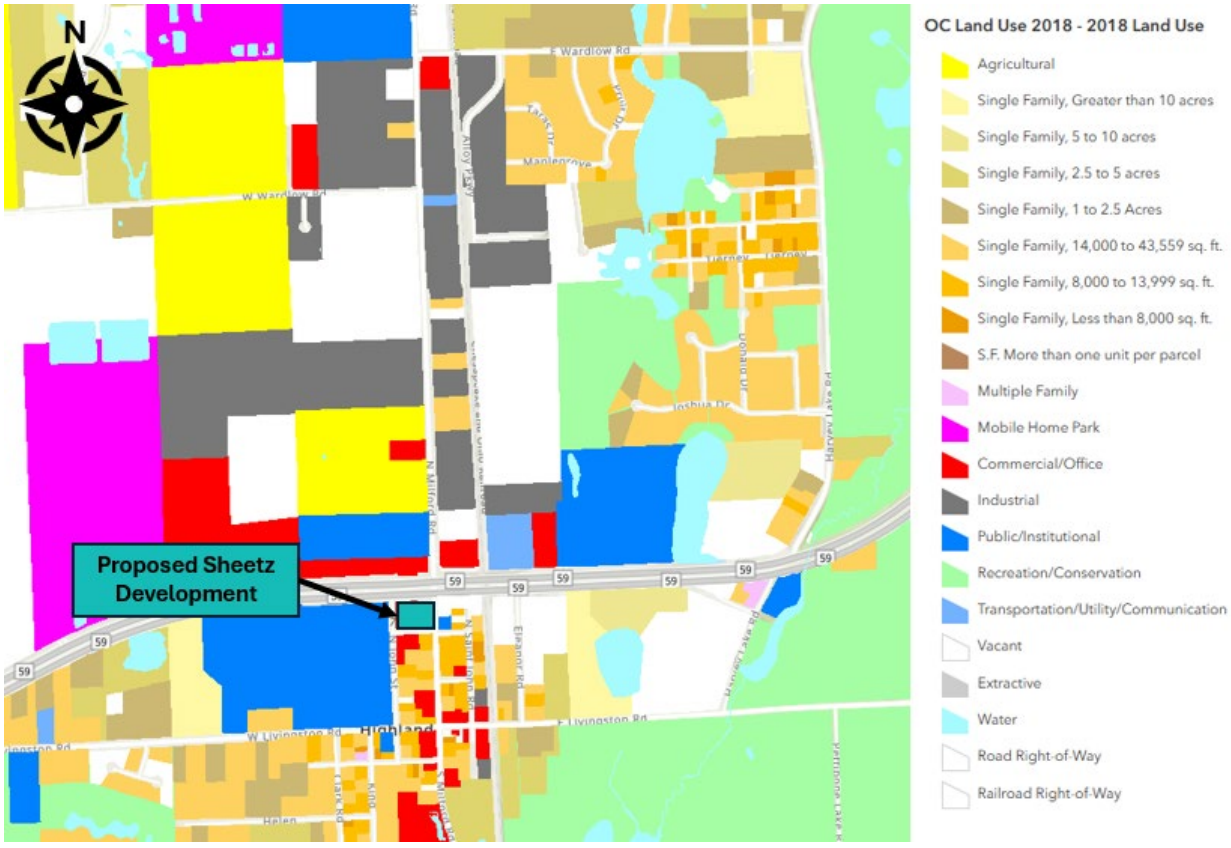


Figure 8: Highland Charter Township Zoning Map

3.0 Existing Traffic Operations

This section of the report summarizes the existing traffic and safety operations.

3.1 Existing Traffic Counts

Existing peak period turning movement counts were collected at study intersections on Thursday, April 25, 2024.

Volumes were collected in 15-minute intervals between 7:00 AM and 9:00 AM in the morning peak period and between 4:00 PM and 6:00 PM in the evening peak period, with several counts being for the entire 24-hours. Counts were collected during typical traffic conditions while local schools were in session. No inclement weather, construction, or traffic incidents were concurrent with count collection activities. Volumes collected show a breakdown of all vehicle types including passenger vehicles, heavy vehicles, buses, pedestrians, and cyclists. **Table 2** summarizes AM and PM peak hours at study intersections. Raw traffic counts are provided in **Appendix B**.

Table 2: Study Intersection and Peak Hours

Intersection	AM Peak Hour	PM Peak Hour
N Milford Road & E Wardlow Road	7:15 AM – 8:15 AM	4:00 PM – 5:00 PM
M-59 & N Milford Road	7:30 AM – 8:30 AM	4:15 PM – 5:15 PM
N Milford Road/S Milford Road & W Livingston Road/E Livingston Road	7:00 AM – 8:00 AM	4:45 PM – 5:45 PM
M-59 WB & M-59 EB Crossover	8:30 AM – 9:30 AM	4:45 PM – 5:45 PM
M-59 EB & M-59 WB Crossover (Signalized)	7:45 AM – 8:45 AM	4:15 PM – 5:15 PM

The Michigan Department of Transportation (MDOT) *Electronic Traffic Control Devices Guidelines*[1] states that peak hours of each intersection should be utilized to determine the network peak hours of the study area. Analysis of volumes collected at project intersections indicates that the highest network hourly volumes occur between 7:30 AM and 8:30 AM during the morning peak period, and between 4:15 PM to 5:15 PM during the afternoon peak period. Existing condition network AM and PM peak hour turning movement volumes are illustrated in **Figure 9.**

[1] MDOT, *Electronic Traffic Control Devices Guidelines*. (2021) https://mdotjboss.state.mi.us/

Figure 9: Existing Peak Hour Traffic Volumes

3.2 Existing Measures of Effectiveness (MOEs)

Control delay and Level of Service (LOS) at project intersections were determined via Synchro 11, which calculates operational metrics using methodologies consistent with those in the *Highway Capacity Manual*[2] (HCM). LOS, which ranges between A and F, is an operational metric that ranks an approach or intersection based on average control delay per vehicle. Average control delay per vehicle includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS A represents traffic conditions with minimal amounts of delay while LOS F represents conditions with severe congestion and delay. LOS D designation or better is considered acceptable in urban areas. HCM LOS rankings and delay thresholds are summarized in **Table 3**.

Table 3: Highway Capacity Manual Intersection LOS Criteria

LOS	Brief Description	Unsignalized Average Delay [B] (s/veh)	Signalized Average Delay (s/veh)
A	Excellent operational levels with minimal or no delay.	0 - 10	0 - 10
B		> 10 - 15	> 10 - 20
C	Typical operational levels with moderate delay.	> 15 - 25	> 20 - 35
D		> 25 - 35	> 35 - 55
E	Operational levels with severe congestion and delay. [A]	> 35 - 50	> 55 - 80
F		> 50	> 80

[A] *Mitigation or improvements are usually considered with LOS E and LOS F designations.*
[B] *Overall intersection LOS and delay values at two-way stop-controlled intersections are equivalent to LOS and delay values of the worst performing stop-controlled approach per HCM guidance.*

Traffic signal permits for project intersections were requested from and provided by the Road Commission for Oakland County (RCOC). Signal phasing, timing, and coordination patterns from the permits were entered into Synchro models in addition to lane configurations and AM and PM peak hour volumes. Traffic signal permits provided by RCOC permits are provided in **Appendix C.**

Synchro reports for 2024 Existing Conditions AM and PM peak hours are provided in **Appendix D**. Intersection delay and LOS for 2024 Existing Conditions AM and PM peak hours are summarized in **Table 4**, which also includes delay from SimTraffic (microscopic simulation model).

[2] National Academies of Sciences, Engineering, and Medicine. 2022. *Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis*. Washington, DC: The National Academies Press.

Table 4: 2024 Existing AM and PM Peak Hour Intersection Levels of Service

Node #	Location	Movement	AM Peak			PM Peak		
			Synchro Results		SimTraffic Results	Synchro Results		SimTraffic Results
			Delay	LOS	Delay	Delay	LOS	Delay
1001	M-59 EB & N Milford Road	EBL	8.5	A	17.6	78.0	E	36.3
		EBT	10.0	B	6.8	10.8	B	8.4
		EBR	2.4	A	3.3	2.5	A	3.6
		NBT	24.3	C	22.6	37.7	D	24.9
		NBR	6.4	A	7.4	27.5	C	15.0
		SBT	4.6	A	3.9	6.4	A	3.4
		Overall	**8.8**	**A**	**7.9**	**20.1**	**C**	**12.3**
1101	M-59 EB & M-59 WB Crossover	EBT	5.2	A	4.3	7.0	A	5.0
		SBL	23.3	C	7.7	23.7	C	7.2
		Overall	**8.2**	**A**	**4.9**	**10.2**	**B**	**5.4**
1309	N Milford Road & E Wardlow Road/Apollo Center Driveway	EBL	17.7	B	20.7	20.0	B	39.8
		EBT/EBR	8.8	A	7.8	13.5	B	17.9
		WBL	21.7	C	19.1	26.0	C	30.8
		WBT/WBR	7.2	A	9.9	7.3	A	14.0
		NBL/NBT	11.5	B	9.1	12.1	B	8.0
		NBR	3.0	A	1.9	1.9	A	2.0
		SB	11.3	B	12.9	9.3	A	12.4
		Overall	**11.9**	**B**	**11.4**	**11.1**	**B**	**11.2**
2001	M-59 WB & N Milford Road	WBT	14.0	B	11.6	18.3	B	15.3
		WBR	2.4	A	3.0	3.9	A	5.4
		NBT	17.5	B	16.6	13.4	B	11.9
		SBT	38.2	D	27.5	34.2	C	24.7
		SBR	22.0	C	8.3	23.7	C	8.6
		Overall	**19.1**	**B**	**14.3**	**19.1**	**B**	**14.7**
3001	N Milford Road/S Milford Road & W Livingston Road/E Livingston Road	EB	10.1	B	11.5	10.5	B	15.2
		WB	20.3	C	17.8	26.5	C	23.4
		NBL	7.2	A	16.4	9.1	A	20.3
		NBT/NBR	7.6	A	7.3	11.2	B	12.3
		SBL	6.6	A	12.2	6.7	A	18.6
		SBT/SBR	10.6	B	10.0	10.7	B	9.9
		Overall	**10.2**	**B**	**10.1**	**11.9**	**B**	**12.7**

Under the 2024 Existing Conditions scenario, all intersections and individual approaches, except for M-59 EB at N Milford Road, operate at LOS D or better during both the AM and PM peak hours. At the intersection of M-59 EB at N Milford Road, the EBL approach operates at LOS E

during the PM peak hour. This appears to be due to the lack of storage in the median between the two signals. Minimal eastbound left-turning vehicles are able to make the movement each cycle length but fill the storage between the signalized intersections which blocks additional eastbound left-turning vehicles from making the movement causing a delay for those vehicles that cannot make the movement during the same cycle length.

3.3 Safety Analysis

Crash analyses of the study area were performed for a five-year period between January 1, 2018, and December 31, 2022. Crash data for 2023 was unavailable at the time of this study. Crashes were obtained from *Michigan Traffic Crash Facts*[3] (MTCF) website. Crash data between 2020 and 2021 may have presented anomalies due to the COVID-19 pandemic.

Crash analyses of the study area involved quantitative assessments of KABCO injury severity classifications and crash types. **Table 5** displays Federal Highway Administration (FHWA) crash injury classifications and definitions used within the state of Michigan.[4]

Table 5: KABCO Injury Classifications

KABCO	Injury Severity Classification
K	Fatal Injury
A	Incapacitating Injury
B	Non-incapacitating Evident Injury
C	Possible Injury
O	No Injury

Safety analyses were conducted for each of the intersections in the study area. Corridor crashes were obtained from MTCF by selecting specific intersection nodes.

3.3.1 N Milford Road and E Wardlow Road

Between 2018 and 2022, 12 crashes occurred at N Milford Road and E Wardlow Road. The crash types with highest frequencies from the five-year period were rear-end/rear-end left turn (75%). Remaining crash types are summarized in **Figure 10**. **Table 6** summarizes N Milford Road and E Wardlow Road intersection crashes by KABCO injury classification.

[3] *Michigan Traffic Crash Facts, https://michigantrafficcrashfacts.org/*
[4] FHWA, *KABCO Injury Classification Scale and Definitions*, https://safety.fhwa.dot.gov/hsip/spm/conversion_tbl/pdfs/kabco_ctable_by_state.pdf

Table 6: N Milford Road and E Wardlow Road KABCO Crashes (2018-2022)

Crash Type	2018	2019	2020	2021	2022	Total	% Total
O (No Injury)	0	3	0	3	3	**9**	**75%**
C (Possible Injury)	1	0	1	1	0	**3**	**25%**
Total	**1**	**3**	**1**	**4**	**3**	**12**	

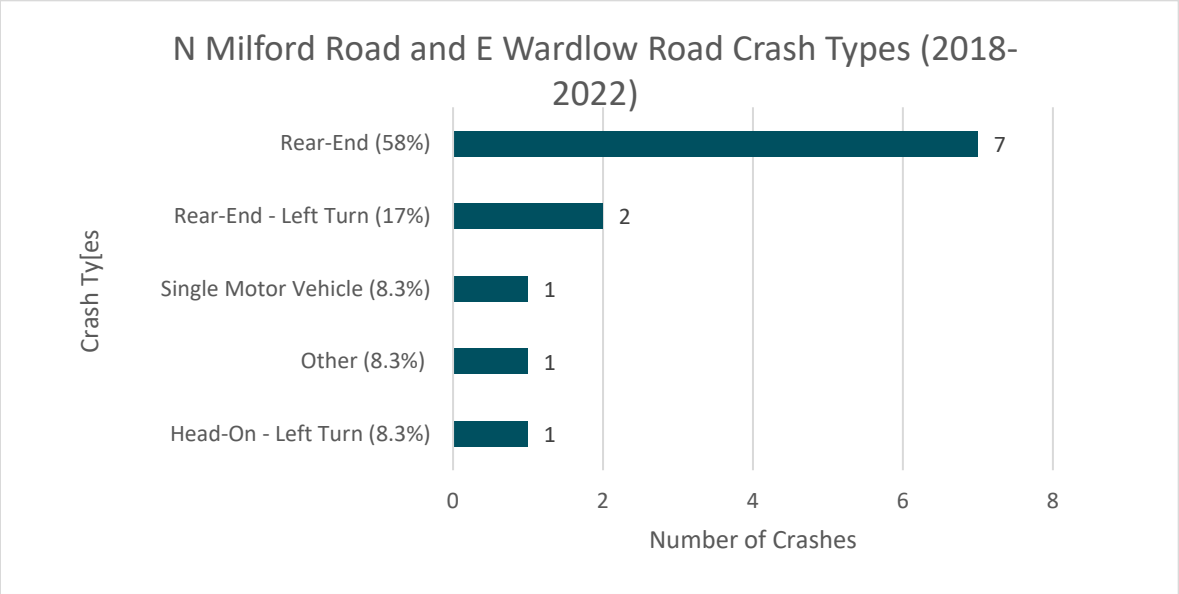


Figure 10: Crash Types at N Milford Road and E Wardlow Road, 2018-2022

3.3.2 M-59 and N Milford Road Intersection Crashes

Between 2018 and 2022, 75 crashes were reported at the intersection at M-59 and N Milford Road. Rear-end type crashes accounted for 37 (49%) of the crashes. There were also 22 angle crashes (29%). Remaining crash types are summarized in **Figure 11. Table 7** summarizes intersection crashes by KABCO injury classification.

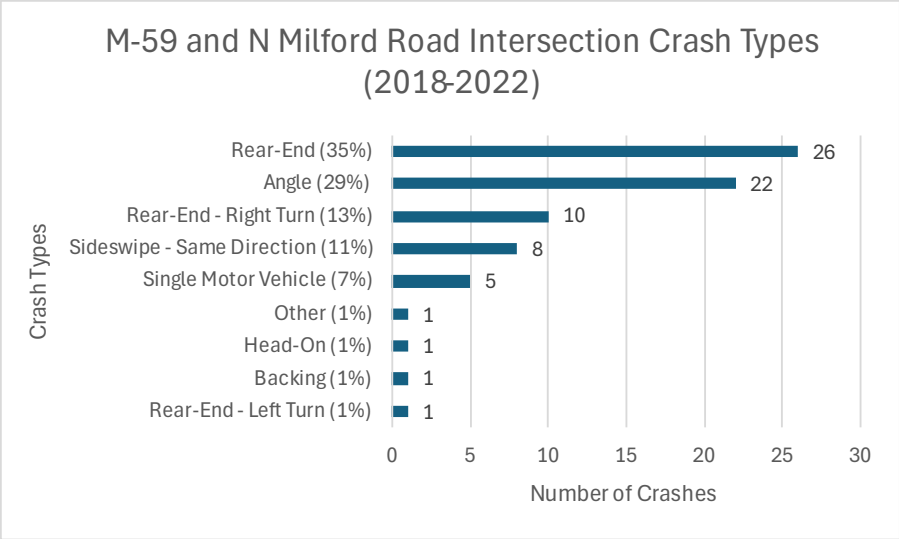


Figure 11: Crash Types at M-59 and N Milford Road, 2018-2022

Table 7: M-59 and N Milford Road KABCO Crashes (2018-2022)

Crash Type	2018	2019	2020	2021	2022	Total
K (Fatal Injury)	0	0	1	0	0	**1**
A (Incapacitating Injury)	1	0	0	1	0	**2**
B (Non-incapacitating Evident Injury)	1	1	1	0	1	**4**
C (Possible Injury)	0	3	1	1	2	**7**
O (No Injury)	6	16	14	10	15	**61**
Total	**8**	**20**	**17**	**12**	**18**	**75**

A breakdown of the Type K and A crashes are as follows:

- A single motor vehicle crash occurred on 03/07/2020 at 6:57 PM. A pedestrian was travelling northbound across the eastbound lanes of M-59 within the crosswalk when they were struck by a vehicle. The pedestrian sustained Type K injuries. This crash occurred in dark-lit and dry conditions.
- An angle crash occurred on 06/25/2021 at 8:25 PM. Vehicle one was travelling north on N Milford Road when they failed to stop at the red light. Vehicle two was traveling westbound on M-59 when they struck vehicle one. Vehicle two then ran off the roadway hitting the one-way sign located at the northwest corner of the intersection. The driver of vehicle two sustained Type A injuries. This crash occurred at dusk in wet conditions.
- An angle crash occurred on 06/24/2018 at 2:35 PM. Vehicle one was travelling west on M-59 when they failed to stop at the red light and struck vehicle two that was heading north on N Milford Road. The passenger of vehicle two sustained Type A injuries. This crash occurred in daylight and dry conditions.

3.3.3 N Milford Road/S Milford Road and W Livingston Road/E Livingston Road

Between 2018 and 2022, 11 crashes occurred at the intersection of N Milford Road/S Milford Road and W Livingston Road/E Livingston Road. Crash types occurring most frequently included 5 (45%) rear-end crashes, 3 (27%) angle crashes, and 2 (18%) Head-on Left Turn crashes. Crash types are summarized in **Figure 12**. **Table 8** summarizes intersection crashes by KABCO injury classification.

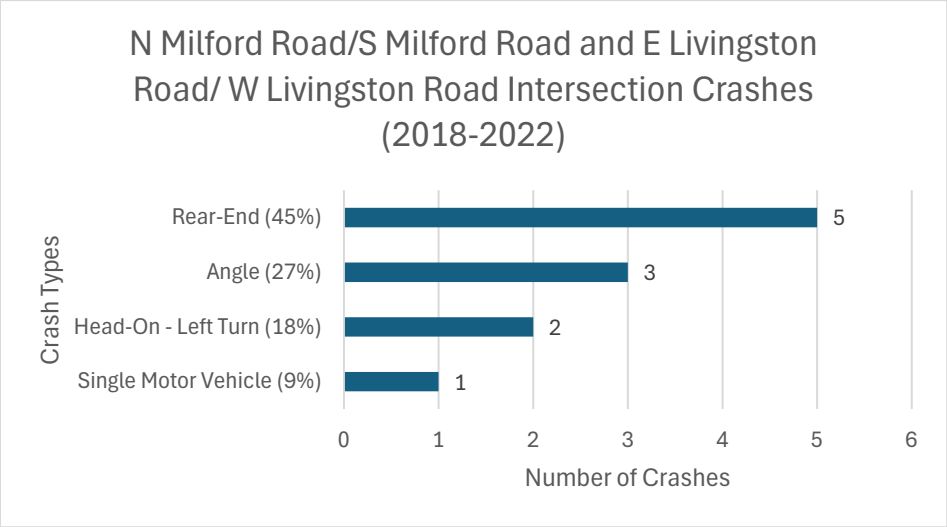


Figure 12: Crash Types at N Milford Road/S Milford Road and W Livingston Road/E Livingston Road, 2018-2022

Table 8: N Milford Road/S Milford Road and W Livingston Road/E Livingston Road KABCO Crashes (2018-2022)

Crash Type	2018	2019	2020	2021	2022	Total
K (Fatal Injury)	0	0	0	0	0	**0**
A (Incapacitating Injury)	0	0	0	0	1	**1**
B (Non-incapacitating Evident Injury)	0	0	1	0	0	**1**
C (Possible Injury)	0	0	1	1	0	**2**
O (No Injury)	1	4	1	0	1	**7**
Total	**1**	**4**	**3**	**1**	**2**	**11**

A breakdown of the single Type A crash that resulted in an incapacitating injury, is as follows:

- The crash occurred on 10/12/2022 at 9:41 PM. Vehicle one was turning from westbound Livingston Road to southbound Milford Road after the light turned green. A pedestrian began crossing S Milford Road in the crosswalk; the crosswalk sign indicated walk. Vehicle one hit the pedestrian in the crosswalk. The pedestrian was wearing a black hoodie and black pants. The pedestrian sustained Type A injuries as a result of this crash. This crash occurred in dark-unlit, rainy conditions.

3.3.4 M-59 WB and M-59 EB Crossover

Between 2018 and 2022, zero crashes occurred at the M-59 WB and M-59 EB crossover.

3.3.5 M-59 EB and M-59 WB Crossover (Signalized)

Between 2018 and 2022, 2 crashes occurred at the M-59 EB and M-59 WB crossover. Both were rear-end crashes that resulted in no injury (Type O).

4.0 Traffic Forecasts

Background traffic represents future volumes without new traffic generated by the proposed development. The proposed development is anticipated to be completed and operational by 2026. A conservative annual growth rate of 1.0% was assumed for this study based on local volume trends obtained from MDOT's *Transportation Data Management System*[5].

The proposed development site currently houses an unoccupied lumber company and a cell phone store. No additional developments in the area were identified to also be considered in the background traffic forecast. Traffic volumes for 2026 Background Conditions AM and PM peak hours were forecasted by applying the 1.0% annual growth rate to the 2024 Existing Conditions AM and PM peak hour volumes throughout the study area and these volumes are illustrated in **Figure 13.**

[5] MDOT, Transportation Data Management System.
https://mdot.public.ms2soft.com/tcds/tsearch.asp?loc=Mdot&mod=TCDS

Figure 13: 2026 Background Peak Hour Traffic Volumes

4.1 Background Traffic Operations

Under the 2026 Background Conditions scenario, intersection geometry and traffic controls are identical to those in 2024 Existing Conditions. Intersection delay and LOS for 2026 Background Conditions AM and PM peak hours were determined via Synchro 11 models and are summarized in **Table 9. Appendix E** contains Synchro reports from the analysis.

The MOEs of 2026 Background Conditions are similar to those of 2024 Existing Conditions. All intersections and individual approaches, except for M-59 EB at N Milford Road, operate at LOS D or better during both the AM and PM peak hours under 2026 Background Conditions. At the intersection of M-59 EB at N Milford Road, the EBL approach continues to operate at LOS E during the PM peak hour. This LOS is the same as 2024 Existing Conditions. The same issue occurs as in Existing Conditions where EBL turning vehicles run out of storage between the M-59 signals which causes EBL vehicles to have to wait in the EBL queue another cycle length.

Table 9: 2026 Background AM and PM Peak Hour Levels of Service

Node #	Location	Movement	AM Peak			PM Peak		
			Synchro Results		SimTraffic Results	Synchro Results		SimTraffic Results
			Delay	LOS	Delay	Delay	LOS	Delay
1001	M-59 EB & N Milford Road	**EBL**	8.8	A	15.1	78.3	E	40.5
		EBT	10.1	B	6.6	10.8	B	8.7
		EBR	2.4	A	3.7	2.5	A	3.6
		NBT	24.3	C	20.5	38.5	D	27.7
		NBR	7.3	A	6.6	28.7	C	16.4
		SBT	4.6	A	3.8	6.6	A	3.6
		Overall	**8.9**	**A**	**7.4**	**20.4**	**C**	**13.5**
1101	M-59 EB & M-59 WB Crossover	**EBT**	5.2	A	4.4	7.3	A	5.0
		SBL	23.8	C	8.9	23.8	C	7.3
		Overall	**8.4**	**A**	**5.2**	**10.4**	**B**	**5.5**
1309	N Milford Road & E Wardlow Road/Apollo Center Driveway	**EBL**	17.7	B	22.6	20.0	B	16.5
		EBT/EBR	8.7	A	7.8	13.5	B	12.4
		WBL	21.8	C	20.5	26.2	C	34.7
		WBT/WBR	7.1	A	10.1	7.3	A	15.4
		NBL/NBT	11.5	B	9.5	12.2	B	8.4
		NBR	3.0	A	1.7	1.9	A	2.0
		SB	11.3	B	12.5	9.3	A	12.9
		Overall	**12.0**	**B**	**11.5**	**11.1**	**B**	**12.0**
2001	M-59 WB & N Milford Road	WBT	14.3	B	11.9	19.0	B	15.5
		WBR	2.5	A	3.0	4.2	A	6.2
		NBT	17.6	B	17.8	13.5	B	11.6
		SBT	38.8	D	25.9	34.6	C	24.0
		SBR	22.6	C	7.5	23.9	C	8.2
		Overall	**19.4**	**B**	**14.2**	**19.6**	**B**	**14.7**
3001	N Milford Road/S Milford Road & W Livingston Road/E Livingston Road	EB	10.0	A	11.5	10.6	B	14.9
		WB	20.3	C	18.5	27.1	C	22.8
		NBL	7.2	A	17.2	9.3	A	20.9
		NBT/NBR	7.7	A	7.0	11.4	B	12.3
		SBL	6.6	A	13.2	6.7	A	21.3
		SBT/SBR	10.7	B	9.7	10.9	B	10.8
		Overall	**10.3**	**B**	**10.0**	**12.1**	**B**	**12.8**

5.0 Future Traffic Impacts

5.1 Site Traffic Generation

Trip generation rates for the proposed development were obtained from the 11th edition of the *ITE Trip Generation Manual*[6]. Trip generation rates obtained from the manual are associated with the following land uses:

- Convenience Store/Gas Station – GFA (5.5-10K) (Land Use Code (LUC) 945)
- Fast-Food Restaurant with Drive-Through Window and No Indoor Seating (LUC 935)

For the gas station and the retail land use, site generated trips were calculated using the number of vehicle fueling stations (14) as the independent variable. The ITE description of Convenience Store/Gas Station is as follows:

> *A convenience store/gas station is a facility with a co-located convenience store and gas station. The convenience store sells grocery and other everyday items that a person may need or want as a matter of convenience. The gas station sells automotive fuels such as gasoline and diesel.*
>
> *A convenience store/gas station is typically located along a major thoroughfare to optimize motorist convenience. Extended hours of operation (with many open 24 hours, 7 days a week) are common at these facilities.*
>
> *The convenience store product mix typically includes pre-packaged grocery items, beverages, dairy products, snack foods, confectionary, tobacco products, over-the-counter drugs, and toiletries. A convenience store may sell alcohol, often limited to beer and wine. Coffee and premade sandwiches are also commonly sold at a convenience store. Made-to-order food orders are sometimes offered. Some stores offer limited seating.*
>
> *The sites in this land use include both self-pump and attendant-pumped fueling positions and both pre-pay and post-pay operations.*

For the restaurant land use (LUC 935), site generated trips were calculated using the number of drive-through lanes (1) as the independent variable. The ITE description of Fast-Food Restaurant with Drive-Through Window and No Indoor Seating is as follows:

> *This land use includes any fast-food restaurant that provides drive-through service only. The restaurant is typically housed in a very small building. It may provide a limited amount of outside seating at which there usually is no table service.*

Retail and service land uses such as gas stations, convenience stores, and fast-food restaurants may generate pass-by trips. Pass-by trips are described as intermediate trips occurring between an origin and primary destination instead of new trips diverted from another roadway. Similarly, sites with two or more land uses may generate internal capture trips. Internal capture trips are described as trips to a multi-land use site resulting in trips between land uses. The *ITE Trip*

[6] Institute of Traffic Engineers, ITE Trip Generation Manual, 11th Edition. https://www.itetripgen.org/Query

Generation Manual contains methodologies and rates to estimate reduction of base trip-generation rates for pass-by trips and internal capture trips.

Pass-by trips were calculated using rates for Convenience Store/Gas Station (LUC 945) and Fast-Food Restaurant with Drive-Through Window and No Indoor Seating (LUC 935). Internal capture trips were calculated using *NCHRP 8-51 Internal Trip Capture Estimation Tool*[7] and guidance from the *ITE Trip Generation Manual*.

Diverted trips were not used in this study. The ITE Trip Generation Manual states that "diverted trips are difficult to identify"[8] and should only be estimated if the following conditions are met:

- Reliable data for primary trips, pass-by trips, and diverted trips are available.
- Travel routes for diverted trips are clearly established.

Table 10 summarizes new trips generated by the proposed development and includes a breakdown of entering and exiting trips. It is projected that the development will generate a total of 117 new vehicle trips during the AM peak hour and 92 new vehicle trips during the PM peak hour. Details of land use code and the estimation tool used for this project are contained in **Appendix F.**

[7] Transportation Research Board, NCHRP 8-51 Internal Trip Capture Estimation Tool. (2010) http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=927

[8] Institute of Traffic Engineers, ITE Trip Generation Manual, 11th Edition. https://www.itetripgen.org/Query

Table 10: Development Trip Generation for the Proposed Site Development

Land Use	Land Use Code	Unit	Land Use Size	Site Trip Generation Rates						Site Trips					
				AM Peak			PM Peak			AM Peak			PM Peak		
				Rate	In	Out	Rate	In	Out	In	Out	Total	In	Out	Total
Convenience Store/Gas Station - GFA (5.5-10k)	945	# Vehicle Fueling Positions	14												
Primary Trips				31.6	50%	50%	26.9	50%	50%	221	221	442	189	189	377
Pass-By Trips					76%	76%		75%	75%	168	168	336	142	142	284
Diverted Trips					0%	0%		0%	0%	0	0	0	0	0	0
Internal Capture Trips					1%	4%		6%	4%	2	11	13	11	9	20
Newly Generated Trips										51	42	93	36	38	73
Fast-Food Restaurant with Drive-Through Window and No Indoor Seating	935	# Drive Through Lanes	1												
Primary Trips				43	47%	53%	59.5	51%	49%	20	23	43	31	29	60
Pass-By Trips					50%	50%		55%	55%	10	12	22	17	16	33
Diverted Trips					0%	0%		0%	0%	0	0	0	0	0	0
Internal Capture Trips					50%	13%		29%	41%	10	3	13	9	12	21
Newly Generated Trips										0	8	8	5	1	6
Total Development Trips															
Primary Trips										**241**	**244**	**485**	**220**	**218**	**437**
Pass-By Trips										178	180	358	159	158	317
Diverted Trips										0	0	0	0	0	0
Internal Capture Trips										12	14	26	20	21	41
Newly Generated Trips										**51**	**50**	**101**	**41**	**39**	**79**

5.2 Site Development Trip Distribution

Newly generated trips were distributed throughout the study area based on the distribution of existing traffic volumes collected during the AM and PM peak hours. Distribution of proposed site generated traffic at the study intersections is summarized in **Table 11** and **Table 12.**

Table 11: Existing Volumes Trip Distribution Percentages

Coming From	Road Name	AM	PM	Going To	AM	PM
North	EB Apollo Center Driveway @ N Milford Rd/E Wardlow Rd	1.1%	0.3%	North	0.2%	0.0%
North	SB N Milford Rd @ E Wardlow Rd	11.4%	9.1%	North	6.8%	11.8%
North	WB E Wardlow Rd @ SB N Milford Rd	4.2%	3.9%	North	2.4%	4.9%
South	NB S Milford Rd @ Livingston Rd	7.5%	16.2%	South	18.3%	15.0%
West	EB Highland Rd (M-59) @ WB Highland Rd (M-59) Crossover	35.5%	32.2%	West	39.1%	36.4%
West	EB W Livingston Rd @ Milford Rd	0.4%	0.4%	West	0.1%	0.6%
East	WB Highland Rd (M-59) @ EB Highland Rd (M-59) Crossover	39.4%	37.1%	East	32.4%	30.6%
East	WB E Livingston Rd @ Milford Rd	0.4%	0.7%	East	0.9%	0.6%
Total		**100%**	**100%**	**Total**	**100%**	**100%**

Table 12: Distribution of Trips Newly Generated by the Proposed Site Development

Coming From	Road Name	AM	PM	Going To	AM	PM
North	EB Apollo Center Driveway @ N Milford Rd/E Wardlow Rd	1	0	North	0	0
North	SB N Milford Rd @ E Wardlow Rd	6	4	North	3	5
North	WB E Wardlow Rd @ SB N Milford Rd	2	2	North	1	2
South	NB S Milford Rd @ Livingston Rd	4	7	South	9	6
West	EB Highland Rd (M-59) @ WB Highland Rd (M-59) Crossover	18	13	West	20	14
West	EB W Livingston Rd @ Milford Rd	0	0	West	0	0
East	WB Highland Rd (M-59) @ EB Highland Rd (M-59) Crossover	20	15	East	16	12
East	WB E Livingston Rd @ Milford Rd	0	0	East	0	0
Total		**51**	**41**	**Total**	**49**	**39**

As previously stated, the proposed site is slated to have two unsignalized access points, one to the east of the project site on N Milford Roadand one to the west on N John Street. All access points will allow unrestricted inbound and outbound access via left and right turns. The proposed development will feature a dedicated one-way circulation infrastructure for the restaurant drive-through lane, and a bidirectional circulation network for other portions of the site. For this study, the following assumptions were made:

- 100% of trips originating from and departing to the north via N Milford Road will utilize the N Milford Road access point.
- 100% of trips originating from and departing to the south N Milford Road will utilize the N Milford Road access point.
- 100% of trips originating from the east and west via M-59 will utilize the N John Street access point.
- 50% of trips departing to the east and west via M-59 will utilize the N Milford Road access point with the other 50% using the N John Street access point.

Figure 14 summarizes the distribution of newly generated development traffic volumes through study intersections. Distributed newly generated trips were added to 2026 Background Conditions traffic volumes to obtain 2026 Project Conditions traffic volumes. Project Conditions traffic volumes are illustrated in **Figure 15**.

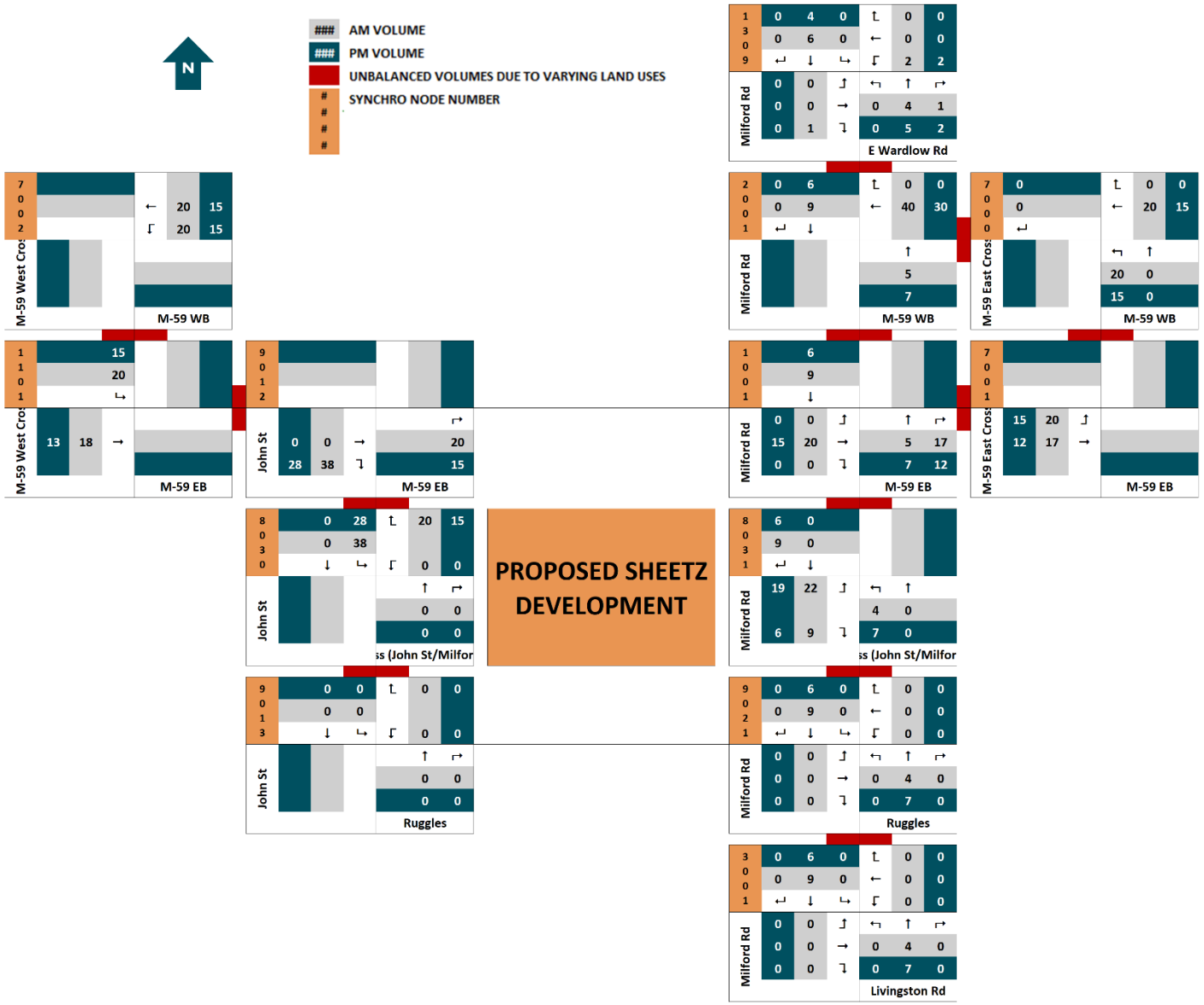


Figure 14: Proposed Site Development Traffic Volumes

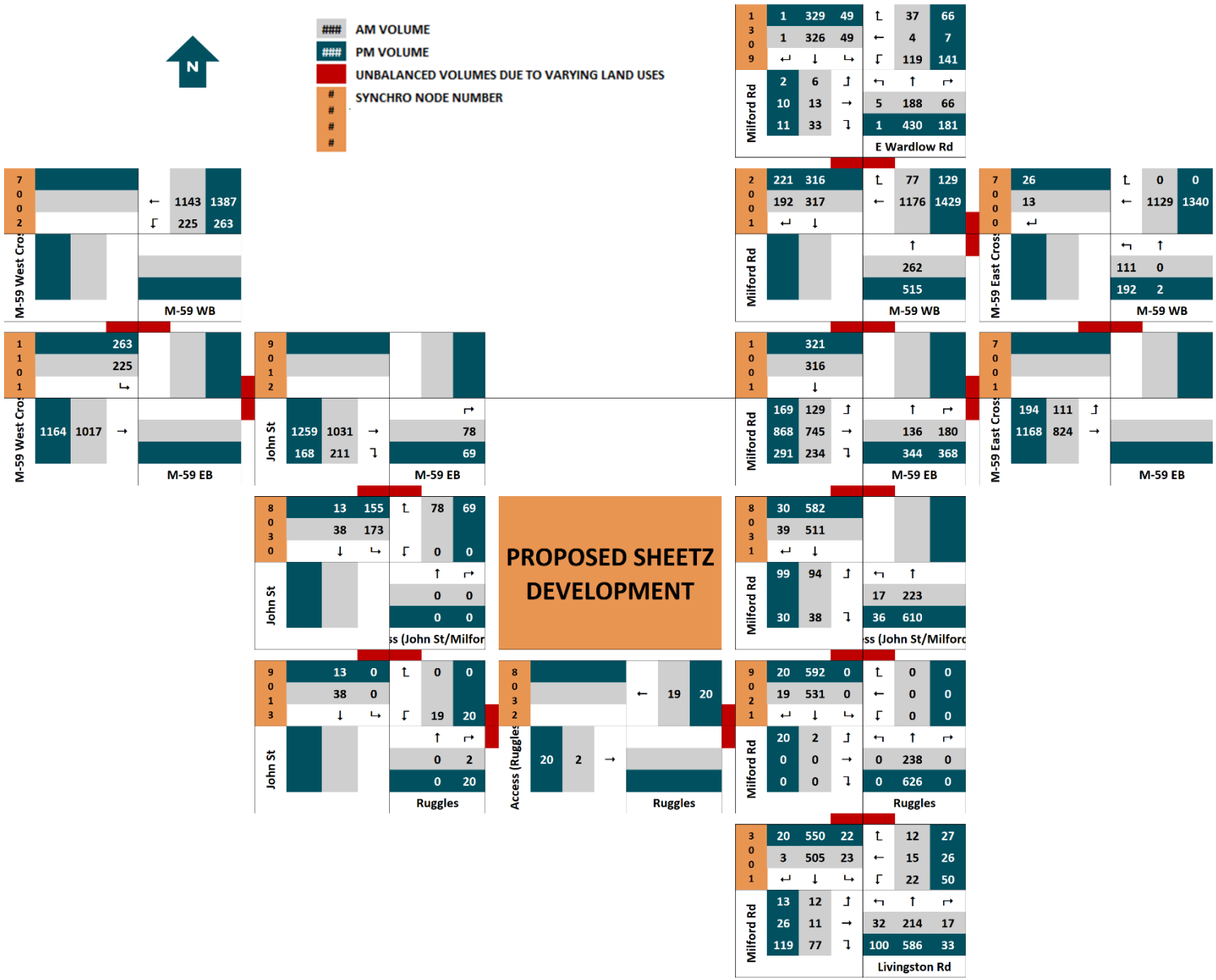


Figure 15: 2026 Project Conditions Peak Hour Traffic Volumes

5.3 Future Site Traffic Operations

The proposed Sheetz development will have two unsignalized access points, one to the east of the project site on N Milford Road and one to the west on N John Street. Allaccess points will allow unrestricted inbound and outbound access via left and right turns.

The Project Conditions scenario represents traffic generated by a full build out of the proposed Sheetz gas station and the convenience store along with normal operations of the fast-food restaurant. Under the 2026 Project Conditions scenario, intersection geometry and traffic controls are identical to those in Existing Conditions and Background Conditions scenarios. Synchro reports for 2026 Project Conditions AM and PM peak hours are provided in **Appendix G**.

Like the findings under 2024 Existing Conditions and the 2026 Background Conditions scenarios, all project intersections and individual approaches, except for M-59 EB at N Milford Road, operate at LOS D or better during both the AM and PM peak hours. At the intersection of M-59 EB at N Milford Road, the EBL approach continues to operate at LOS E during the PM peak hour. This LOS grade is the same as the 2024 Existing Condition & 2026 Background Conditions. All proposed access points are expected to operate at LOS A during the AM and PM peak hours. The EBL movement at the N Milford Road access point operates at LOS F. SimTraffic delay for the N Milford Road Access EB movement also shows this higher delay. This is due to the increased NB/SB traffic volumes on N Milford Road in the PM. Northbound vehicles at the M-59 signal are queuing past this access point, which is causing delay for vehicles attempting to turn left onto N Milford Road. Analysis was completed under the assumption that vehicles exiting the proposed development to head EB/WB on M-59 would be split 50/50 between the N Milford Road Access and N John Street Access. If NB vehicles are queuing in the PM as shown in the model, it is assumed most drivers attempting to head EB/WB on M-59 would see this queue and use the N John Street Access instead. This would reduce the number of vehicles attempting to turn left from the N Milford Road Access, reducing the delay currently shown. Intersection delay and LOS for 2026 Project Conditions AM and PM peak hours are summarized in **Table 13.**

Table 13: Future AM and PM Peak Hour Levels of Service

Node #	Location	Movement	AM Peak			PM Peak		
			Synchro Results		SimTraffic Results	Synchro Results		SimTraffic Results
			Delay	LOS	Delay	Delay	LOS	Delay
1001	M-59 EB & N Milford Road	EBL	9.2	A	18.0	79.9	E	47.7
		EBT	10.0	B	7.3	10.5	B	9.7
		EBR	2.0	A	4.7	2.5	A	5.1
		NBT	24.1	C	20.8	38.2	D	24.3
		NBR	11.9	B	7.3	38.4	D	13.8
		SBT	4.6	A	4.0	6.4	A	3.9
		Overall	**9.2**	**A**	**8.3**	**22.5**	**C**	**13.9**
1101	M-59 EB & M-59 WB Crossover	EBT	5.9	A	5.4	7.7	A	5.6
		SBL	24.0	C	7.1	22.9	C	7.2
		Overall	**9.1**	**A**	**5.7**	**10.7**	**B**	**5.9**
1309	N Milford Road & E Wardlow Road/Apollo Center Driveway	EBL	17.7	B	15.2	20.0	B	25.8
		EBT/EBR	8.6	A	4.4	13.5	B	32.1
		WBL	21.9	C	20.1	26.3	C	30.9
		WBT/WBR	7.1	A	13.3	7.3	A	25.1
		NBL/NBT	11.6	B	10.2	12.3	B	18.4
		NBR	3.0	A	1.8	1.9	A	2.1
		SB	11.4	B	14.1	9.3	A	17.5
		Overall	**12.0**	**B**	**11.5**	**11.2**	**B**	**11.2**
2001	M-59 WB & N Milford Road	WBT	15.7	B	12.2	21.9	C	17.5
		WBR	2.5	A	3.6	4.3	A	7.1
		NBT	17.2	B	16.8	13.1	B	12.6
		SBT	38.8	D	27.1	34.3	C	24.6
		SBR	22.1	C	8.4	23.5	C	10.0
		Overall	**19.9**	**B**	**14.5**	**21.0**	**C**	**16.2**
3001	N Milford Road/S Milford Road & W Livingston Road/E Livingston Road	EB	10.0	A	24.3	10.6	B	24.8
		WB	20.3	C	22.2	27.1	C	33.3
		NBL	7.2	A	15.9	9.4	A	20.5
		NBT/NBR	7.7	A	7.9	11.6	B	11.5
		SBL	6.6	A	12.6	6.7	A	20.0
		SBT/SBR	10.9	B	10.4	11.0	B	8.1
		Overall	**10.4**	**B**	**10.5**	**12.2**	**B**	**13.1**
8030	N John Street Site Access	WB	0.0	A	2.9	0.0	A	3.0
		NB	0.0	A	0.0	0.0	A	0.0
		SB	0.0	A	0.7	0.0	A	0.6
		Overall	**0.0**	**A**	**1.2**	**0.0**	**A**	**1.3**

Node #	Location	Movement	AM Peak			PM Peak		
			Synchro Results		SimTraffic Results	Synchro Results		SimTraffic Results
			Delay	LOS	Delay	Delay	LOS	Delay
8031	N Milford Road Site Access	EBL	21.3	C	16.8	78.6	F	286.0
		EBR	12.6	B	6.1	13.2	B	189.9
		NBL	8.7	A	5.2	9.1	A	8.7
		SB	0.0	A	1.3	0.0	A	1.1
		Overall	**2.8**	**A**	**2.9**	**6.1**	**A**	**24.4**

6.0 Summary & Mitigation Measures

This traffic impact analysis summarizes the traffic impacts of the proposed Sheetz gas station which includes a convenience store and a fast-food restaurant. The proposed development will replace an unoccupied lumber company and a cell phone store at the southwest corner of the intersection of M-59 EB and N Milford Road in Highland Charter Township, Oakland County, Michigan. Two unsignalized access points are proposed with the development. All access points will allow unrestricted inbound and outbound access via left and right turns.

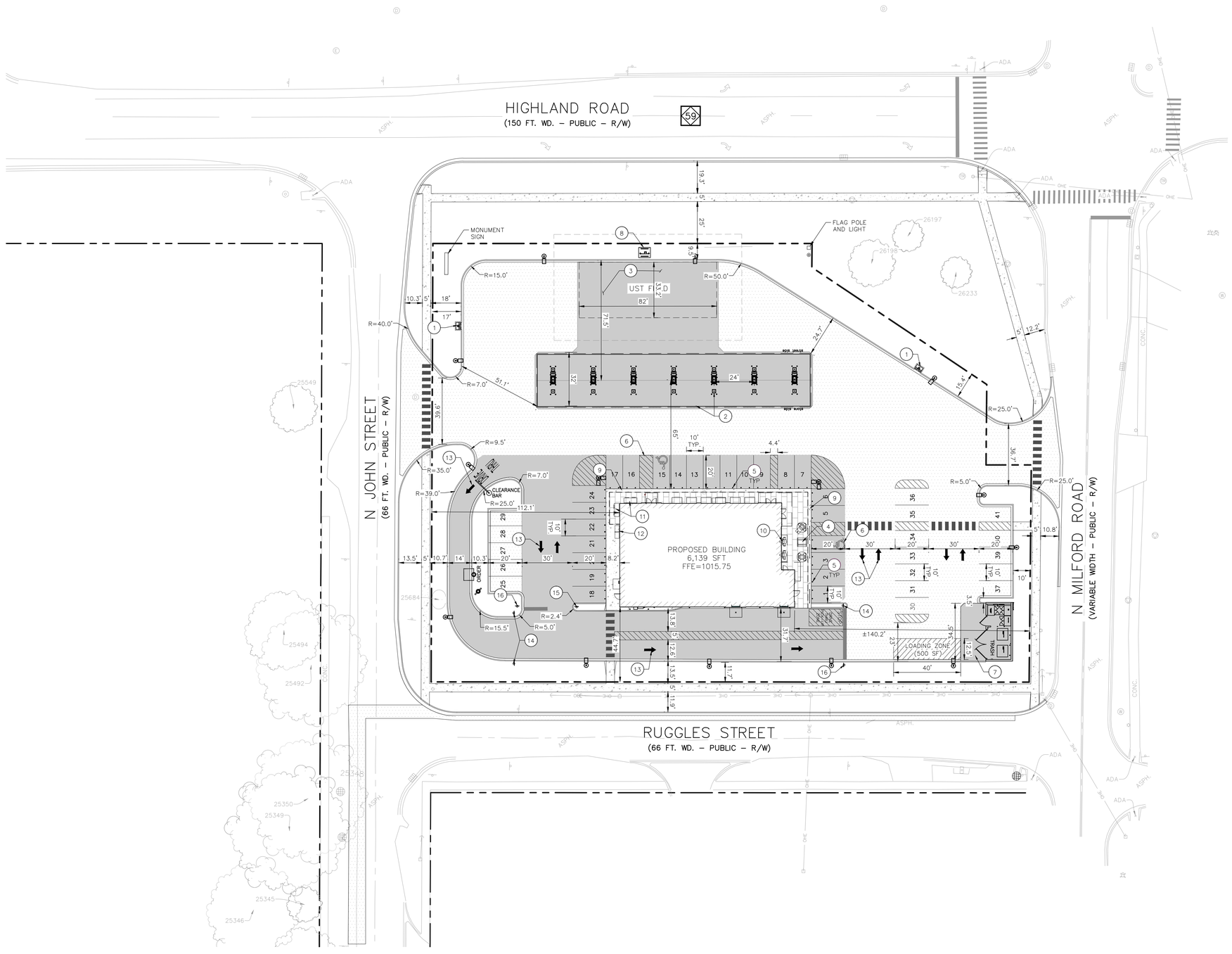
Safety analysis conducted as part of this study has not indicated any adverse safety issues either at the study intersections or the corridor levels that could be exacerbated by the proposed development.

Like the findings under 2024 Existing Conditions and 2026 Background Conditions, all project intersections and individual approaches, except for M-59 EB at N Milford Road, are expected to operate at LOS D or better during both the AM and PM peak hour under 2026 Project Conditions. Because the project does not worsen approach and intersection LOS at study intersections, no mitigation is recommended on behalf of the proposed development. However, with the 2024 Existing Conditions M-59 EB at N Milford Road EBL movement showing LOS E, it is recommended RCOC look at the follow potential mitigations:

- Stripe out the M-59 EB left-turn lane and have these vehicles use the crossover (v/c 0.60).
- Modify signal timings at M-59/N Milford Road intersection.

Appendix A – Proposed Concept for Sheetz Development Site

Drawing name: K:\DET_DO\268593002-Sliker Gold Sheetz-Highland Twp-MI\2 Design\CADD\PlanSheets\C1.0 SITE PLAN.dwg C1.0 SITE PLAN Dec 18, 2024 12:41pm by: tylersmith
This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.



PAVING LEGEND

- HEAVY DUTY ASPHALT PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- CONCRETE SIDEWALK
- BRICK PAVER WALK
- CURB AND GUTTER

SITE NOTES

1. ALL DIMENSIONS REFER TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
2. BUILDING DIMENSIONS ARE TO THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
3. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS TO VERIFY ALL BUILDING DIMENSIONS, DOOR LOCATIONS, PRIOR TO ORDERING MATERIALS.
4. RADII ADJACENT TO PARKING STALL AND NOT DIMENSIONED ON THIS PLAN SHALL BE 3-FEET, TYPICAL.
5. REFER TO ARCHITECTURAL PLANS FOR MONUMENT SIGN DETAILS. SEE MEP PLANS FOR SITE ELECTRICAL DRAWINGS.
6. ALL PROPOSED ON-SITE STRIPING SHALL BE PAINTED UNLESS OTHERWISE NOTED.

KEY NOTES

1. AIR STATION, PER SHEETZ, STANDARD DETAIL
2. FUEL STATIONS AND CANOPY
3. UNDERGROUND STORAGE TANK AREA
4. PATIO AREA
5. STOREFRONT BUMPER POST, PER SHEETZ STANDARD DETAIL, TYP.
6. ADA PARKING SPACE
7. CONCRETE DUMPSTER PAD, PER SHEETZ STANDARD DETAIL
8. UNDERGROUND STORAGE TANK VENT PAD, PER SHEETZ STANDARD DETAIL
9. WALK TO BE CONSTRUCTED FLUSH WITH PAVEMENT PER SHEETZ STANDARD DETAIL
10. OUTDOOR SEATING
11. ICE MERCHANDISER
12. PROPANE LOCKER
13. DIRECTIONAL PAVEMENT MARKING, TYP.
14. "DO NOT ENTER, ONE WAY" SIGN
15. "EXIT ONLY" SIGN
16. "STOP" SIGN

SITE DATA TABLE

PARCEL INFORMATION:

PARCEL 1:
ADDRESS: 115 W HIGHLAND RD
ID: 11-22-352-005

PARCEL 2:
ADDRESS: 315 N MILFORD RD
ID: 11-22-352-006

PARCEL 3:
ADDRESS: 155 W HIGHLAND RD
ID: 11-22-352-010

SITE AREA: 1.94 ACRES (84,664 SF) NET AND GROSS

ZONING:
EXISTING: HS – HIGHLAND STATION
PROPOSED: HS – HIGHLAND STATION (WITH SPECIAL LAND USE)

PROPOSED USE: GAS STATION/RESTAURANT

BUILDING INFORMATION:
BUILDING FOOTPRINT AREA = 6,139 SF
BUILDING LOT COVERAGE = 7.25%

SETBACK REQUIREMENTS:

	PROPOSED BUILDING:
RUGGLES ST:	44.7'
JOHN ST:	82.3'
HIGHLAND RD:	154.6'
MILFORD RD:	170.2'

	PROPOSED LANDSCAPE BUFFER:
RUGGLES ST	11.7'
JOHN ST	17.0'
HIGHLAND RD	9.5'
MILFORD RD	10.0'

PARKING CALCULATIONS:
DRIVE THRU RESTAURANT = 1 SPACE FOR EACH 70 SQ FT OF NET FLOOR AREA, PLUS 10 STACKING SPACES FOR DRIVE-THROUGH SERVICE WHICH DO NOT CONFLICT WITH USE OF REQUIRED SPACES, PLUS 2 LONGER SPACES DESIGNATED FOR RECREATIONAL VEHICLES, BUSES, AND SEMI TRUCKS
GAS STATION = 1 SPACE FOR EACH 125 SQ FT OF NET FLOOR AREA, PLUS 2 PARKING SPACES PER FUELING STATION
TOTAL PARKING REQUIRED = 450 NET FLOOR AREA / 70 = 7
+2,383 USABLE FLOOR AREA/125 = 20
+ 7 GAS PUMPS * 2 = 14
= 41 SPACES

TOTAL PROPOSED PARKING SPACES = 41 SPACES INC. 2 H/C SPACES

811 Know what's below. Call before you dig.

NORTH

GRAPHIC SCALE IN FEET
0 15' 30' 60'

NO.	REVISIONS	DATE	BY

Kimley»Horn of Michigan, Inc.
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3001 W. BIG BEAVER RD., SUITE 26600
TROY, MI 48084-3156
PHONE: 313-372-1560
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED | DESIGNED BY: TES | DRAWN BY: LDF | CHECKED BY: TES

STATE OF MICHIGAN
TYLER SMITH
ENGINEER
NO. 6201068975
REGISTERED PROFESSIONAL ENGINEER

Tyler Smith

SHEETZ

SHEETZ HIGHLAND TOWNSHIP - HIGHLAND RD AND MILFORD RD

SITE PLAN

ORIGINAL ISSUE: 12/18/2024

KHA PROJECT NO. 268593002

SHEET NUMBER

C1.0

Appendix B – 2024 Existing Peak Period Traffic Counts

Milford Rd and M-59 EB
Highland Michigan
Thursday, April 25, 2024

Time	Southbound Milford Rd						Westbound n/a						Northbound Milford Rd						Eastbound M-59 EB						VEHICLE TOTAL
	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	
7:00 AM	0	0	91	0	0	*91*	0	0	0	0	0	*0*	0	0	24	42	0	*66*	0	20	197	56	0	*273*	**430**
7:15 AM	0	0	70	0	0	*70*	0	0	0	0	0	*0*	0	0	36	28	0	*64*	0	21	193	63	0	*277*	**411**
7:30 AM	0	0	80	0	0	*80*	0	0	0	0	0	*0*	0	0	23	26	0	*49*	0	31	199	49	0	*279*	**408**
7:45 AM	0	0	87	0	0	*87*	0	0	0	0	0	*0*	0	0	31	21	0	*52*	0	33	210	64	0	*307*	**446**
Hourly Total	0	0	328	0	0	*328*	0	0	0	0	0	*0*	0	0	114	117	0	*231*	0	105	799	232	0	*1136*	**1695**

Time	Southbound Milford Rd						Westbound n/a						Northbound Milford Rd						Eastbound M-59 EB						VEHICLE TOTAL
	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	
8:00 AM	0	0	72	0	0	*72*	0	0	0	0	0	*0*	0	0	33	29	0	*62*	0	29	177	53	0	*259*	**393**
8:15 AM	0	0	62	0	0	*62*	0	0	0	0	0	*0*	0	0	41	27	0	*68*	0	33	201	63	2	*297*	**427**
8:30 AM	0	0	51	0	0	*51*	0	0	0	0	0	*0*	0	0	24	26	0	*50*	0	29	200	60	0	*289*	**390**
8:45 AM	0	0	92	0	0	*92*	0	0	0	0	0	*0*	0	0	25	34	0	*59*	0	23	184	58	0	*265*	**416**
Hourly Total	0	0	277	0	0	*277*	0	0	0	0	0	*0*	0	0	123	116	0	*239*	0	114	762	234	2	*1110*	**1626**
TOTAL	**0**	**0**	**605**	**0**	**0**	***605***	**0**	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**237**	**233**	**0**	***470***	**0**	**219**	**1561**	**466**	**2**	***2246***	**3321**
Cars	0	0	588	0	0	*588*	0	0	0	0	0	*0*	0	0	220	220	0	*440*	0	207	1469	445	2	*2121*	**3149**
Heavy Vehicles	0	0	17	0	0	*17*	0	0	0	0	0	*0*	0	0	17	13	0	*30*	0	12	92	21	0	*125*	**172**
Heavy Vehicle %	0.00%	0.00%	2.81%	0.00%	0.00%	*2.81%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	0.00%	7.17%	5.58%	0.00%	*6.38%*	0.00%	5.48%	5.89%	4.51%	0.00%	*5.57%*	**5.18%**

Milford Rd and M-59 EB
Highland Michigan
Thursday, April 25, 2024
AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	U Turns	Left Turns	Straight	Right	Crosswalk	*Vehicle*	
7:00 AM	0	0	91	0	0	*91*	0	0	0	0	0	*0*	0	0	24	42	0	*66*	0	20	197	56	0	*273*	**430**
7:15 AM	0	0	70	0	0	*70*	0	0	0	0	0	*0*	0	0	36	28	0	*64*	0	21	193	63	0	*277*	**411**
7:30 AM	0	0	80	0	0	*80*	0	0	0	0	0	*0*	0	0	23	26	0	*49*	0	31	199	49	0	*279*	**408**
7:45 AM	0	0	87	0	0	*87*	0	0	0	0	0	*0*	0	0	31	21	0	*52*	0	33	210	64	0	*307*	**446**
Peak Hour Total	0	0	328	0	0	*328*	0	0	0	0	0	*0*	0	0	114	117	0	*231*	0	105	799	232	0	*1136*	**1695**
PHF	0.000	0.000	0.901	0.000	0.000	*0.901*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.792	0.696	0.000	*0.875*	0.000	0.795	0.951	0.906	0.000	*0.925*	**0.950**
Heavy Vehicle %	0.00%	0.00%	1.52%	0.00%		1.52%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	4.39%	5.13%		4.76%	0.00%	6.67%	7.51%	4.74%		6.87%	**5.55%**

Milford Rd and M-59 EB
Highland Michigan
Thursday, April 25, 2024

Time	Southbound N Milford Rd						Westbound n/a						Northbound N Milford Rd						Eastbound M-59 EB						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
4:00 PM	0	0	67	0	0	*67*	0	0	0	0	0	*0*	0	0	86	62	0	*148*	0	44	256	61	0	*361*	**576**
4:15 PM	0	0	67	0	0	*67*	0	0	0	0	0	*0*	0	0	97	63	0	*160*	0	49	228	79	1	*356*	**583**
4:30 PM	0	0	69	0	0	*69*	0	0	0	0	0	*0*	0	0	75	60	0	*135*	0	35	232	57	0	*324*	**528**
4:45 PM	0	0	78	0	0	*78*	0	0	0	0	0	*0*	0	0	76	74	0	*150*	0	43	227	74	0	*344*	**572**
Hourly Total	0	0	281	0	0	*281*	0	0	0	0	0	*0*	0	0	334	259	0	*593*	0	171	943	271	1	*1385*	**2259**
5:00 PM	0	0	95	0	0	*95*	0	0	0	0	0	*0*	0	0	82	99	0	*181*	0	39	221	75	0	*335*	**611**
5:15 PM	0	0	65	0	0	*65*	0	0	0	0	1	*0*	0	0	93	75	0	*168*	0	43	249	63	0	*355*	**588**
5:30 PM	0	0	52	0	0	*52*	0	0	0	0	1	*0*	0	0	89	82	0	*171*	0	41	229	61	0	*331*	**554**
5:45 PM	0	0	51	0	0	*51*	0	0	0	0	0	*0*	0	0	77	47	0	*124*	0	39	198	68	0	*305*	**480**
Hourly Total	0	0	263	0	0	*263*	0	0	0	0	2	*0*	0	0	341	303	0	*644*	0	162	897	267	0	*1326*	**2233**
TOTAL	**0**	**0**	**544**	**0**	**0**	***544***	**0**	**0**	**0**	**0**	**2**	***0***	**0**	**0**	**675**	**562**	**0**	***1237***	**0**	**333**	**1840**	**538**	**1**	***2711***	**4492**
Cars	0	0	536	0	0	*536*	0	0	0	0	0	*0*	0	0	664	544	0	*1208*	0	321	1800	519	1	*2640*	**4384**
Heavy Vehicles	0	0	8	0	0	*8*	0	0	0	0	2	*0*	0	0	11	18	0	*29*	0	12	40	19	0	*71*	**108**
Heavy Vehicle %	0.00%	0.00%	1.47%	0.00%	0.00%	*1.47%*	0.00%	0.00%	0.00%	0.00%	100.00%	*0.00%*	0.00%	0.00%	1.63%	3.20%	0.00%	*2.34%*	0.00%	3.60%	2.17%	3.53%	0.00%	*2.62%*	**2.40%**

Milford Rd and M-59 EB
Highland Michigan
Thursday, April 25, 2024
PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
4:45 PM	0	0	78	0	0	*78*	0	0	0	0	0	*0*	0	0	76	74	0	*150*	0	43	227	74	0	*344*	**572**
5:00 PM	0	0	95	0	0	*95*	0	0	0	0	0	*0*	0	0	82	99	0	*181*	0	39	221	75	0	*335*	**611**
5:15 PM	0	0	65	0	0	*65*	0	0	0	0	1	*0*	0	0	93	75	0	*168*	0	43	249	63	0	*355*	**588**
5:30 PM	0	0	52	0	0	*52*	0	0	0	0	1	*0*	0	0	89	82	0	*171*	0	41	229	61	0	*331*	**554**
Peak Hour Total	0	0	290	0	0	*290*	0	0	0	0	2	*0*	0	0	340	330	0	*670*	0	166	926	273	0	*1365*	**2325**
PHF	0.000	0.000	0.763	0.000	0.000	*0.763*	0.000	0.000	0.000	0.000	0.500	*0.000*	0.000	0.000	0.914	0.833	0.000	*0.925*	0.000	0.965	0.930	0.910	0.000	*0.961*	**0.951**
Heavy Vehicle %	0.00%	0.00%	2.07%	0.00%		2.07%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	1.18%	4.24%		2.69%	0.00%	3.61%	2.16%	4.03%		2.71%	**2.62%**

M-59 WB to EB Crossover
Highland Michigan
Thursday, April 25, 2024

	Southbound n/a						Westbound M-59 WB						Northbound n/a						Eastbound M-59 EB						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
7:00 AM	0	0	0	0	0	*0*	47	0	0	0	0	*47*	0	0	0	0	0	*0*	0	0	221	0	0	*221*	**268**
7:15 AM	0	0	0	0	0	*0*	57	0	0	0	0	*57*	0	0	0	0	0	*0*	0	0	237	0	0	*237*	**294**
7:30 AM	0	0	0	0	0	*0*	52	0	0	0	0	*52*	0	0	0	0	0	*0*	0	0	234	0	0	*234*	**286**
7:45 AM	0	0	0	0	0	*0*	48	0	0	0	0	*48*	0	0	0	0	0	*0*	0	0	270	0	0	*270*	**318**
Hourly Total	0	0	0	0	0	*0*	204	0	0	0	0	*204*	0	0	0	0	0	*0*	0	0	962	0	0	*962*	**1166**

	Southbound n/a						Westbound M-59 WB						Northbound n/a						Eastbound M-59 EB						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
8:00 AM	0	0	0	0	0	*0*	48	0	0	0	0	*48*	0	0	0	0	0	*0*	0	0	212	0	0	*212*	**260**
8:15 AM	0	0	0	0	0	*0*	53	0	0	0	0	*53*	0	0	0	0	0	*0*	0	0	263	0	0	*263*	**316**
8:30 AM	0	0	0	0	0	*0*	62	0	0	0	0	*62*	0	0	0	0	0	*0*	0	0	236	0	0	*236*	**298**
8:45 AM	0	0	0	0	0	*0*	65	0	0	0	0	*65*	0	0	0	0	0	*0*	0	0	214	0	0	*214*	**279**
Hourly Total	0	0	0	0	0	*0*	228	0	0	0	0	*228*	0	0	0	0	0	*0*	0	0	925	0	0	*925*	**1153**
TOTAL	**0**	**0**	**0**	**0**	**0**	***0***	**432**	**0**	**0**	**0**	**0**	***432***	**0**	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1887**	**0**	**0**	***1887***	**2319**
Cars	0	0	0	0	0	*0*	404	0	0	0	0	*404*	0	0	0	0	0	*0*	0	0	1779	0	0	*1779*	**2183**
Heavy Vehicles	0	0	0	0	0	*0*	28	0	0	0	0	*28*	0	0	0	0	0	*0*	0	0	108	0	0	*108*	**136**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	6.48%	0.00%	0.00%	0.00%	0.00%	*6.48%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	0.00%	5.72%	0.00%	0.00%	*5.72%*	**5.86%**

M-59 WB to EB Crossover
Highland Michigan
Thursday, April 25, 2024
AM Peak Hour

	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
7:45 AM	0	0	0	0	0	*0*	48	0	0	0	0	*48*	0	0	0	0	0	*0*	0	0	270	0	0	*270*	**318**
8:00 AM	0	0	0	0	0	*0*	48	0	0	0	0	*48*	0	0	0	0	0	*0*	0	0	212	0	0	*212*	**260**
8:15 AM	0	0	0	0	0	*0*	53	0	0	0	0	*53*	0	0	0	0	0	*0*	0	0	263	0	0	*263*	**316**
8:30 AM	0	0	0	0	0	*0*	62	0	0	0	0	*62*	0	0	0	0	0	*0*	0	0	236	0	0	*236*	**298**
Peak Hour Total	0	0	0	0	0	*0*	211	0	0	0	0	*211*	0	0	0	0	0	*0*	0	0	981	0	0	*981*	**1192**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.851	0.000	0.000	0.000	0.000	*0.851*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.908	0.000	0.000	*0.908*	**0.937**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%		0.00%	3.79%	0.00%	0.00%	0.00%		3.79%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	5.40%	0.00%		5.40%	**5.12%**

M-59 WB to EB Crossover
Highland Michigan
Thursday, April 25, 2024

Time	Southbound n/a						Westbound M-59 WB						Northbound n/a						Eastbound M-59 EB						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	
4:00 PM	0	0	0	0	0	*0*	55	0	0	0	0	*55*	0	0	0	0	0	*0*	0	0	289	0	0	*289*	**344**
4:15 PM	0	0	0	0	0	*0*	64	0	0	0	0	*64*	0	0	0	0	0	*0*	0	0	287	0	0	*287*	**351**
4:30 PM	0	0	0	0	0	*0*	51	0	0	0	0	*51*	0	0	0	0	0	*0*	0	0	273	0	0	*273*	**324**
4:45 PM	0	0	0	0	0	*0*	59	0	0	0	0	*59*	0	0	0	0	0	*0*	0	0	288	0	0	*288*	**347**
Hourly Total	0	0	0	0	0	*0*	229	0	0	0	0	*229*	0	0	0	0	0	*0*	0	0	1137	0	0	*1137*	**1366**
5:00 PM	0	0	0	0	0	*0*	69	0	0	0	0	*69*	0	0	0	0	0	*0*	0	0	280	0	0	*280*	**349**
5:15 PM	0	0	0	0	0	*0*	48	0	0	0	0	*48*	0	0	0	0	0	*0*	0	0	286	0	0	*286*	**334**
5:30 PM	0	0	0	0	0	*0*	54	0	0	0	0	*54*	0	0	0	0	0	*0*	0	0	282	0	0	*282*	**336**
5:45 PM	0	0	0	0	0	*0*	51	0	0	0	0	*51*	0	0	0	0	0	*0*	0	0	263	0	0	*263*	**314**
Hourly Total	0	0	0	0	0	*0*	222	0	0	0	0	*222*	0	0	0	0	0	*0*	0	0	1111	0	0	*1111*	**1333**
TOTAL	**0**	**0**	**0**	**0**	**0**	***0***	**451**	**0**	**0**	**0**	**0**	***451***	**0**	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**2248**	**0**	**0**	***2248***	**2699**
Cars	0	0	0	0	0	*0*	438	0	0	0	0	*438*	0	0	0	0	0	*0*	0	0	2195	0	0	*2195*	**2633**
Heavy Vehicles	0	0	0	0	0	*0*	13	0	0	0	0	*13*	0	0	0	0	0	*0*	0	0	53	0	0	*53*	**66**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	2.88%	0.00%	0.00%	0.00%	0.00%	*2.88%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	0.00%	2.36%	0.00%	0.00%	*2.36%*	**2.45%**

M-59 WB to EB Crossover
Highland Michigan
Thursday, April 25, 2024
PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	
4:15 PM	0	0	0	0	0	*0*	64	0	0	0	0	*64*	0	0	0	0	0	*0*	0	0	287	0	0	*287*	**351**
4:30 PM	0	0	0	0	0	*0*	51	0	0	0	0	*51*	0	0	0	0	0	*0*	0	0	273	0	0	*273*	**324**
4:45 PM	0	0	0	0	0	*0*	59	0	0	0	0	*59*	0	0	0	0	0	*0*	0	0	288	0	0	*288*	**347**
5:00 PM	0	0	0	0	0	*0*	69	0	0	0	0	*69*	0	0	0	0	0	*0*	0	0	280	0	0	*280*	**349**
Peak Hour Total	0	0	0	0	0	*0*	243	0	0	0	0	*243*	0	0	0	0	0	*0*	0	0	1128	0	0	*1128*	**1371**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.880	0.000	0.000	0.000	0.000	*0.880*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.979	0.000	0.000	*0.979*	**0.976**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%		0.00%	3.70%	0.00%	0.00%	0.00%		3.70%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	2.66%	0.00%		2.66%	**2.84%**

Milford Rd and Wardlow Rd
Highland Michigan
Thursday, April 25, 2024

	Southbound N Milford Rd						Westbound E Wardlow Rd						Northbound N Milford Rd						Eastbound Apollo Center (School) Driveway						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	
7:00 AM	0	9	84	1	0	*94*	0	28	1	2	0	*31*	0	0	28	8	0	*36*	0	0	0	3	0	*3*	**164**
7:15 AM	0	16	81	0	0	*97*	0	30	0	3	0	*33*	0	0	38	31	0	*69*	0	0	0	2	0	*2*	**201**
7:30 AM	0	14	76	1	0	*91*	0	29	0	4	0	*33*	0	0	43	17	0	*60*	0	0	0	4	0	*4*	**188**
7:45 AM	0	16	86	0	0	*102*	0	36	1	11	0	*48*	0	3	43	14	0	*60*	0	1	2	4	0	*7*	**217**
Hourly Total	0	55	327	2	0	*384*	0	123	2	20	0	*145*	0	3	152	70	0	*225*	0	1	2	13	0	*16*	**770**
8:00 AM	0	11	73	0	0	*84*	0	26	1	12	0	*39*	0	2	50	17	0	*69*	0	3	7	16	0	*26*	**218**
8:15 AM	0	7	79	0	0	*86*	0	24	2	9	0	*35*	0	0	44	16	0	*60*	0	2	4	7	0	*13*	**194**
8:30 AM	0	16	69	0	0	*85*	0	18	0	4	0	*22*	0	0	27	11	0	*38*	0	1	2	2	0	*5*	**150**
8:45 AM	0	16	97	1	0	*114*	0	34	1	5	0	*40*	0	0	40	18	0	*58*	0	1	0	5	0	*6*	**218**
Hourly Total	0	50	318	1	0	*369*	0	102	4	30	0	*136*	0	2	161	62	0	*225*	0	7	13	30	0	*50*	**780**
TOTAL	**0**	**105**	**645**	**3**	**0**	***753***	**0**	**225**	**6**	**50**	**0**	***281***	**0**	**5**	**313**	**132**	**0**	***450***	**0**	**8**	**15**	**43**	**0**	***66***	**1550**
Cars	0	100	632	3	0	*735*	0	221	5	46	0	*272*	0	0	286	118	0	*404*	0	8	12	38	0	*58*	**1469**
Heavy Vehicles	0	5	13	0	0	*18*	0	4	1	4	0	*9*	0	5	27	14	0	*46*	0	0	3	5	0	*8*	**81**
Heavy Vehicle %	0.00%	4.76%	2.02%	0.00%	0.00%	*2.39%*	0.00%	1.78%	16.67%	8.00%	0.00%	*3.20%*	0.00%	100.00%	8.63%	10.61%	0.00%	*10.22%*	0.00%	0.00%	20.00%	11.63%	0.00%	*12.12%*	**5.23%**

Milford Rd and Wardlow Rd
Highland Michigan
Thursday, April 25, 2024
AM Peak Hour

	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Average	
7:15 AM	0	16	81	0	0	*97*	0	30	0	3	0	*33*	0	0	38	31	0	*69*	0	0	0	2	0	*2*	**201**
7:30 AM	0	14	76	1	0	*91*	0	29	0	4	0	*33*	0	0	43	17	0	*60*	0	0	0	4	0	*4*	**188**
7:45 AM	0	16	86	0	0	*102*	0	36	1	11	0	*48*	0	3	43	14	0	*60*	0	1	2	4	0	*7*	**217**
8:00 AM	0	11	73	0	0	*84*	0	26	1	12	0	*39*	0	2	50	17	0	*69*	0	3	7	16	0	*26*	**218**
Peak Hour Total	0	57	316	1	0	*374*	0	121	2	30	0	*153*	0	5	174	79	0	*258*	0	4	9	26	0	*39*	**824**
PHF	0.000	0.891	0.919	0.250	0.000	*0.917*	0.000	0.840	0.500	0.625	0.000	*0.797*	0.000	0.417	0.870	0.637	0.000	*0.935*	0.000	0.333	0.321	0.406	0.000	*0.375*	**0.945**
Heavy Vehicle %	0.00%	5.26%	2.53%	0.00%		2.94%	0.00%	0.83%	50.00%	6.67%		2.61%	0.00%	100.00%	10.34%	13.92%		13.18%	0.00%	0.00%	22.22%	15.38%		15.38%	**6.67%**

Milford Rd and Wardlow Rd
Highland Michigan
Thursday, April 25, 2024

Time	Southbound N Milford Rd						Westbound E Wardlow Rd						Northbound N Milford Rd						Eastbound Apollo Center (School) Driveway						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
4:00 PM	0	14	76	0	0	*90*	0	22	0	14	0	*36*	0	0	122	46	0	*168*	0	1	3	2	1	*6*	**300**
4:15 PM	0	14	75	0	0	*89*	0	35	3	23	0	*61*	0	0	129	47	0	*176*	0	0	4	1	1	*5*	**331**
4:30 PM	0	9	73	0	0	*82*	0	30	1	10	0	*41*	0	0	96	42	0	*138*	0	1	2	6	0	*9*	**270**
4:45 PM	0	12	92	1	0	*105*	0	36	2	15	0	*53*	0	0	94	39	4	*133*	0	1	0	0	0	*1*	**292**
Hourly Total	0	49	316	1	0	*366*	0	123	6	62	0	*191*	0	0	441	174	4	*615*	0	3	9	9	2	*21*	**1193**
5:00 PM	0	13	79	0	0	*92*	0	35	1	17	0	*53*	0	1	98	47	0	*146*	0	0	4	4	0	*8*	**299**
5:15 PM	0	16	69	0	0	*85*	0	29	1	19	0	*49*	0	0	100	49	4	*149*	0	1	3	2	1	*6*	**289**
5:30 PM	0	15	70	0	0	*85*	0	23	0	12	0	*35*	0	0	122	35	6	*157*	0	0	2	5	0	*7*	**284**
5:45 PM	0	8	56	0	0	*64*	0	19	0	10	0	*29*	0	0	98	30	0	*128*	0	0	0	2	0	*2*	**223**
Hourly Total	0	52	274	0	0	*326*	0	106	2	58	0	*166*	0	1	418	161	10	*580*	0	1	9	13	1	*23*	**1095**
TOTAL	**0**	**101**	**590**	**1**	**0**	***692***	**0**	**229**	**8**	**120**	**0**	***357***	**0**	**1**	**859**	**335**	**14**	***1195***	**0**	**4**	**18**	**22**	**3**	***44***	**2288**
Cars	0	100	579	1	0	*680*	0	224	8	117	0	*349*	0	0	845	333	13	*1178*	0	4	18	22	3	*44*	**2251**
Heavy Vehicles	0	1	11	0	0	*12*	0	5	0	3	0	*8*	0	1	14	2	1	*17*	0	0	0	0	0	*0*	**37**
Heavy Vehicle %	0.00%	0.99%	1.86%	0.00%	0.00%	*1.73%*	0.00%	2.18%	0.00%	2.50%	0.00%	*2.24%*	0.00%	100.00%	1.63%	0.60%	7.14%	*1.42%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**1.62%**

Milford Rd and Wardlow Rd
Highland Michigan
Thursday, April 25, 2024
PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
4:00 PM	0	14	76	0	0	*90*	0	22	0	14	0	*36*	0	0	122	46	0	*168*	0	1	3	2	1	*6*	**300**
4:15 PM	0	14	75	0	0	*89*	0	35	3	23	0	*61*	0	0	129	47	0	*176*	0	0	4	1	1	*5*	**331**
4:30 PM	0	9	73	0	0	*82*	0	30	1	10	0	*41*	0	0	96	42	0	*138*	0	1	2	6	0	*9*	**270**
4:45 PM	0	12	92	1	0	*105*	0	36	2	15	0	*53*	0	0	94	39	4	*133*	0	1	0	0	0	*1*	**292**
Peak Hour Total	0	49	316	1	0	*366*	0	123	6	62	0	*191*	0	0	441	174	4	*615*	0	3	9	9	2	*21*	**1193**
PHF	0.000	0.875	0.859	0.250	0.000	*0.871*	0.000	0.854	0.500	0.674	0.000	*0.783*	0.000	0.000	0.855	0.926	0.250	*0.874*	0.000	0.750	0.563	0.375	0.500	*0.583*	**0.901**
Heavy Vehicle %	0.00%	2.04%	3.16%	0.00%		3.01%	0.00%	0.81%	0.00%	1.61%		1.05%	0.00%	0.00%	1.81%	0.00%		1.30%	0.00%	0.00%	0.00%	0.00%		0.00%	**1.76%**

Milford Rd and M-59 WB
Highland Michigan
Thursday, April 25, 2024

Time	Southbound N Milford Rd						Westbound M-59 WB						Northbound N Milford Rd						Eastbound n/a						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	1	0	0	*1*	0	0	29	3	0	*32*	0	1	3	0	0	*4*	0	0	0	0	0	*0*	**37**
12:15 AM	0	0	0	3	0	*3*	0	0	9	1	0	*10*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**19**
12:30 AM	0	0	1	3	0	*4*	0	0	12	0	0	*12*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**18**
12:45 AM	0	0	0	0	0	*0*	0	0	7	2	0	*9*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**10**
Hourly Total	0	0	2	6	0	*8*	0	0	57	6	0	*63*	0	1	12	0	0	*13*	0	0	0	0	0	*0*	**84**
1:00 AM	0	0	2	2	0	*4*	0	0	5	2	0	*7*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**14**
1:15 AM	0	0	1	2	0	*3*	0	0	6	1	0	*7*	0	0	5	0	0	*5*	0	0	0	0	0	*0*	**15**
1:30 AM	0	0	0	1	0	*1*	0	0	5	1	0	*6*	0	1	2	0	0	*3*	0	0	0	0	0	*0*	**10**
1:45 AM	0	0	0	1	0	*1*	0	0	7	2	0	*9*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	**14**
Hourly Total	0	0	3	6	0	*9*	0	0	23	6	0	*29*	0	1	14	0	0	*15*	0	0	0	0	0	*0*	**53**
2:00 AM	0	0	1	1	0	*2*	0	0	7	0	0	*7*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**10**
2:15 AM	0	0	1	1	0	*2*	0	0	1	3	0	*4*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**7**
2:30 AM	0	0	1	3	0	*4*	0	0	5	1	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**10**
2:45 AM	0	0	1	2	0	*3*	0	0	5	0	0	*5*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**11**
Hourly Total	0	0	4	7	0	*11*	0	0	18	4	0	*22*	0	0	5	0	0	*5*	0	0	0	0	0	*0*	**38**
3:00 AM	0	0	1	3	0	*4*	0	0	5	0	0	*5*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	**13**
3:15 AM	0	0	2	3	0	*5*	0	0	9	1	0	*10*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**15**
3:30 AM	0	0	1	2	0	*3*	0	0	6	1	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**10**
3:45 AM	0	0	6	1	0	*7*	0	0	7	2	0	*9*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**17**
Hourly Total	0	0	10	9	0	*19*	0	0	27	4	0	*31*	0	0	5	0	0	*5*	0	0	0	0	0	*0*	**55**
4:00 AM	0	0	5	4	0	*9*	0	0	13	4	0	*17*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**29**
4:15 AM	0	0	6	6	0	*12*	0	0	16	2	0	*18*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**30**
4:30 AM	0	0	6	7	0	*13*	0	0	23	4	0	*27*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**41**
4:45 AM	0	0	12	9	0	*21*	0	0	30	3	0	*33*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	**58**
Hourly Total	0	0	29	26	0	*55*	0	0	82	13	0	*95*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**158**
5:00 AM	0	0	21	10	0	*31*	0	0	45	6	0	*51*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**90**
5:15 AM	0	0	22	19	0	*41*	0	0	90	5	0	*95*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**144**
5:30 AM	0	0	36	23	0	*59*	0	0	88	8	0	*96*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**163**
5:45 AM	0	0	26	18	0	*44*	0	0	119	10	0	*129*	0	0	14	0	0	*14*	0	0	0	0	0	*0*	**187**
Hourly Total	0	0	105	70	0	*175*	0	0	342	29	0	*371*	0	0	38	0	0	*38*	0	0	0	0	0	*0*	**584**
6:00 AM	0	0	30	33	0	*63*	0	0	106	5	0	*111*	0	0	18	0	0	*18*	0	0	0	0	0	*0*	**192**
6:15 AM	0	0	42	35	0	*77*	0	0	182	2	0	*184*	0	0	22	0	0	*22*	0	0	0	0	0	*0*	**283**
6:30 AM	0	0	52	39	0	*91*	0	0	210	12	0	*222*	0	0	23	0	0	*23*	0	0	0	0	0	*0*	**336**
6:45 AM	0	0	80	42	0	*122*	0	0	239	26	0	*265*	0	0	54	0	0	*54*	0	0	0	0	0	*0*	**441**
Hourly Total	0	0	204	149	0	*353*	0	0	737	45	0	*782*	0	0	117	0	0	*117*	0	0	0	0	0	*0*	**1252**
7:00 AM	0	0	91	38	0	*129*	0	0	222	14	0	*236*	0	0	44	0	0	*44*	0	0	0	0	0	*0*	**409**
7:15 AM	0	0	71	53	0	*124*	0	0	253	30	0	*283*	0	0	57	0	0	*57*	0	0	0	0	0	*0*	**464**
7:30 AM	0	0	80	47	0	*127*	0	0	273	22	0	*295*	0	0	55	0	0	*55*	0	0	0	0	0	*0*	**477**
7:45 AM	0	0	88	55	0	*143*	0	0	259	21	0	*280*	0	0	64	0	0	*64*	0	0	0	0	0	*0*	**487**
Hourly Total	0	0	330	193	0	*523*	0	0	1007	87	0	*1094*	0	0	220	0	0	*220*	0	0	0	0	0	*0*	**1837**

Time	Southbound N Milford Rd						Westbound M-59 WB						Northbound N Milford Rd						Eastbound n/a						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	0	74	37	1	*111*	0	0	255	17	0	*272*	0	0	62	0	0	*62*	0	0	0	0	0	*0*	**445**
8:15 AM	0	0	60	49	0	*109*	0	0	266	15	0	*281*	0	0	71	0	0	*71*	0	0	0	0	1	*0*	**461**
8:30 AM	0	0	53	41	0	*94*	0	0	275	18	0	*293*	0	0	50	0	0	*50*	0	0	0	0	0	*0*	**437**
8:45 AM	0	0	89	44	0	*133*	0	0	255	21	0	*276*	0	0	47	0	0	*47*	0	0	0	0	0	*0*	**456**
Hourly Total	0	0	276	171	1	*447*	0	0	1051	71	0	*1122*	0	0	230	0	0	*230*	0	0	0	0	1	*0*	**1799**
9:00 AM	0	0	76	59	0	*135*	0	0	249	24	0	*273*	0	0	65	0	0	*65*	0	0	0	0	0	*0*	**473**
9:15 AM	0	0	74	49	0	*123*	0	0	261	30	0	*291*	0	0	64	0	0	*64*	0	0	0	0	0	*0*	**478**
9:30 AM	0	0	59	47	0	*106*	0	0	231	31	0	*262*	0	0	57	0	0	*57*	0	0	0	0	0	*0*	**425**
9:45 AM	0	0	53	44	0	*97*	0	0	243	25	0	*268*	0	0	62	0	0	*62*	0	0	0	0	0	*0*	**427**

Hourly Total	0	0	262	199	0	*461*	0	0	984	110	0	*1094*	0	0	248	0	0	*248*	0	0	0	0	0	*0*	**1803**
10:00 AM	0	0	51	41	0	*92*	0	0	190	21	0	*211*	0	0	46	0	0	*46*	0	0	0	0	0	*0*	**349**
10:15 AM	0	0	52	40	0	*92*	0	0	205	19	0	*224*	0	0	59	0	0	*59*	0	0	0	0	0	*0*	**375**
10:30 AM	0	0	48	52	0	*100*	0	0	200	24	0	*224*	0	0	50	0	0	*50*	0	0	0	0	1	*0*	**374**
10:45 AM	0	0	41	51	0	*92*	0	0	219	29	0	*248*	0	0	52	0	0	*52*	0	0	0	0	1	*0*	**392**
Hourly Total	0	0	192	184	0	*376*	0	0	814	93	0	*907*	0	0	207	0	0	*207*	0	0	0	0	2	*0*	**1490**
11:00 AM	0	0	47	52	0	*99*	0	0	192	33	0	*225*	0	0	57	0	0	*57*	0	0	0	0	1	*0*	**381**
11:15 AM	0	0	45	40	1	*85*	0	0	207	32	0	*239*	0	0	82	0	0	*82*	0	0	0	0	0	*0*	**406**
11:30 AM	0	0	57	48	0	*105*	0	0	201	39	0	*240*	0	0	64	0	0	*64*	0	0	0	0	0	*0*	**409**
11:45 AM	0	0	57	51	0	*108*	0	0	195	27	0	*222*	0	0	75	0	0	*75*	0	0	0	0	0	*0*	**405**
Hourly Total	0	0	206	191	1	*397*	0	0	795	131	0	*926*	0	0	278	0	0	*278*	0	0	0	0	1	*0*	**1601**
12:00 PM	0	0	47	44	0	*91*	0	0	179	29	0	*208*	0	0	82	0	0	*82*	0	0	0	0	0	*0*	**381**
12:15 PM	0	0	43	38	0	*81*	0	0	228	30	0	*258*	0	0	80	0	0	*80*	0	0	0	0	0	*0*	**419**
12:30 PM	0	0	53	52	1	*105*	0	0	235	25	0	*260*	0	1	55	0	0	*56*	0	0	0	0	0	*0*	**421**
12:45 PM	0	0	47	44	2	*91*	0	0	235	26	0	*261*	0	0	72	0	0	*72*	0	0	0	0	0	*0*	**424**
Hourly Total	0	0	190	178	3	*368*	0	0	877	110	0	*987*	0	1	289	0	0	*290*	0	0	0	0	0	*0*	**1645**
1:00 PM	0	0	37	31	0	*68*	0	0	238	23	0	*261*	0	0	65	0	0	*65*	0	0	0	0	0	*0*	**394**
1:15 PM	0	0	52	44	0	*96*	0	0	234	29	0	*263*	0	0	66	0	0	*66*	0	0	0	0	0	*0*	**425**
1:30 PM	0	0	39	37	0	*76*	0	0	250	23	0	*273*	0	0	55	0	0	*55*	0	0	0	0	0	*0*	**404**
1:45 PM	0	0	45	40	0	*85*	0	0	271	27	0	*298*	0	0	76	0	0	*76*	0	0	0	0	0	*0*	**459**
Hourly Total	0	0	173	152	0	*325*	0	0	993	102	0	*1095*	0	0	262	0	0	*262*	0	0	0	0	0	*0*	**1682**
2:00 PM	0	0	53	53	1	*106*	0	0	223	40	0	*263*	0	0	89	0	0	*89*	0	0	0	0	0	*0*	**458**
2:15 PM	0	0	37	44	0	*81*	0	0	271	38	0	*309*	0	0	115	0	0	*115*	0	0	0	0	0	*0*	**505**
2:30 PM	0	0	49	46	0	*95*	0	0	249	32	0	*281*	0	1	90	0	0	*91*	0	0	0	0	0	*0*	**467**
2:45 PM	0	0	54	39	1	*93*	0	0	279	32	0	*311*	0	0	92	0	0	*92*	0	0	0	0	0	*0*	**496**
Hourly Total	0	0	193	182	2	*375*	0	0	1022	142	0	*1164*	0	1	386	0	0	*387*	0	0	0	0	0	*0*	**1926**
3:00 PM	0	0	69	63	0	*132*	0	0	262	35	0	*297*	0	0	95	0	0	*95*	0	0	0	0	0	*0*	**524**
3:15 PM	0	0	45	71	1	*116*	0	0	295	35	0	*330*	0	0	103	0	0	*103*	0	0	0	0	0	*0*	**549**
3:30 PM	0	0	64	46	0	*110*	0	0	261	37	0	*298*	0	0	104	0	0	*104*	0	0	0	0	0	*0*	**512**
3:45 PM	0	0	82	51	0	*133*	0	0	340	18	0	*358*	0	0	107	0	0	*107*	0	0	0	0	1	*0*	**598**
Hourly Total	0	0	260	231	1	*491*	0	0	1158	125	0	*1283*	0	0	409	0	0	*409*	0	0	0	0	1	*0*	**2183**

	Southbound N Milford Rd						Westbound M-59 WB						Northbound N Milford Rd						Eastbound n/a						
Time	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**VEHICLE TOTAL**
4:00 PM	0	0	65	56	1	*121*	0	0	310	34	0	*344*	0	0	130	0	0	*130*	0	0	0	0	0	*0*	**595**
4:15 PM	0	0	67	59	0	*126*	0	0	321	31	0	*352*	0	0	145	0	0	*145*	0	0	0	0	2	*0*	**623**
4:30 PM	0	0	65	52	0	*117*	0	0	281	35	0	*316*	0	0	113	0	0	*113*	0	0	0	0	0	*0*	**546**
4:45 PM	0	0	80	46	0	*126*	0	0	363	30	0	*393*	0	0	120	0	0	*120*	0	0	0	0	0	*0*	**639**
Hourly Total	0	0	277	213	1	*490*	0	0	1275	130	0	*1405*	0	0	508	0	0	*508*	0	0	0	0	2	*0*	**2403**
5:00 PM	0	0	92	60	0	*152*	0	0	350	30	0	*380*	0	0	120	0	0	*120*	0	0	0	0	0	*0*	**652**
5:15 PM	0	0	68	44	0	*112*	0	0	315	29	0	*344*	0	0	133	0	0	*133*	0	0	0	0	0	*0*	**589**
5:30 PM	0	0	52	56	0	*108*	0	0	313	19	0	*332*	0	0	135	0	0	*135*	0	0	0	0	0	*0*	**575**
5:45 PM	0	0	50	39	0	*89*	0	0	304	32	0	*336*	0	0	117	0	0	*117*	0	0	0	0	0	*0*	**542**
Hourly Total	0	0	262	199	0	*461*	0	0	1282	110	0	*1392*	0	0	505	0	0	*505*	0	0	0	0	0	*0*	**2358**
6:00 PM	0	0	44	41	0	*85*	0	0	312	28	0	*340*	0	0	105	0	0	*105*	0	0	0	0	0	*0*	**530**
6:15 PM	0	0	41	41	0	*82*	0	0	281	33	0	*314*	0	0	93	0	0	*93*	0	0	0	0	0	*0*	**489**
6:30 PM	0	0	40	24	0	*64*	0	0	246	31	0	*277*	0	0	75	0	0	*75*	0	0	0	0	0	*0*	**416**
6:45 PM	0	0	33	41	0	*74*	0	0	218	22	0	*240*	0	0	85	0	0	*85*	0	0	0	0	0	*0*	**399**
Hourly Total	0	0	158	147	0	*305*	0	0	1057	114	0	*1171*	0	0	358	0	0	*358*	0	0	0	0	0	*0*	**1834**
7:00 PM	0	0	27	27	0	*54*	0	0	186	30	0	*216*	0	0	85	0	0	*85*	0	0	0	0	0	*0*	**355**
7:15 PM	0	0	40	22	0	*62*	0	0	172	19	0	*191*	0	0	69	0	0	*69*	0	0	0	0	0	*0*	**322**
7:30 PM	0	0	27	22	0	*49*	0	0	160	31	0	*191*	0	0	64	0	0	*64*	0	0	0	0	0	*0*	**304**
7:45 PM	0	0	27	19	0	*46*	0	0	159	23	0	*182*	0	0	82	0	0	*82*	0	0	0	0	0	*0*	**310**
Hourly Total	0	0	121	90	0	*211*	0	0	677	103	0	*780*	0	0	300	0	0	*300*	0	0	0	0	0	*0*	**1291**
8:00 PM	0	0	11	24	0	*35*	0	0	121	23	0	*144*	0	0	50	0	0	*50*	0	0	0	0	0	*0*	**229**
8:15 PM	0	0	21	16	0	*37*	0	0	126	11	0	*137*	0	0	53	0	0	*53*	0	0	0	0	0	*0*	**227**
8:30 PM	0	0	18	15	0	*33*	0	0	115	20	0	*135*	0	0	45	0	0	*45*	0	0	0	0	0	*0*	**213**
8:45 PM	0	0	22	18	0	*40*	0	0	117	25	0	*142*	0	0	63	0	0	*63*	0	0	0	0	0	*0*	**245**
Hourly Total	0	0	72	73	0	*145*	0	0	479	79	0	*558*	0	0	211	0	0	*211*	0	0	0	0	0	*0*	**914**

9:00 PM	0	0	14	18	0	*32*	0	0	105	12	0	*117*	0	0	45	0	0	*45*	0	0	0	0	0	*0*	**194**
9:15 PM	0	0	19	10	0	*29*	0	0	92	13	0	*105*	0	0	41	0	0	*41*	0	0	0	0	0	*0*	**175**
9:30 PM	0	0	11	17	0	*28*	0	0	73	10	0	*83*	0	0	39	0	0	*39*	0	0	0	0	0	*0*	**150**
9:45 PM	0	0	11	16	0	*27*	0	0	74	9	0	*83*	0	0	37	0	0	*37*	0	0	0	0	0	*0*	**147**
Hourly Total	0	0	55	61	0	*116*	0	0	344	44	0	*388*	0	0	162	0	0	*162*	0	0	0	0	0	*0*	**666**
10:00 PM	0	0	3	8	0	*11*	0	0	75	14	0	*89*	0	1	18	0	0	*19*	0	0	0	0	0	*0*	**119**
10:15 PM	0	0	3	9	0	*12*	0	0	65	9	0	*74*	0	0	19	0	0	*19*	0	0	0	0	0	*0*	**105**
10:30 PM	0	0	4	7	0	*11*	0	0	42	12	0	*54*	0	0	17	0	0	*17*	0	0	0	0	0	*0*	**82**
10:45 PM	0	0	4	5	0	*9*	0	0	43	15	0	*58*	0	0	12	0	0	*12*	0	0	0	0	0	*0*	**79**
Hourly Total	0	0	14	29	0	*43*	0	0	225	50	0	*275*	0	1	66	0	0	*67*	0	0	0	0	0	*0*	**385**
11:00 PM	0	0	6	4	0	*10*	0	0	45	6	0	*51*	0	0	16	0	0	*16*	0	0	0	0	0	*0*	**77**
11:15 PM	0	0	0	6	0	*6*	0	0	42	3	0	*45*	0	0	13	0	0	*13*	0	0	0	0	0	*0*	**64**
11:30 PM	0	0	3	3	0	*6*	0	0	38	6	0	*44*	0	0	10	0	0	*10*	0	0	0	0	0	*0*	**60**
11:45 PM	0	0	3	3	0	*6*	0	0	24	6	0	*30*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	**45**
Hourly Total	0	0	12	16	0	*28*	0	0	149	21	0	*170*	0	0	48	0	0	*48*	0	0	0	0	0	*0*	**246**
TOTAL	**0**	**0**	**3410**	**2782**	**9**	***6192***	**0**	**0**	**15475**	**1729**	**0**	***17204***	**0**	**5**	**4886**	**0**	**0**	***4891***	**0**	**0**	**0**	**0**	**7**	***0***	**28287**
Cars	0	0	3330	2675	1	*6005*	0	0	15012	1666	0	*16678*	0	5	4727	0	0	*4732*	0	0	0	0	7	*0*	**27415**
Heavy Vehicles	0	0	80	107	8	*187*	0	0	463	63	0	*526*	0	0	159	0	0	*159*	0	0	0	0	0	*0*	**872**
Heavy Vehicle %	0.00%	0.00%	2.35%	3.85%	88.89%	*3.02%*	0.00%	0.00%	2.99%	3.64%	0.00%	*3.06%*	0.00%	0.00%	3.25%	0.00%	0.00%	*3.25%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**3.08%**

Milford Rd and M-59 WB
Highland Michigan
Thursday, April 25, 2024

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
7:15 AM	0	0	71	53	0	*124*	0	0	253	30	0	*283*	0	0	57	0	0	*57*	0	0	0	0	0	*0*	**464**
7:30 AM	0	0	80	47	0	*127*	0	0	273	22	0	*295*	0	0	55	0	0	*55*	0	0	0	0	0	*0*	**477**
7:45 AM	0	0	88	55	0	*143*	0	0	259	21	0	*280*	0	0	64	0	0	*64*	0	0	0	0	0	*0*	**487**
8:00 AM	0	0	74	37	1	*111*	0	0	255	17	0	*272*	0	0	62	0	0	*62*	0	0	0	0	0	*0*	**445**
Peak Hour Total	0	0	313	192	1	*505*	0	0	1040	90	0	*1130*	0	0	238	0	0	*238*	0	0	0	0	0	*0*	**1873**
PHF	0.000	0.000	0.889	0.873	0.250	*0.883*	0.000	0.000	0.952	0.750	0.000	*0.958*	0.000	0.000	0.930	0.000	0.000	*0.930*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.961**
Heavy Vehicle %	0.00%	0.00%	2.24%	9.38%		4.95%	0.00%	0.00%	5.67%	8.89%		5.93%	0.00%	0.00%	5.88%	0.00%		5.88%	0.00%	0.00%	0.00%	0.00%		0.00%	**5.66%**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:15 PM	0	0	67	59	0	*126*	0	0	321	31	0	*352*	0	0	145	0	0	*145*	0	0	0	0	2	*0*	**623**
4:30 PM	0	0	65	52	0	*117*	0	0	281	35	0	*316*	0	0	113	0	0	*113*	0	0	0	0	0	*0*	**546**
4:45 PM	0	0	80	46	0	*126*	0	0	363	30	0	*393*	0	0	120	0	0	*120*	0	0	0	0	0	*0*	**639**
5:00 PM	0	0	92	60	0	*152*	0	0	350	30	0	*380*	0	0	120	0	0	*120*	0	0	0	0	0	*0*	**652**
Peak Hour Total	0	0	304	217	0	*521*	0	0	1315	126	0	*1441*	0	0	498	0	0	*498*	0	0	0	0	2	*0*	**2460**
PHF	0.000	0.000	0.826	0.904	0.000	*0.857*	0.000	0.000	0.906	0.900	0.000	*0.917*	0.000	0.000	0.859	0.000	0.000	*0.859*	0.000	0.000	0.000	0.000	0.250	*0.000*	**0.943**
Heavy Vehicle %	0.00%	0.00%	2.30%	3.69%		2.88%	0.00%	0.00%	2.13%	2.38%		2.15%	0.00%	0.00%	2.81%	0.00%		2.81%	0.00%	0.00%	0.00%	0.00%		0.00%	**2.44%**

Milford Rd and Livingston Rd
Highland Michigan
Thursday, April 25, 2024

	Southbound N Milford Rd						Westbound E Livingston Rd						Northbound S Milford Rd						Eastbound W Livingston Rd						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
7:00 AM	0	0	145	0	0	*145*	0	8	0	1	0	*9*	0	7	67	5	0	*79*	0	1	6	34	0	*41*	**274**
7:15 AM	0	9	115	1	0	*125*	0	5	2	1	0	*8*	0	11	55	8	0	*74*	0	2	5	19	0	*26*	**233**
7:30 AM	0	7	119	0	0	*126*	0	1	6	1	0	*8*	0	5	45	1	0	*51*	0	2	2	18	1	*22*	**207**
7:45 AM	0	6	133	1	0	*140*	0	6	2	1	0	*9*	0	3	49	4	0	*56*	0	3	2	22	0	*27*	**232**
Hourly Total	0	22	512	2	0	*536*	0	20	10	4	0	*34*	0	26	216	18	0	*260*	0	8	15	93	1	*116*	**946**
8:00 AM	0	5	116	0	0	*121*	0	9	1	8	0	*18*	0	10	54	7	0	*71*	0	1	5	17	0	*23*	**233**
8:15 AM	0	5	118	2	0	*125*	0	6	6	2	0	*14*	0	13	58	5	0	*76*	0	6	2	18	0	*26*	**241**
8:30 AM	0	2	101	1	0	*104*	0	2	3	4	0	*9*	0	7	45	4	0	*56*	0	1	5	21	1	*27*	**196**
8:45 AM	0	2	124	4	0	*130*	0	6	3	2	0	*11*	0	11	52	7	0	*70*	0	2	0	26	0	*28*	**239**
Hourly Total	0	14	459	7	0	*480*	0	23	13	16	0	*52*	0	41	209	23	0	*273*	0	10	12	82	1	*104*	**909**
TOTAL	**0**	**36**	**971**	**9**	**0**	***1016***	**0**	**43**	**23**	**20**	**0**	***86***	**0**	**67**	**425**	**41**	**0**	***533***	**0**	**18**	**27**	**175**	**2**	***220***	**1855**
Cars	0	33	937	9	0	*979*	0	43	22	18	0	*83*	0	67	407	39	0	*513*	0	15	26	173	1	*214*	**1789**
Heavy Vehicles	0	3	34	0	0	*37*	0	0	1	2	0	*3*	0	0	18	2	0	*20*	0	3	1	2	1	*6*	**66**
Heavy Vehicle %	0.00%	8.33%	3.50%	0.00%	0.00%	*3.64%*	0.00%	0.00%	4.35%	10.00%	0.00%	*3.49%*	0.00%	0.00%	4.24%	4.88%	0.00%	*3.75%*	0.00%	16.67%	3.70%	1.14%	50.00%	*2.73%*	**3.56%**

Milford Rd and Livingston Rd
Highland Michigan
Thursday, April 25, 2024
AM Peak Hour

	Southbound N Milford Rd						Westbound E Livingston Rd						Northbound S Milford Rd						Eastbound W Livingston Rd						VEHICLE TOTAL
Time	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	Vehicle Approach	
7:00 AM	0	0	145	0	0	*145*	0	8	0	1	0	*9*	0	7	67	5	0	*79*	0	1	6	34	0	*41*	**274**
7:15 AM	0	9	115	1	0	*125*	0	5	2	1	0	*8*	0	11	55	8	0	*74*	0	2	5	19	0	*26*	**233**
7:30 AM	0	7	119	0	0	*126*	0	1	6	1	0	*8*	0	5	45	1	0	*51*	0	2	2	18	1	*22*	**207**
7:45 AM	0	6	133	1	0	*140*	0	6	2	1	0	*9*	0	3	49	4	0	*56*	0	3	2	22	0	*27*	**232**
Peak Hour Total	0	22	512	2	0	*536*	0	20	10	4	0	*34*	0	26	216	18	0	*260*	0	8	15	93	1	*116*	**946**
PHF	0.000	0.611	0.883	0.500	0.000	*0.924*	0.000	0.625	0.417	1.000	0.000	*0.944*	0.000	0.591	0.806	0.563	0.000	*0.823*	0.000	0.667	0.625	0.684	0.250	*0.707*	**0.863**
Heavy Vehicle %	0.00%	9.09%	2.54%	0.00%		2.80%	0.00%	0.00%	10.00%	0.00%		2.94%	0.00%	0.00%	4.63%	11.11%		4.62%	0.00%	12.50%	0.00%	1.08%		1.72%	**3.17%**

Milford Rd and Livingston Rd
Highland Michigan
Thursday, April 25, 2024

Time	Southbound N Milford Rd						Westbound E Livingston Rd						Northbound S Milford Rd						Eastbound W Livingston Rd						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	
4:00 PM	0	3	113	4	1	*120*	0	7	1	4	0	*12*	0	26	134	7	0	*167*	0	14	9	31	0	*54*	**353**
4:15 PM	0	4	138	5	0	*147*	0	13	2	8	0	*23*	0	20	141	14	0	*175*	0	4	12	33	0	*49*	**394**
4:30 PM	0	7	112	1	2	*120*	0	8	3	3	2	*14*	0	22	124	2	0	*148*	0	2	4	27	0	*33*	**315**
4:45 PM	0	6	134	10	0	*150*	0	10	14	8	0	*32*	0	30	141	12	0	*183*	0	4	6	26	0	*36*	**401**
Hourly Total	0	20	497	20	3	*537*	0	38	20	23	2	*81*	0	98	540	35	0	*673*	0	24	31	117	0	*172*	**1463**
5:00 PM	0	5	149	4	0	*158*	0	18	6	7	0	*31*	0	26	162	4	0	*192*	0	3	3	31	0	*37*	**418**
5:15 PM	0	1	130	3	0	*134*	0	9	8	1	2	*18*	0	27	165	12	0	*204*	0	6	4	34	0	*44*	**400**
5:30 PM	0	0	108	1	0	*109*	0	6	2	1	0	*9*	0	23	158	8	0	*189*	0	4	1	42	0	*47*	**354**
5:45 PM	0	6	114	2	0	*122*	0	8	7	3	0	*18*	0	35	110	9	0	*154*	0	2	3	25	0	*30*	**324**
Hourly Total	0	12	501	10	0	*523*	0	41	23	12	2	*76*	0	111	595	33	0	*739*	0	15	11	132	0	*158*	**1496**
TOTAL	**0**	**32**	**998**	**30**	**3**	***1060***	**0**	**79**	**43**	**35**	**4**	***157***	**0**	**209**	**1135**	**68**	**0**	***1412***	**0**	**39**	**42**	**249**	**0**	***330***	**2959**
Cars	0	30	975	30	1	*1035*	0	68	42	35	2	*145*	0	207	1119	68	0	*1394*	0	37	41	244	0	*322*	**2896**
Heavy Vehicles	0	2	23	0	2	*25*	0	11	1	0	2	*12*	0	2	16	0	0	*18*	0	2	1	5	0	*8*	**63**
Heavy Vehicle %	0.00%	6.25%	2.30%	0.00%	66.67%	*2.36%*	0.00%	13.92%	2.33%	0.00%	50.00%	*7.64%*	0.00%	0.96%	1.41%	0.00%	0.00%	*1.27%*	0.00%	5.13%	2.38%	2.01%	0.00%	*2.42%*	**2.13%**

Milford Rd and Livingston Rd
Highland Michigan
Thursday, April 25, 2024
PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk	*Vehicle Approach*	
4:45 PM	0	6	134	10	0	*150*	0	10	14	8	0	*32*	0	30	141	12	0	*183*	0	4	6	26	0	*36*	**401**
5:00 PM	0	5	149	4	0	*158*	0	18	6	7	0	*31*	0	26	162	4	0	*192*	0	3	3	31	0	*37*	**418**
5:15 PM	0	1	130	3	0	*134*	0	9	8	1	2	*18*	0	27	165	12	0	*204*	0	6	4	34	0	*44*	**400**
5:30 PM	0	0	108	1	0	*109*	0	6	2	1	0	*9*	0	23	158	8	0	*189*	0	4	1	42	0	*47*	**354**
Peak Hour Total	0	12	521	18	0	*551*	0	43	30	17	2	*90*	0	106	626	36	0	*768*	0	17	14	133	0	*164*	**1573**
PHF	0.000	0.500	0.874	0.450	0.000	*0.872*	0.000	0.597	0.536	0.531	0.250	*0.703*	0.000	0.883	0.948	0.750	0.000	*0.941*	0.000	0.708	0.583	0.792	0.000	*0.872*	**0.941**
Heavy Vehicle %	0.00%	0.00%	3.07%	0.00%		2.90%	0.00%	23.26%	3.33%	0.00%		12.22%	0.00%	0.94%	1.44%	0.00%		1.30%	0.00%	0.00%	0.00%	1.50%		1.22%	**2.48%**

M-59 EB to WB Crossover
Highland Michigan
Thursday, April 25, 2024

Time	Southbound Driveway						Westbound M-59 WB						Northbound n/a						Eastbound M-59 EB						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	0	0	*0*	0	0	31	0	0	*31*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**32**
12:15 AM	0	0	0	0	0	*0*	0	0	10	0	0	*10*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**10**
12:30 AM	0	0	0	0	0	*0*	0	0	11	0	0	*11*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**12**
12:45 AM	0	0	0	0	0	*0*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**9**
Hourly Total	0	0	0	0	0	*0*	0	0	61	0	0	*61*	0	0	0	0	0	*0*	2	0	0	0	0	*2*	**63**
1:00 AM	0	0	0	0	0	*0*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**7**
1:15 AM	0	0	0	0	0	*0*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**7**
1:30 AM	0	0	0	0	0	*0*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**6**
1:45 AM	0	0	0	0	0	*0*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**9**
Hourly Total	0	0	0	0	0	*0*	0	0	29	0	0	*29*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**29**
2:00 AM	0	0	0	0	0	*0*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**7**
2:15 AM	0	0	0	0	0	*0*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
2:30 AM	0	0	0	0	0	*0*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**6**
2:45 AM	0	0	0	0	0	*0*	0	0	5	0	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
Hourly Total	0	0	0	0	0	*0*	0	0	22	0	0	*22*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**22**
3:00 AM	0	0	0	0	0	*0*	0	0	5	0	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
3:15 AM	0	0	0	0	0	*0*	0	0	10	0	0	*10*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**10**
3:30 AM	0	0	0	0	0	*0*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**7**
3:45 AM	0	0	0	0	0	*0*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**9**
Hourly Total	0	0	0	0	0	*0*	0	0	31	0	0	*31*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**31**
4:00 AM	0	0	0	0	0	*0*	0	0	17	0	0	*17*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**17**
4:15 AM	0	0	0	0	0	*0*	0	0	18	0	0	*18*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**18**
4:30 AM	0	0	0	0	0	*0*	0	0	27	0	0	*27*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**27**
4:45 AM	0	0	0	0	0	*0*	0	0	33	0	0	*33*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**33**
Hourly Total	0	0	0	0	0	*0*	0	0	95	0	0	*95*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**95**
5:00 AM	0	0	0	0	0	*0*	0	0	50	0	0	*50*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**51**
5:15 AM	0	0	0	0	0	*0*	0	0	93	0	0	*93*	0	0	0	0	0	*0*	2	0	0	0	0	*2*	**95**
5:30 AM	0	0	0	0	0	*0*	0	0	95	0	0	*95*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**96**
5:45 AM	0	0	0	0	0	*0*	0	0	126	0	0	*126*	0	0	0	0	0	*0*	3	0	0	0	0	*3*	**129**
Hourly Total	0	0	0	0	0	*0*	0	0	364	0	0	*364*	0	0	0	0	0	*0*	7	0	0	0	0	*7*	**371**
6:00 AM	0	0	0	0	0	*0*	0	0	111	0	0	*111*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**112**
6:15 AM	0	0	0	0	0	*0*	0	0	178	0	0	*178*	0	0	0	0	0	*0*	6	4	0	0	0	*10*	**188**
6:30 AM	0	0	0	0	0	*0*	0	0	218	0	0	*218*	0	0	0	0	0	*0*	4	6	0	0	0	*10*	**228**
6:45 AM	0	0	0	0	0	*0*	0	0	260	0	0	*260*	0	0	0	0	0	*0*	5	16	0	0	0	*21*	**281**
Hourly Total	0	0	0	0	0	*0*	0	0	767	0	0	*767*	0	0	0	0	0	*0*	15	27	0	0	0	*42*	**809**
7:00 AM	0	0	0	0	0	*0*	0	0	226	0	0	*226*	0	0	0	0	0	*0*	10	0	0	0	0	*10*	**236**
7:15 AM	0	0	0	25	0	*25*	0	0	248	0	0	*248*	0	0	0	0	0	*0*	10	0	0	0	0	*10*	**283**
7:30 AM	0	0	0	9	0	*9*	0	0	283	0	0	*283*	0	0	0	0	0	*0*	3	0	0	0	0	*3*	**295**
7:45 AM	0	0	0	0	0	*0*	0	0	276	0	0	*276*	0	0	0	0	0	*0*	4	0	0	0	0	*4*	**280**
Hourly Total	0	0	0	34	0	*34*	0	0	1033	0	0	*1033*	0	0	0	0	0	*0*	27	0	0	0	0	*27*	**1094**

Time	Southbound Driveway						Westbound M-59 WB						Northbound n/a						Eastbound M-59 EB						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	0	0	4	0	*4*	0	0	256	0	0	*256*	0	0	0	0	0	*0*	12	0	0	0	0	*12*	**272**
8:15 AM	0	0	0	0	0	*0*	0	0	272	0	0	*272*	0	0	0	0	0	*0*	9	0	0	0	0	*9*	**281**
8:30 AM	0	0	0	0	0	*0*	0	0	283	0	0	*283*	0	0	0	0	0	*0*	10	0	0	0	0	*10*	**293**
8:45 AM	0	0	0	0	0	*0*	0	0	270	0	0	*270*	0	0	0	0	0	*0*	6	0	0	0	0	*6*	**276**
Hourly Total	0	0	0	4	0	*4*	0	0	1081	0	0	*1081*	0	0	0	0	0	*0*	37	0	0	0	0	*37*	**1122**
9:00 AM	0	0	0	1	0	*1*	0	0	259	0	0	*259*	0	0	0	0	0	*0*	13	0	0	0	0	*13*	**273**
9:15 AM	0	0	0	0	0	*0*	0	0	266	0	0	*266*	0	0	0	0	0	*0*	25	1	0	0	0	*26*	**292**
9:30 AM	0	0	0	0	0	*0*	0	0	243	0	0	*243*	0	0	0	0	0	*0*	19	0	0	0	0	*19*	**262**
9:45 AM	0	0	0	0	0	*0*	0	0	249	0	0	*249*	0	0	0	0	0	*0*	19	0	0	0	0	*19*	**268**

Hourly Total	0	0	0	1	0	*1*	0	0	1017	0	0	*1017*	0	0	0	0	0	*0*	76	1	0	0	0	*77*	**1095**
10:00 AM	0	0	0	0	0	*0*	0	0	199	0	0	*199*	0	0	0	0	0	*0*	12	0	0	0	0	*12*	**211**
10:15 AM	0	0	0	0	0	*0*	0	0	202	0	0	*202*	0	0	0	0	0	*0*	22	0	0	0	0	*22*	**224**
10:30 AM	0	0	0	0	0	*0*	0	0	212	0	0	*212*	0	0	0	0	0	*0*	12	0	0	0	0	*12*	**224**
10:45 AM	0	0	0	0	0	*0*	0	0	234	0	0	*234*	0	0	0	0	0	*0*	14	0	0	0	0	*14*	**248**
Hourly Total	0	0	0	0	0	*0*	0	0	847	0	0	*847*	0	0	0	0	0	*0*	60	0	0	0	0	*60*	**907**
11:00 AM	0	0	0	0	0	*0*	0	0	210	0	0	*210*	0	0	0	0	0	*0*	15	0	0	0	0	*15*	**225**
11:15 AM	0	0	0	0	0	*0*	0	0	226	0	0	*226*	0	0	0	0	0	*0*	13	0	0	0	0	*13*	**239**
11:30 AM	0	0	0	0	0	*0*	0	0	222	0	0	*222*	0	0	0	0	0	*0*	18	0	0	0	0	*18*	**240**
11:45 AM	0	0	0	0	0	*0*	0	0	206	0	0	*206*	0	0	0	0	0	*0*	16	0	0	0	0	*16*	**222**
Hourly Total	0	0	0	0	0	*0*	0	0	864	0	0	*864*	0	0	0	0	0	*0*	62	0	0	0	0	*62*	**926**
12:00 PM	0	0	0	1	0	*1*	0	0	190	0	0	*190*	0	0	0	0	0	*0*	17	0	0	0	0	*17*	**208**
12:15 PM	0	0	0	0	0	*0*	0	0	248	0	0	*248*	0	0	0	0	0	*0*	10	1	0	0	0	*11*	**259**
12:30 PM	0	0	0	1	0	*1*	0	0	239	0	0	*239*	0	0	0	0	0	*0*	20	0	0	0	0	*20*	**260**
12:45 PM	0	0	0	0	0	*0*	0	0	240	0	0	*240*	0	0	0	0	0	*0*	21	0	0	0	0	*21*	**261**
Hourly Total	0	0	0	2	0	*2*	0	0	917	0	0	*917*	0	0	0	0	0	*0*	68	1	0	0	0	*69*	**988**
1:00 PM	0	0	0	0	0	*0*	0	0	240	0	0	*240*	0	0	0	0	0	*0*	21	0	0	0	0	*21*	**261**
1:15 PM	0	0	0	0	0	*0*	0	0	238	0	0	*238*	0	0	0	0	0	*0*	25	0	0	0	0	*25*	**263**
1:30 PM	0	0	0	0	0	*0*	0	0	258	0	0	*258*	0	0	0	0	0	*0*	15	0	0	0	0	*15*	**273**
1:45 PM	0	0	0	0	0	*0*	0	0	274	0	0	*274*	0	0	0	0	0	*0*	24	0	0	0	0	*24*	**298**
Hourly Total	0	0	0	0	0	*0*	0	0	1010	0	0	*1010*	0	0	0	0	0	*0*	85	0	0	0	0	*85*	**1095**
2:00 PM	0	0	0	0	0	*0*	0	0	243	0	0	*243*	0	0	0	0	0	*0*	20	0	0	0	0	*20*	**263**
2:15 PM	0	0	0	0	0	*0*	0	0	281	0	0	*281*	0	0	0	0	0	*0*	28	0	0	0	0	*28*	**309**
2:30 PM	0	0	0	0	0	*0*	0	0	256	0	0	*256*	0	0	0	0	0	*0*	25	0	0	0	0	*25*	**281**
2:45 PM	0	0	0	1	0	*1*	0	0	282	0	0	*282*	0	0	0	0	0	*0*	28	0	0	0	0	*28*	**311**
Hourly Total	0	0	0	1	0	*1*	0	0	1062	0	0	*1062*	0	0	0	0	0	*0*	101	0	0	0	0	*101*	**1164**
3:00 PM	0	0	0	5	0	*5*	0	0	264	0	0	*264*	0	0	0	0	0	*0*	28	1	0	0	0	*29*	**298**
3:15 PM	0	0	0	13	0	*13*	0	0	295	0	0	*295*	0	0	0	0	0	*0*	22	0	0	0	0	*22*	**330**
3:30 PM	0	0	0	1	0	*1*	0	0	281	0	0	*281*	0	0	0	0	0	*0*	16	0	0	0	0	*16*	**298**
3:45 PM	0	0	0	0	0	*0*	0	0	337	0	0	*337*	0	0	0	0	0	*0*	21	1	0	0	0	*22*	**359**
Hourly Total	0	0	0	19	0	*19*	0	0	1177	0	0	*1177*	0	0	0	0	0	*0*	87	2	0	0	0	*89*	**1285**

	Southbound Driveway						Westbound M-59 WB						Northbound n/a						Eastbound M-59 EB						
Time	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**U Turns**	**Left Turns**	**Straight Through**	**Right Turns**	**Crosswalk Crossings**	***Vehicle Approach Total***	**VEHICLE TOTAL**
4:00 PM	0	0	0	1	0	*1*	0	0	321	0	0	*321*	0	0	0	0	0	*0*	22	1	0	0	0	*23*	**345**
4:15 PM	0	0	0	1	0	*1*	0	0	329	0	0	*329*	0	0	0	0	0	*0*	22	0	0	0	0	*22*	**352**
4:30 PM	0	0	0	0	0	*0*	0	0	302	0	0	*302*	0	0	0	0	0	*0*	14	0	0	0	0	*14*	**316**
4:45 PM	0	0	0	1	0	*1*	0	0	351	0	0	*351*	0	0	0	0	0	*0*	41	0	0	0	0	*41*	**393**
Hourly Total	0	0	0	3	0	*3*	0	0	1303	0	0	*1303*	0	0	0	0	0	*0*	99	1	0	0	0	*100*	**1406**
5:00 PM	0	0	0	23	0	*23*	0	0	317	0	0	*317*	0	0	0	0	0	*0*	40	2	0	0	0	*42*	**382**
5:15 PM	0	0	0	10	0	*10*	0	0	307	0	0	*307*	0	0	0	0	0	*0*	27	0	0	0	0	*27*	**344**
5:30 PM	0	0	0	0	0	*0*	0	0	295	0	0	*295*	0	0	0	0	0	*0*	37	0	0	0	0	*37*	**332**
5:45 PM	0	0	0	0	0	*0*	0	0	318	0	0	*318*	0	0	0	0	0	*0*	18	0	0	0	0	*18*	**336**
Hourly Total	0	0	0	33	0	*33*	0	0	1237	0	0	*1237*	0	0	0	0	0	*0*	122	2	0	0	0	*124*	**1394**
6:00 PM	0	0	0	2	0	*2*	0	0	316	0	0	*316*	0	0	0	0	0	*0*	22	0	0	0	0	*22*	**340**
6:15 PM	0	0	0	0	0	*0*	0	0	303	0	0	*303*	0	0	0	0	0	*0*	11	0	0	0	0	*11*	**314**
6:30 PM	0	0	0	0	0	*0*	0	0	258	0	0	*258*	0	0	0	0	0	*0*	19	1	0	0	0	*20*	**278**
6:45 PM	0	0	0	1	0	*1*	0	0	225	0	0	*225*	0	0	0	0	0	*0*	14	0	0	0	0	*14*	**240**
Hourly Total	0	0	0	3	0	*3*	0	0	1102	0	0	*1102*	0	0	0	0	0	*0*	66	1	0	0	0	*67*	**1172**
7:00 PM	0	0	0	0	0	*0*	0	0	193	0	0	*193*	0	0	0	0	0	*0*	23	1	0	0	0	*24*	**217**
7:15 PM	0	0	0	5	0	*5*	0	0	174	0	0	*174*	0	0	0	0	0	*0*	12	0	0	0	0	*12*	**191**
7:30 PM	0	0	0	1	0	*1*	0	0	179	0	0	*179*	0	0	0	0	0	*0*	11	0	0	0	0	*11*	**191**
7:45 PM	0	0	0	0	0	*0*	0	0	167	0	0	*167*	0	0	0	0	0	*0*	15	0	0	0	0	*15*	**182**
Hourly Total	0	0	0	6	0	*6*	0	0	713	0	0	*713*	0	0	0	0	0	*0*	61	1	0	0	0	*62*	**781**
8:00 PM	0	0	0	0	0	*0*	0	0	135	0	0	*135*	0	0	0	0	0	*0*	9	0	0	0	0	*9*	**144**
8:15 PM	0	0	0	0	0	*0*	0	0	128	0	0	*128*	0	0	0	0	0	*0*	9	0	0	0	0	*9*	**137**
8:30 PM	0	0	0	0	0	*0*	0	0	125	0	0	*125*	0	0	0	0	0	*0*	10	0	0	0	0	*10*	**135**
8:45 PM	0	0	0	0	0	*0*	0	0	130	0	0	*130*	0	0	0	0	0	*0*	12	0	0	0	0	*12*	**142**
Hourly Total	0	0	0	0	0	*0*	0	0	518	0	0	*518*	0	0	0	0	0	*0*	40	0	0	0	0	*40*	**558**

9:00 PM	0	0	0	0	0	*0*	0	0	106	0	0	*106*	0	0	0	0	0	*0*	11	0	0	0	0	*11*	**117**
9:15 PM	0	0	0	0	0	*0*	0	0	93	0	0	*93*	0	0	0	0	0	*0*	12	0	0	0	0	*12*	**105**
9:30 PM	0	0	0	0	0	*0*	0	0	75	0	0	*75*	0	0	0	0	0	*0*	8	0	0	0	0	*8*	**83**
9:45 PM	0	0	0	0	0	*0*	0	0	83	0	0	*83*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**83**
Hourly Total	0	0	0	0	0	*0*	0	0	357	0	0	*357*	0	0	0	0	0	*0*	31	0	0	0	0	*31*	**388**
10:00 PM	0	0	0	0	0	*0*	0	0	83	0	0	*83*	0	0	0	0	0	*0*	6	0	0	0	0	*6*	**89**
10:15 PM	0	0	0	0	0	*0*	0	0	71	0	0	*71*	0	0	0	0	0	*0*	3	0	0	0	0	*3*	**74**
10:30 PM	0	0	0	0	0	*0*	0	0	53	0	0	*53*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**54**
10:45 PM	0	0	0	0	0	*0*	0	0	54	0	0	*54*	0	0	0	0	0	*0*	4	0	0	0	0	*4*	**58**
Hourly Total	0	0	0	0	0	*0*	0	0	261	0	0	*261*	0	0	0	0	0	*0*	14	0	0	0	0	*14*	**275**
11:00 PM	0	0	0	0	0	*0*	0	0	50	0	0	*50*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**51**
11:15 PM	0	0	0	0	0	*0*	0	0	45	0	0	*45*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**45**
11:30 PM	0	0	0	0	0	*0*	0	0	44	0	0	*44*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**44**
11:45 PM	0	0	0	0	0	*0*	0	0	30	0	0	*30*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**30**
Hourly Total	0	0	0	0	0	*0*	0	0	169	0	0	*169*	0	0	0	0	0	*0*	1	0	0	0	0	*1*	**170**
TOTAL	**0**	**0**	**0**	**106**	**0**	***106***	**0**	**0**	**16037**	**0**	**0**	***16037***	**0**	**0**	**0**	**0**	**0**	***0***	**1061**	**36**	**0**	**0**	**0**	***1097***	**17240**
Cars	0	0	0	72	0	*72*	0	0	15585	0	0	*15585*	0	0	0	0	0	*0*	1021	35	0	0	0	*1056*	**16713**
Heavy Vehicles	0	0	0	34	0	*34*	0	0	452	0	0	*452*	0	0	0	0	0	*0*	40	1	0	0	0	*41*	**527**
Heavy Vehicle %	0.00%	0.00%	0.00%	32.08%	0.00%	*32.08%*	0.00%	0.00%	2.82%	0.00%	0.00%	*2.82%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	3.77%	2.78%	0.00%	0.00%	0.00%	*3.74%*	**3.06%**

M-59 EB to WB Crossover
Highland Michigan
Thursday, April 25, 2024

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:30 AM	0	0	0	0	0	*0*	0	0	283	0	0	*283*	0	0	0	0	0	*0*	10	0	0	0	0	*10*	**293**
8:45 AM	0	0	0	0	0	*0*	0	0	270	0	0	*270*	0	0	0	0	0	*0*	6	0	0	0	0	*6*	**276**
9:00 AM	0	0	0	1	0	*1*	0	0	259	0	0	*259*	0	0	0	0	0	*0*	13	0	0	0	0	*13*	**273**
9:15 AM	0	0	0	0	0	*0*	0	0	266	0	0	*266*	0	0	0	0	0	*0*	25	1	0	0	0	*26*	**292**
Peak Hour Total	0	0	0	1	0	*1*	0	0	1078	0	0	*1078*	0	0	0	0	0	*0*	54	1	0	0	0	*55*	**1134**
PHF	0.000	0.000	0.000	0.250	0.000	*0.250*	0.000	0.000	0.952	0.000	0.000	*0.952*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.540	0.250	0.000	0.000	0.000	*0.529*	**0.968**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	3.90%	0.00%		3.90%	0.00%	0.00%	0.00%	0.00%		0.00%	5.56%	0.00%	0.00%	0.00%		5.45%	**3.97%**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:45 PM	0	0	0	1	0	*1*	0	0	351	0	0	*351*	0	0	0	0	0	*0*	41	0	0	0	0	*41*	**393**
5:00 PM	0	0	0	23	0	*23*	0	0	317	0	0	*317*	0	0	0	0	0	*0*	40	2	0	0	0	*42*	**382**
5:15 PM	0	0	0	10	0	*10*	0	0	307	0	0	*307*	0	0	0	0	0	*0*	27	0	0	0	0	*27*	**344**
5:30 PM	0	0	0	0	0	*0*	0	0	295	0	0	*295*	0	0	0	0	0	*0*	37	0	0	0	0	*37*	**332**
Peak Hour Total	0	0	0	34	0	*34*	0	0	1270	0	0	*1270*	0	0	0	0	0	*0*	145	2	0	0	0	*147*	**1451**
PHF	0.000	0.000	0.000	0.370	0.000	*0.370*	0.000	0.000	0.905	0.000	0.000	*0.905*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.884	0.250	0.000	0.000	0.000	*0.875*	**0.923**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	2.13%	0.00%		2.13%	0.00%	0.00%	0.00%	0.00%		0.00%	1.38%	50.00%	0.00%	0.00%		2.04%	**2.07%**

Appendix C – Traffic Signal Permits

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: M-59 & Milford DATE: 8-27-19

CITY/TOWNSHIP: Highland BY: T CREECH

COUNTY#: 4101 STATE#: 63041-01-001 CHARGES: WO 185937

PLEASE PERFORM THE FOLLOWING:

_____ ELECTRICAL DEVICE: ____ INSTALL _____ MODERNIZE _____ MAINTENANCE

_____ UNDERGROUND: _____

_____ EDISON OK: _____ YES _____ NO JOB#: _____

_____ COORDINATE W/DISTRICT 7: _____

DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
_____ CHANGE TIMING.....																			
_____ CHANGE OFFSET.....																			
_____ CHANGE CYCLE LENGTH.....																			
_____ ADD DIAL/SPLIT.....																			

_____ CHANGE BREAKOUT OR EPROM: _____

_____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

ROAD COMMISSION FOR OAKLAND COUNTY
MAR 16 2020
TRAFFIC OPERATIONS

_____ REPROGRAM TBC

_____ INSTALL INTERCONNECT: _____ TBC _____ MINITROL _____ TONE

_____ MBT OK: _____ YES _____ NO

_____ NO CHANGE - RECORD CORRECTION

X OTHER: Build P44-16 TS2 cabinet for contractor w/Cobalt controller, smart monitor, video detection system, and GPS equipment.

APPROVED BY: TJC DATE: 8/28/19

DATE INSTALLED: 3.3.20

INSTALLED BY: DAN'S / TOC

THE ROAD COMMISSION FOR OAKLAND COUNTY
PROGRAM LOG FOR ECONOLITE COBALT CONTROLLER (V.03.01.32)

INTERSECTION: M-59 & Milford

CITY/VILLAGE/TOWNSHIP: Highland

COUNTY#: 4101 MDOT#: 63041-01-001 REV#: 1 DETROIT EDISON#:

DRAWN BY: TC APPROVED BY: RJ DATE DRAWN: 8/27/19

INSTALLED BY: DATE INSTLD: / /

HOURS OF OPERATION: 7 Days: 24 Hours

HOURS OF FLASHING: NONE

1. CONFIGURATION - 1. CABINET - 1. CABINET TYPE

[ ] CABINET [TS1]

	1	2	3	4
BIU Detector				

Ignore SDLC Frame Errors (Diag)	NO
Controller Platform Type	COBALT
I/O Mode	0

[X] CABINET [TS2-1]

	1	2	3	4
BIU Terminal & Facility	1	2		
BIU Detector	1	2		

Enable SDLC Stop Time	NO
Latch 3 Critical Errors	YES
MMU To CU SDLC External Start	YES
Ignore SDLC Frame Errors (Diag)	NO

1. CONFIGURATION - 2. COMMUNICATIONS - 2. PORT 2/C50S

Enable	YES (Yes/No)	Protocol	GPS NMEA
Bit Rate	4800		
D/P/S	8/N/1		
Duplex	HALF		
Flow Control	NO		

1. CONFIGURATION - 5. LOGIC PROCESSOR - 1. LOGIC STATEMENT CONTROL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LP 1-15															
LP 16-30															
LP 31-45															
LP 46-60															
LP 61-75															
LP 76-90															
LP 91-100															

2. CONTROLLER - 7. SEQUENCE

	B	B						
Ring 1	2	4						
Ring 2	6	8						
Ring 3								
Ring 4								

	1	2	3	4	5	6	7	8
No Serve								

9	10	11	12	13	14	15	16

SEQUENCE COMMANDS

Independent Ring Group	NO
Hardware Alt Sequence	NO

2. CONTROLLER - 6. PHASE OPTION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phases In Use		2		4		6		8								
Dual Entry				4				8								
Simultaneous Gap																
Backup Protect																
Backup Call																
Cond Service To																
Cond Service From																
Passage After Init																
Guaranteed Passage																
Exclusive Ped																
Rest In Walk																
Ped Reservice																
Flashing Walk																
Ped Clear Thru Yel		2		4		6		8								
Ped Clear Thru Red		2		4		6		8								
Ped Omit																

Unit Red Revert	7.0
Ped Clear Protect	YES
MUTCD 3 Sec Dont Walk	YES
Enable Pretimed Mode	NO
Free Input Pretimed Off	NO

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Pretimed																
Non-Actuated I																
Non-Actuated II																

2. CONTROLLER - 5. START/FLASH

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Start PH		W				W										
Start OL		X		X												

Flash Minimum Time	10	Sequence	1
Flash Through CVM	Yes	Timing Plan	1
All Red Time	0		

AUTOMATIC FLASH

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Entry				X				X								
Wig/Wag				X				X								
Color		Y		R		Y		R								
Exit		X				X										

OVERLAP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Wig/Wag																
Exit		X		X												

FL Thru CVM	NO
Minimum Recall	YES
Cycle Thru Phase	NO
Minimum Flash	10
Exit Flash	WALK

ROAD COMMISSION FOR OAKLAND COUNTY PROGRAM LOG FOR ECONOLINE COBALT CONTROLLER

2. CONTROLLER - 1. TIMING PLAN - 1. MIN GREEN

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Green		10		7		10		7								
Bike																
Cond Srv																

2. CONTROLLER - 1. TIMING PLAN - 2. PASSAGE

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Extend1				3.0				3.0								
Extend2																

2. CONTROLLER - 1. TIMING PLAN - 3. MAX GREEN

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Max1		44		31		44		31								
Max2																
Max3																

2. CONTROLLER - 1. TIMING PLAN - 4. PEDESTRIAN

PEDESTRIAN

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Delay																
Walk		7		7		7		7								
Clear		23		15		23		15								
Advanced																

ALTERNATE

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk2																
Clear2																

PEDESTRIAN CARRY OVER

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
To Phase																

MAX EXTENSION

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk																
Clear																

2. CONTROLLER - 1. TIMING PLAN - 5. CLEARANCE

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Yellow		5.0		4.3		5.0		4.3								
Red		1.6		4.9		1.6		4.9								
Revert																
Max Ext Red																

2. CONTROLLER - 1. TIMING PLAN - 6. PHASE RECALL

PHASE	1	2	3	4	5	6	7	8
Lock Detector								
Veh Recall				4				8
Ped Recall		2				6		
Max Recall		2				6		
Soft Recall								
No Rest								

9	10	11	12	13	14	15	16

2. CONTROLLER - 1. TIMING PLAN - 7. OVERLAP

START OF GREEN

OVERLAP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Advance																
Delay																
Adv Ped																

TRAILING

OVERLAP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Green		3.0		3.0												
Yellow		4.3		4.3												
Red		1.9		1.9												

2. CONTROLLER - 2. VEHICLE OVERLAP (TYPE OVERLAP)

OVERLAP [A] TYPE [OVERLAP]

PHASE	1	2	3	4	5	6	7	8
Included Phase								
Protected Phase								
Inhibit w/Ped								
Inhibit w/Phase								
Inhibit w/Green								
Trail When Exit								
Trail When Next								
Trail PH Allow								
GRN When Next								

OVERLAP [C] TYPE [OVERLAP]

PHASE	1	2	3	4	5	6	7	8
Included Phase								
Protected Phase								
Inhibit w/Ped								
Inhibit w/Phase								
Inhibit w/Green								
Trail When Exit								
Trail When Next								
Trail PH Allow								
GRN When Next								

OVERLAP [B] TYPE [OVERLAP]

PHASE	1	2	3	4	5	6	7	8
Included Phase				4				
Protected Phase								
Inhibit w/Ped								
Inhibit w/Phase								
Inhibit w/Green								
Trail When Exit				4				
Trail When Next								
Trail PH Allow								
GRN When Next								

OVERLAP [D] TYPE [OVERLAP]

PHASE	1	2	3	4	5	6	7	8
Included Phase								8
Protected Phase								
Inhibit w/Ped								
Inhibit w/Phase								
Inhibit w/Green								
Trail When Exit								8
Trail When Next								
Trail PH Allow								
GRN When Next								

2. CONTROLLER - 2. VEHICLE OVERLAP (TYPE PPLT/FYA)

OVERLAP [A] TYPE [PPLT/FYA]

Protected Turn	Phase 1
Permissive Through	Phase 2
Output Mode	CH 13 GRN OLP
Inhibit With Ped	
Early FYA Enable	NO
Event Plan SF Bit Disable	0

OVERLAP [C] TYPE [PPLT/FYA]

Protected Turn	Phase 5
Permissive Through	Phase 6
Output Mode	CH 15 GRN OLP
Inhibit With Ped	
Early FYA Enable	NO
Event Plan SF Bit Disable	0

OVERLAP [B] TYPE [PPLT/FYA]

Protected Turn	Phase 3
Permissive Through	Phase 4
Output Mode	CH 14 GRN OLP
Inhibit With Ped	
Early FYA Enable	NO
Event Plan SF Bit Disable	0

OVERLAP [D] TYPE [PPLT/FYA]

Protected Turn	Phase 7
Permissive Through	Phase 8
Output Mode	CH 16 GRN OLP
Inhibit With Ped	
Early FYA Enable	NO
Event Plan SF Bit Disable	0

5. SCHEDULER - 2. EVENT PLAN

EVENT PLAN [1] — TYPE [COORD]
CYCLE LENGTH 75 — ACTUATED COORD NO
OFFSET VAL 0

PHASE	1	2	3	4	5	6	7	8
SPLITS		44		31		44		31

Dwell/Add Time	0	Act Walk Rest	NO
Timing Plan	1	Phase Resrvce	NO
Sequence	1	Max Select	MAXINH
Max Transition	0	RNG GRP Offset	0s
SCP Strategy Plan	0	VEH Detector Plan	1

	1	2	3	4	5	6	7	8
Coord Phase		2				6		
Fixed Force Off								
Adaptive Split								
Vehicle Ext 2								
Vehicle Recall								
Walk 2								
Ped Recall								
Max Recall								
Use Max 2								
Use Max 3								
Cond Srv To Inh								
Phase Omit								

EVENT PLAN [2] — TYPE [COORD]
CYCLE LENGTH 75 — ACTUATED COORD NO
OFFSET VAL 0

PHASE	1	2	3	4	5	6	7	8
SPLITS		44		31		44		31

Dwell/Add Time	0	Act Walk Rest	NO
Timing Plan	1	Phase Resrvce	NO
Sequence	1	Max Select	MAXINH
Max Transition	0	RNG GRP Offset	0s
SCP Strategy Plan	0	VEH Detector Plan	1

	1	2	3	4	5	6	7	8
Coord Phase		2				6		
Fixed Force Off								
Adaptive Split								
Vehicle Ext 2								
Vehicle Recall								
Walk 2								
Ped Recall								
Max Recall								
Use Max 2								
Use Max 3								
Cond Srv To Inh								
Phase Omit								

EVENT PLAN [3] — TYPE [COORD]
CYCLE LENGTH 75 — ACTUATED COORD NO
OFFSET VAL 0

PHASE	1	2	3	4	5	6	7	8
SPLITS		44		31		44		31

Dwell/Add Time	0	Act Walk Rest	NO
Timing Plan	1	Phase Resrvce	NO
Sequence	1	Max Select	MAXINH
Max Transition	0	RNG GRP Offset	0s
SCP Strategy Plan	0	VEH Detector Plan	1

	1	2	3	4	5	6	7	8
Coord Phase		2				6		
Fixed Force Off								
Adaptive Split								
Vehicle Ext 2								
Vehicle Recall								
Walk 2								
Ped Recall								
Max Recall								
Use Max 2								
Use Max 3								
Cond Srv To Inh								
Phase Omit								

EVENT PLAN [4] — TYPE [COORD]
CYCLE LENGTH ____ — ACTUATED COORD ____
OFFSET VAL ____

PHASE	1	2	3	4	5	6	7	8
SPLITS								

Dwell/Add Time	0	Act Walk Rest	NO
Timing Plan	1	Phase Resrvce	NO
Sequence	1	Max Select	MAXINH
Max Transition	0	RNG GRP Offset	0s
SCP Strategy Plan	0	VEH Detector Plan	1

	1	2	3	4	5	6	7	8
Coord Phase								
Fixed Force Off								
Adaptive Split								
Vehicle Ext 2								
Vehicle Recall								
Walk 2								
Ped Recall								
Max Recall								
Use Max 2								
Use Max 3								
Cond Srv To Inh								
Phase Omit								

5. SCHEDULER - 3. DAY PLAN

DAY PLAN [1]

#	EVENT	Start Time
1	1	00 :00
2		:
3		:
4		:
5		:
6		:
7		:
8		:
9		:
10		:
11		:
12		:
13		:
14		:
15		:
16		:
17		:
18		:
19		:
20		:
21		:
22		:
23		:
24		:

DAY PLAN [2]

#	EVENT	Start Time
1	1	00:00
2	2	06:00
3	1	09:00
4	3	15:00
5	1	19:00
6		:
7		:
8		:
9		:
10		:
11		:
12		:
13		:
14		:
15		:
16		:
17		:
18		:
19		:
20		:
21		:
22		:
23		:
24		:

DAY PLAN [3]

#	EVENT	Start Time
1		:
2		:
3		:
4		:
5		:
6		:
7		:
8		:
9		:
10		:
11		:
12		:
13		:
14		:
15		:
16		:
17		:
18		:
19		:
20		:
21		:
22		:
23		:
24		:

DAY PLAN [4]

#	EVENT	Start Time
1		:
2		:
3		:
4		:
5		:
6		:
7		:
8		:
9		:
10		:
11		:
12		:
13		:
14		:
15		:
16		:
17		:
18		:
19		:
20		:
21		:
22		:
23		:
24		:

NOTE: EVENT DAYS 99 = FREE; 100 = FLASH

5. SCHEDULER - 4. SCHEDULE NUMBER

Schedule Number [1] Day Plan [1]

J	F	M	A	M	J	J	A	S	O	N	D
X	X	X	X	X	X	X	X	X	X	X	X

Sun	Mon	Tue	Wed	Thu	Fri	Sat
X						X

1-20

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

21-31

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

1
1

Schedule Number [2] Day Plan [2]

J	F	M	A	M	J	J	A	S	O	N	D
X	X	X	X	X	X	X	X	X	X	X	X

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	X	X	X	X	X	

1-20

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

21-31

1	2	3	4	5	6	7	8	9	0
1	2	3	4	5	6	7	8	9	0

1
1

Schedule Number [3] Day Plan [3]

J	F	M	A	M	J	J	A	S	O	N	D

Sun	Mon	Tue	Wed	Thu	Fri	Sat

1-20

1	2	3	4	5	6	7	8	9	0

1	2	3	4	5	6	7	8	9	0

21-31

1	2	3	4	5	6	7	8	9	0

1

Schedule Number [4] Day Plan [4]

J	F	M	A	M	J	J	A	S	O	N	D

Sun	Mon	Tue	Wed	Thu	Fri	Sat

1-20

1	2	3	4	5	6	7	8	9	0

1	2	3	4	5	6	7	8	9	0

21-31

1	2	3	4	5	6	7	8	9	0

1

5. SCHEDULER - 5. EXCEPTION DAYS

	FLOAT/ FIXED	MON/ MON	DOW/ DOM	WOM/ YEAR	DAY PLAN
1		:			
2		:			
3		:			
4		:			
5		:			
6		:			
7		:			
8		:			
9		:			
10		:			
11		:			
12		:			
13		:			
14		:			
15		:			
16		:			
17		:			
18		:			
19		:			
20		:			
21		:			
22		:			
23		:			
24		:			
25		:			
26		:			
27		:			
28		:			
29		:			
30		:			
31		:			
32		:			
33		:			
34		:			
35		:			
36		:			

3. COORDINATOR - 1. COORD UNIT OPTIONS

SYSTEM SOURCE	TBC	ECPI COORD	YES
SPLITS IN	SECONDS	OFFSET IN	SECONDS
TRANSITION	SMOOTH	CAL USE PED TM	NO
DWELL/ADD TIME	0	PED RESERVE	NO
DLY COORD WK	NO	FO ADD INI GRN	NO
OFFSET REF	LEAD	RE-SYNC COUNT	0
BIND RING CLOCKS	NO	CYCLE COUNT	DOWN

5. SCHEDULER - 1. CLOCK OPTIONS

SYNC REF TIME	00:00	SYNC REF	REF TIME
TIME FROM GMT	-05	DAYLIGHT SAVE	USDLS
TIME RESET INPUT SET TIME			04:00:00

6. DETECTOR - 1. VEHICLE ASSIGN

VEHICLE DETECTOR ASSIGNMENT PLAN [1]

DET#	PH	1	2	3	4	5	6	7	8
1	4								
2	4								
3	8								
4	8								
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									

9	10	11	12	13	14	15	16

6. DETECTOR - 2. VEHICLE OPTION PLAN [1]

DET#	Lock In	Ext Opt	Call Opt	Bike	Red Ext	TS2	Delay	Ext Time	Dis Time	C SW PH	Add Int
1	RED	PASS	YES	NO	NO	YES	0	0	0	0	NO
2	RED	PASS	YES	NO	NO	YES	0	0	0	0	NO
3	RED	PASS	YES	NO	NO	YES	0	0	0	0	NO
4	RED	PASS	YES	NO	NO	YES	0	0	0	0	NO
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
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20											
21											
22											
23											
24											

4. PREEMPTOR/SCP - 1. PREEMPT PLAN 1-10

Enable Y/N		*Interlock		*Dwell Cycle Extend	
Entrance Walk		Call Lock		Ped Clr Thru Yellow	
Entrance Ped CLR		*Clear to Green		*Active Stat Output type	
Entrance Min Green		Ped CLR Thru Yellow		*Active Stat Dwell Interval	
Entrance Yellow time		Track Min Green		*Active Stat Non Priority	
Entrance All Red		*Track Ext Green		*Active Stat Other Priority	
*Min Duration		*Track Max Green		Max Call	
Override Flash		Track Yellow		*Exit Flash Color	
Priority Override		Track All Red		*Exit Option	
Call Delay		*Track Clr Reserve		Exit Timing Plan	
*Inhibit		*Dwell Flash		*Link Preempt	
*INH Ext Time		Dwell Timing Plan		Exit Yellow	
*Term Overlap		*Dwell Ped Dark		Exit All Red	
*Backup Prevent		Dwell MIN GRN/CYC			

TRK VEH/PED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TRK Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
TRK Vehicle																
TRK Overlap																
Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
ENA TRL																
Dwell VEH/PED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Dwell Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Dwell VEH/PED																
Dwell PED																
Dwell Overlap																
CYC Veh																
CYC PED																
CYC Overlap																
Exit VEH/PED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Exit Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Exit Phase																
Exit Call																

SIGNAL PHASING

PHASE#	ROAD	PHASE	LOAD SW	FLASH
1				
2	WB M-59	A	2	FLA
3				
4	SB Milford (NEAR)	BN	4	FLR
5				
6	EB M-59	C	6	FLA
7				
8	NB Milford (NEAR)	DN	8	FLR
OLA				
OLB	SB Milford (FAR)	BF	14	FLR
OLC				
OLD	NB Milford (FAR)	DF	16	FLR
1PED				
2PED	M-59 Ped (North Leg)	WA	9	–
3PED				
4PED	Milford Ped (West Leg)	WB	10	–
5PED				
6PED	M-59 Ped (South Leg)	WC	11	–
7PED				
8PED	Milford Ped (East Leg)	WD	12	–

Controller Information Sheet
TS2 Cabinet W/Econolite Cobalt Controller

Intersection	:	M-59 & Milford
City/Twp	:	Highland
State No.	:	63041-01-001
County No.	:	4101
Prepared By	:	Terry Creech
Date	:	08/27/19

Phasing:

Load Switch 2: WB M-59	A	FLA
Load Switch 4: SB Milford (Near)	BN	FLR
Load Switch 6: EB M-59	C	FLA
Load Switch 8: NB Milford (Near)	DN	FLR
Load Switch 9: M-59 Ped (North Leg)	WA	
Load Switch 10: Milford Ped (West Leg)	WB	
Load Switch 11: M-59 Ped (South Leg)	WC	
Load Switch 12: Milford Ped (East Leg)	WD	
Load Switch 14: SB Milford (Far) (OLB)	BF	FLR
Load Switch 16: NB Milford (Far) (OLD)	DF	FLR

MMU: (MENU : SET/VIEW CONFIG)

Field Check Enable

Channel 2: G, Y, R
Channel 4: G, Y, R
Channel 6: G, Y, R
Channel 8: G, Y, R
Channel 14: G, Y, R
Channel 16: G, Y, R

Dual Indication Enable:
R+G: Channel 2, 4, 6, 8, 9, 10, 11, 12, 14, 16
R+Y: Channel 2, 4, 6, 8, 14, 16
G+Y: Channel 2, 4, 6, 8, 14, 16

Red Fail Enable: Enable: Channel 2, 4, 6, 8, 14, 16

Y & R Clearance Disable: Channel 2, 4, 6, 8, 14, 16 Enabled

Flashing Yellow Arrow: None

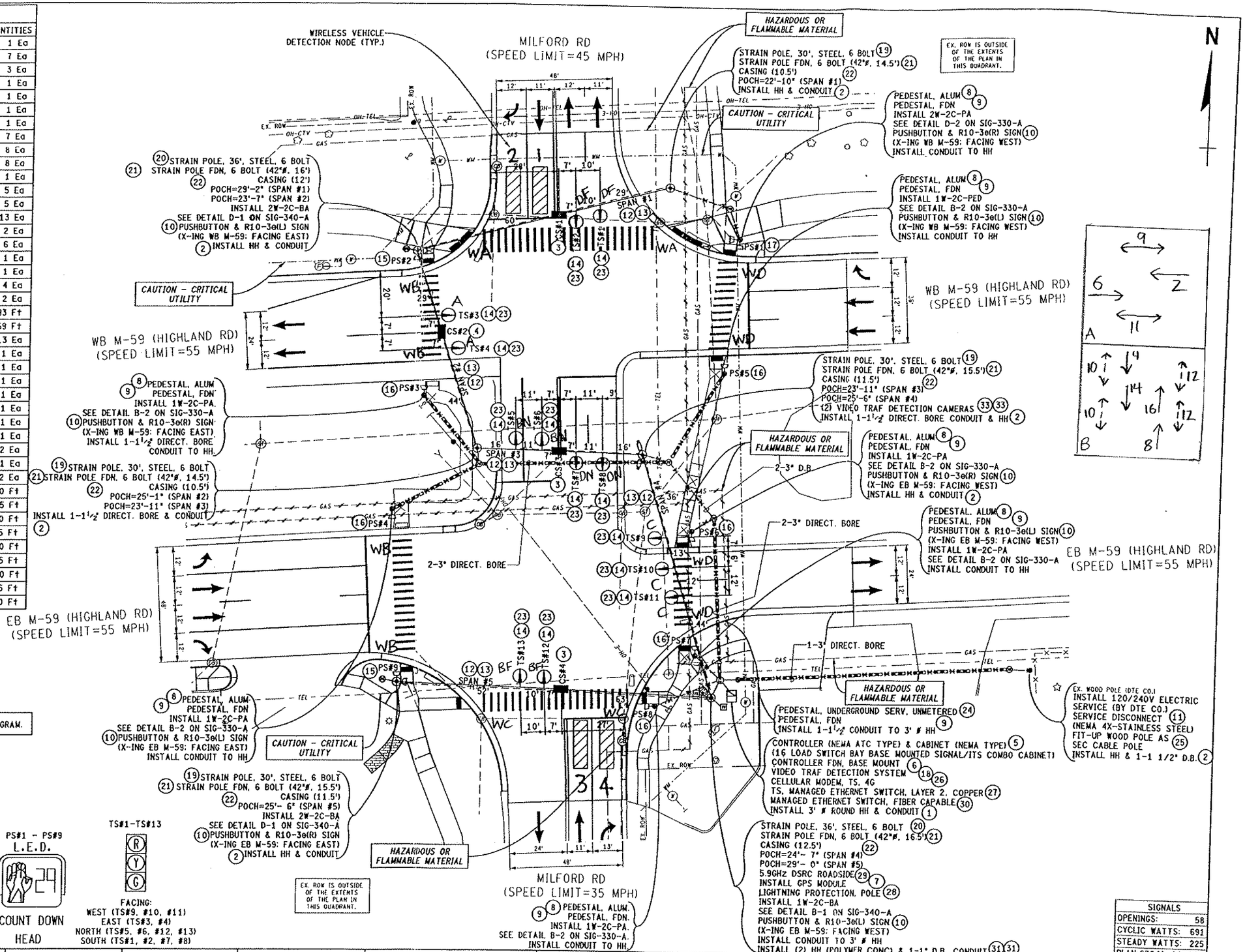
Unit Options:
All OFF except:
Recurrent pulse
LED Guard
Program Memory Card

Program Card: Compatible Channels: 2-6, 2-9, 2-11, 4-8, 4-10, 4-12, 4-14, 4-16, 6-9, 6-11, 8-10, 8-12, 8-14, 8-16, 9-11, 10-12, 10-14, 10-16, 12-14, 12-16, 14-16.

Min Flash Time : 4+2+1
Min Yellow Change Disable: 9, 10, 11, 12
Voltage Monitor Latch: None

LIST OF MATERIAL

NO.	ITEM	QUANTITIES
(1)	Hh, Round, 3 foot dia	1 Ea
(2)	Hh, Round	7 Ea
(3)	Case Sign (LED), Two Way, 24 inch by 30 inch	3 Ea
(4)	Case Sign (LED), One Way, 24 inch by 30 inch	1 Ea
(5)	Controller, NEMA ATC Type	1 Ea
(6)	Controller Fdn, Base Mount	1 Ea
(7)	Global Positioning System Module	1 Ea
(8)	Pedestal, Alum	7 Ea
(9)	Pedestal, Fdn	8 Ea
(10)	Pushbutton and Sign	8 Ea
(11)	Serv Disconnect	1 Ea
(12)	Span Wire	5 Ea
(13)	Span Wire Tether	5 Ea
(14)	TS, One Way Span Wire Mtd (LED)	13 Ea
(15)	TS, Pedestrian, Two Way Bracket Arm Mtd (LED) Countdown	2 Ea
(16)	TS, Pedestrian, One Way Pedestal Mtd (LED) Countdown	6 Ea
(17)	TS, Pedestrian, Two Way Pedestal Mtd (LED) Countdown	1 Ea
(18)	Video Traf Detection System	1 Ea
(19)	Strain Pole, Steel, 6 bolt, 30 foot	4 Ea
(20)	Strain Pole, Steel, 6 bolt, 36 foot	2 Ea
(21)	Strain Pole Fdn, 6 Bolt	93 Ft
(22)	Casing	69 Ft
(23)	Backplate, TS	13 Ea
(24)	Pedestal, Underground Serv, Unmetered	1 Ea
(25)	Wood Pole, Fit Up, Sec Cable Pole	1 Ea
(26)	Cellular Modem, TS, 4G	1 Ea
(27)	TS, Managed Field Ethernet Switch, Layer 2, Copper	1 Ea
(28)	Lightning Protection, Pole	1 Ea
(29)	Roadside Unit, Intersection	1 Ea
(30)	Managed Field Ethernet Switch, Fiber Capable	1 Ea
(31)	Hh, Polymer Conc	2 Ea
(32)	Cabinet, NEMA Type	1 Ea
(33)	Video Traf Detection Camera	2 Ea
( )	Conduit, DB, 1, 1 inch	20 Ft
( )	Conduit, DB, 1, 1 1/2 inch	165 Ft
( )	Conduit, DB, 2, 3 inch	30 Ft
( )	Conduit, DB, 3, 3 inch	55 Ft
( )	Conduit, DB, 4, 3 inch	10 Ft
( )	Conduit, Directional Bore, 1, 1 1/2 inch	125 Ft
( )	Conduit, Directional Bore, 1, 3 inch	110 Ft
( )	Conduit, Directional Bore, 2, 3 inch	135 Ft
( )	Cable, Sec, 600V, 1, 3/C#6	200 Ft



SEE NEXT SHEET FOR ADDITIONAL NOTES, POCH DIAGRAMS, AND CABLING DIAGRAM.

CS#1 TWO-WAY 24" X 30" LED CASE SIGN — NO TURNS — FACING SOUTH / FACING NORTH

CS#2 ONE-WAY 24" X 30" LED CASE SIGN — FACING EAST

CS#3 TWO-WAY 24" X 30" LED CASE SIGN — FACING NORTH & SOUTH

CS#4 TWO-WAY 24" X 30" LED CASE SIGN — NO TURNS — FACING NORTH / FACING SOUTH

PS#1 - PS#9 L.E.D. COUNT DOWN HEAD

TS#1-TS#13 (R Y G)
FACING:
WEST (TS#9, #10, #11)
EAST (TS#3, #4)
NORTH (TS#5, #6, #12, #13)
SOUTH (TS#1, #2, #7, #8)

SIGNALS	
OPENINGS:	58
CYCLIC WATTS:	691
STEADY WATTS:	225
PLAN: 63041-01-001	

FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

AECOM

MDOT Michigan Department of Transportation

0 HORZ. (FT) 40

FILE: 111374_6304101001_CON001.DGN

DATE: 11/2/2018
DESIGN UNIT: PITT
TSC: OAKLAND

CS: 63041
JN: 111374A

TRAFFIC SIGNAL INSTALLATION SHEET
M-59 (HIGHLAND) AT MILFORD ROAD
HIGHLAND TOWNSHIP; OAKLAND COUNTY

DRAWING	SHEET
M-59 SIGNAL 013	SECT 1 304

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: EB M-59 E/O W/O Milford DATE: 2-27-20

CITY/TOWNSHIP: Highland BY: ELA

COUNTY#: 4125 STATE#: 63041-01-101 CHARGES: 04125 G

PLEASE PERFORM THE FOLLOWING:

_____ ELECTRICAL DEVICE: ____ INSTALL _____ MODERNIZE _____ MAINTENANCE

_____ UNDERGROUND: _____

_____ EDISON OK: _____ YES _____ NO JOB#: _____

_____ COORDINATE W/DISTRICT 7: _____

	DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
	SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
X	CHANGE TIMING.....	X					X					X								
X	CHANGE OFFSET.....	X					X					X								
X	CHANGE CYCLE LENGTH.....	X					X					X								
_____	ADD DIAL/SPLIT.....																			

_____ CHANGE BREAKOUT OR EPROM: _____

_____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

MAR 3 2020

_____ REPROGRAM TBC

_____ INSTALL INTERCONNECT: _____ TBC _____ MINITROL _____ TONE

_____ MBT OK: _____ YES _____ NO

_____ NO CHANGE - RECORD CORRECTION

X OTHER: Rev 3 (Back to pre-construction)

APPROVED BY: _____ DATE: 2/27/20

DATE INSTALLED: 2/28/2020

INSTALLED BY: Dale Kennedy

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

INTERSECTION: EB M-59 (HIGHLAND) & X/O W/O MILFORD

CITY/VILLAGE/TOWNSHIP: HIGHLAND

COUNTY#: 4125 MDOT#: 63041-01-101 REV#: 3 DETROIT EDISON#:

DRAWN BY: ELA APPROVED BY: DJD DATE DRAWN: 11/15/19

INSTALLED BY: DATE INSTLD: / /

HOURS OF OPERATION: 7 DAYS: 24 HOURS

HOURS OF FLASHING: NONE

2. UTILITIES - 1. ACCESS

CODE.....: 1642 CODE: Four digits (0000 - 9999)

2. UTILITIES - 6. LOAD DEFAULT
C - CHANGE CURRENT SOFTWARE OPTION
2- TS2 (TYPE 1 OR 2)

4. UNIT DATA - 5. RING STRUCTURE

**** NOTE: INSERT ALL RING #'S FIRST, THEN NXT & CONCUR ****

CHANNEL:	RING	PHNXT	CONCURRENT PHASES																CHANNEL	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	VEH	PED
PHASE 1:			1																	
PHASE 2:	1	4		1																
PHASE 3:					1														2	
PHASE 4:	1	2				1														
PHASE 5:							1												4	
PHASE 6:								1												
PHASE 7:									1											
PHASE 8:										1										
PHASE 9:											1									
PHASE 10:												1								
PHASE 11:													1							
PHASE 12:														1						
PHASE 13:															1					
PHASE 14:																1				
PHASE 15:																	1			
PHASE 16:																		1		

CODES:

RING ..... Ring Number for Phase (1-4)
PHNXT ..... Phase Next In Ring (1-16)
CONCUR PH ..... Phases To Be Concurrent (0=NO, 1=YES)

For vehicle channel & ped channel, enter "1" under channel# shown.

3. PHASE DATA - 1. BASIC TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE
Minimum Green		10		7													00-99
Passage				3.0													0.0-9.9
Maximum #1		47		30													000-999
Maximum #2																	000-999
Yellow Clearance		5.0		3.0													3.0-9.9
Red Clearance		1.1		2.0													0.0-9.9

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

3. PHASE DATA - 3. PEDESTRIAN TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE (SEC)
Walk																	00-99
Pedest Clearance																	00-99
Flashing Walk																	
Extend Ped Clear																	
Act Rest in Walk																	

3. PHASE DATA - 4. INITIALIZE & NON ACTUATED RESPONSE

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Initial		4		1												
NA Response																

CODES:	0	1	2	3	4
Initial	none	inactive	red	yellow	green
NA Response	none	to 1	to 2	both	------

3. PHASE DATA - 5. VEHICLE & PEDESTRIAN RECALLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Vehicle Recall		3		2												
Pedestrian Recall																

CODES:	0	1	2	3	4
Vehicle	none	1 call	min	max	soft
Pedestrian	none	1 call	ped	bot N. A.	------

3. PHASE DATA - 6. NONLOCK & MISC CONTROLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nonlock Memory				1												
Dual Entry																
Last Car Passage																
Conditional Service																

CODES: 0 = NO 1 = YES

3. PHASE DATA - 7. SPECIAL SEQUENCE

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Omit																
-Yel																
Ocal																

3. PHASE DATA - 8. SPECIAL DETECTOR - 1. VEH 1-8 (Epac M52 - TS2)

Detector # on Print	1	2	3	4	5	6	7	8
Assigned Phase	4	4						

CODES:	0	1	2	3	4
Operation Mode:	Norm Veh	Norm Ped	1 call	St Bar A	St Bar B

A. CONTROLS

									RANGE (SEC)
Extend Time									00-99
Delay Time	5	5							00-999

3. PHASE DATA - 0. MISC PED+VEH OPT

Phase	1	2	3	4	5	6	7	8
WOFF/10								
MODE								

WOFF MODE: 0 = Advance Walk 1 = Delay Walk

GDLY/10								
YDLY/10								

GDLY = Amt of time Advance Warning remains ON after the beginning of Green

YDLY = Amt of time the Advance Warning turns ON before the end of Green

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN

PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

4. UNIT DATA - 1. STARTUP & MISCELLANEOUS

Start up time	: 10	(00-99)	State	: 0	(0 = fl, 1 = red)
Auto ped clear	: 0		Red revert	: 7.0	(2.0 - 9.9)
Stop time reset	: 0	(0 = No, 1 = Yes)			
I'NAT'L SEQ	: 0	(0 = No, 1 = Yes)			

4. UNIT DATA - 2. REMOTE FLASH

Phase	1	2	3	4	5	6	7	8	A	B	C	D	E	F	G	H
FLASH		2		1												
YEL																
ALT				1												
ENTER				1												
EXIT		1														

(0=No; 1=R, 2=Y)

(0=On/Off; 1=Off/On)

Test A = Remote Flash: 0 (0 = no & 1 = yes)

4. UNIT DATA - 3. OVERLAP STANDARD

Phase	1	2	3	4	5	6	7	8	CH#
OVL A Phses									
+GRN Phses									
OVL B Phses									
+GRN Phses									
OVL C Phses									
+GRN Phses									
OVL D Phses									
+GRN Phses									

Phase	1	2	3	4	5	6	7	8	CH#
Overlap I									
Overlap J									
Overlap K									
Overlap L									
Overlap M									
Overlap N									
Overlap 0									
Overlap P									

Enter a "1" in the channel # shown.

0 = Phase not part of overlap; 1 = Phase part of overlap.

4. UNIT DATA - 4. OVERLAP SPECIAL

Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Trail green																
Trail yellow																
Trail red																
-Green / -yellow (-G/Y)																
+Green (+GRN)																

* Overlap green omitted by # - phase green; Overlap yellow omitted by # - phase yellow
* For FYA operation, '-G/Y' entry defines the phase that is the green arrow
* For FYA operation, '+GRN' entry is the thru phase opposing the FYA phase

6. TIME BASE - 0. SPC FUNCTION MAPPING

FUNCTION NAME

AS 8-15 = OLI - P FL G PHS

AS 8-15 = OLI - P FL R PHS

SPC FUNC

1	2	3	4	5	6	7	8

NOTE: Go up after entering to get this screen.

4. UNIT DATA - 6. ALT SEQ. 08-15

EPAC ALT SEQ (PHASE PAIR TO REVERSE)

SEQ	.PP1.	.PP2.	.PP3.	.PP4.	.PP5.	.PP6.
08						
09						
10						
11						

SEQ	.PP1.	.PP2.	.PP3.	.PP4.	.PP5.	.PP6.
12						
13						
14						
15						

4. UNIT DATA - 7. PORT 1 / ITS DATA

ADDRESS	DESCRIPTION	PRES	M40
0	T&F BIU #1 TS2	\	
1	T&F BIU #2 TS2		
2	T&F BIU #3 TS2		
3	T&F BIU #4 TS2		
4	T&F BIU #5 RESERVED		
5	T&F BIU #6 RESERVED		
6	T&F BIU #7 MFG USE		
7	T&F BIU #8 MFG USE		
8	DET BIU #1 TS2	\	
9	DET BIU #2 TS2		
10	DET BIU #3 TS2		
11	DET BIU #4 TS2		
12	DET BIU #5 RESERVED		
13	DET BIU #6 RESERVED		
14	DET BIU #7 MFG USE		
15	DET BIU #8 MFG USE		
16	MALFUNCTION UNIT	\	
17	DIAGNOSTIC (MSG 30)		
18	CONTROLLER UNIT	\	

CODES: 0=NO / 1=YES

4. UNIT DATA - 8. I/O MISCELLANEOUS

Ring#	1	2	3	4
Input Response	\			
Output Select	\			

5. COORDINATION DATA - 1. COORD SETUP

		0	1	2	3	4	5
OPER:	\	FRE	AUT	MAN	--------	--------	--------
MODE:	0	PRM	YLD	PYL	POM	SOM	FAC
MAX :	0	INH	MX1	MX2	--------	--------	--------
CORR:	2	DWL	MDW	SWY	SW+	--------	--------
OFST:		BEG	END	OF GREEN			
FRCE:		PLN CYC LE TIME					
MX DWELL:		YIELD PERIOD:					

5. COORDINATION DATA - 2. MANUAL CONTROL

DIAL: _____ SPLIT: _____ OFFSET: _____ SYNC: _____

To set cycle zero in manual control enter "1" for sync then press "E".

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

Mode: 0 = actuated
1 = coord phase
2 = minimum recall
3 = maximum recall
4 = pedestrain recall
5 = maximum + pedestrain recall
6 = phase omit
7 = dual coord phase

Sequence: 00 - 15 (Unit data has definition)
Ring Lag: Ring offset from local cycle zero when not barrier locked to Ring #1.
Time: 00 - 99 seconds.

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 1 / SPLIT 1 CYCLE LENGTH: 75

PHASE	1	2	3	4	5	6	7	8
TIME		45		30				
MODE		1		3				

DIAL 1 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	67		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

DIAL 2 / SPLIT 1 CYCLE LENGTH: 75

PHASE	1	2	3	4	5	6	7	8
TIME		47		28				
MODE		1		3				

DIAL 2 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

OFFSET	1	2	3
TIME	67		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 3 / SPLIT 1 CYCLE LENGTH: 75

PHASE	1	2	3	4	5	6	7	8
TIME		46		29				
MODE		1		3				

DIAL 3 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 3 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 3 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 1 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	67		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

6. TIME BASE DATA - 2. SET TIME / DATE

-- DATE -- MM/DD/YY	-- TIME -- HH:MM:SS	MON & WEEK:	BEG -- DST -- MM	SW	END MM	SW
/ /	: :		3	2	11	1

CYCLE ZERO: 24 : 00 (HH:MM - EVENT)

STZ DIFF: -18000 (GPS OFFSET)

2. UTILITIES - 8. CONFIGURE PORTS - 8. GPS CONFIGURATION

GPS: 1 (0-NO, 1-YES) PORT: 4

6. TIME BASE DATA - 3. TRAFFIC EVENTS

PRO DAY	TIME HH : MM	COORD PATRN		MAX 2 PHASE #S									OMIT PHASE #S							
* * *	* * * * *	D / S / O		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*
01	00:00	1/1/1																		
02	00:00	1/1/1																		
02	06:00	2/1/1																		
02	09:00	1/1/1																		
02	15:00	3/1/1																		
02	19:00	1/1/1																		
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REFERENCE DATA
PRO DAY = 01 - 99
(Program day)

HH:MM = 24 Hour clock

PATTERN: (D/S/O)
FLASH =5/5/
FREE =0/0/4

MAX2 & OMITS:
Call free, set pattern to 0/0/0.

D = DIAL #
S = SPLIT #
0 = OFFSET #

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

6. TIME BASE DATA - 4. AUXILIARY EVENTS

PRO	TIME		AUX				DET VALUE				DIM
DAY	H H : M M		A1	A2	A3		D1	D2	D3		DIM
	:										
	:										
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REFERENCE DATA:
PRO DAY = 00 - 99
(Program day)

HH:MM = 24 Hour clock

AUX = Output states
DET VALUE:
1 = Det diag value
2 = Enables report
3 = Repeat multiplier

DIM = Dimming state

ALL: 0 = off, 1 = on

6. TIME BASE DATA - 5. TIME 0F YEAR EVENTS

DATE		SPECIAL	
MM / DD / YY		DAY	WEEK
/ /			
/ /			
/ /			
/ /			
/ /			
/ /			
/ /			
/ /			

DATE		SPECIAL	
MM / DD / YY		DAY	WEEK
/ /			
/ /			
/ /			
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/ /			
/ /			

REFERENCE DATA
Special day = Any
program day 00 - 99.

Special week:
Week 0 = Pro Day 01-07
Week 1 = Pro Day 11-17
Week 2 = Pro Day 21-27

6. TIME BASE DATA - 6. EQUATE/TRANSFER

CODE: 0 (0 = equate, 1 = transfer)

FROM

01 = 07						
02 = 03	04	05	06			
=						
=						
=						
=						
=						

DAY EQUATE: Care must be taken to insure days are not equated to undefined days or days that are equated to other days. The result wil be a day without events to run.

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - TS2 MOD 52 EPAC

7. PREEMPT DATA - 1. ALL PREEMPTS

RING TIMES	1	2	3	4		
MIN GREEN/WALK						
OVERRIDE	FL	1/2	2/3	3/4	4/5	5/6
STATUS						
CODES	0 = NO, 1 = YES					

7. PREEMPT DATA - PREEMPT 1

1. MISC DATA: (0 = no, 1 = yes)

TEST..: ___ N-LOCK.: ___ LINK PR#..: ___
DELAY: ___ EXTEND: ___ DURATION: ___
MXCALL: ___ LOCK OUT: ___

RING	1	2	3	4	5	6	7	8
EXIT								
CALLS								

2. INTERVAL TIMES:

SEL PED CLR : ____ TRK YEL CHG : __ . __
SEL YEL CHG : __ . __ TRK RED CLR : ____
SEL RED CLR : __ . __ DWELL GREEN: ____
TRACK GREEN: ____ RET PED CLR : ____
TRK PED CLR : ____ RET YEL CHG : __ . __
RET YEL CLR : __ . __

3. VEHICLE STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0=no, 1=act, 2=min recall, 3=max recall)

4. PEDESTRIAN STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=dont wlk, 1=wlk, 2=flwlk, 3=dark)

CYCLE								

(0 = no, 1 = act, 2 = recall)

5. OVERLAP STATUS:

OVERLAP	A	B	C	D
TRK GRN				
DWELL				

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0 = no, 1 = act)

6. LOW PRIORITY: (0=no, 1=yes)

TEST..: __ N-LOCK.: __ SKIP.....: __
DELAY: __ EXTEND: __ DURATION: __
DWELL: __ MXCALL: __ LOCK OUT: __

RING	1	2	3	4	5	6	7	8
DWELL								
CALLS								

SIGNAL PHASING

PHASE#	ROAD	PHASE	LOAD SW	FLASH
1				
2	EB M-59	A	2	A
3				
4	X/O W/O MILFORD	B	4	R
5				
6				
7				
8				
OLA				
OLB				
OLC				
OLD				
1PED				
2PED				
3PED				
4PED				
5PED				
6PED				
7PED				
8PED				

CONTROLLER INFORMATION SHEET
Size P44-16 **TS2** Cabinet with MOD 52 EPAC

INTERSECTION:	EB M-59 & X/O W/O Milford
COUNTY NO:	4125
STATE NO:	63041-01-101
PREPARED BY:	Dawn Bierlein
DATE:	11/15/19

BACKPANEL :- SIZE P44-16 **TS2** CABINET

Load Switch 2:	EB M-59	A	FLA
Load Switch 4:	X/O W/O Milford	B	FLR
Load Switch 9Y:	EB Advanced Flasher (Wig)	Adv Fl	
Load Switch 10Y:	EB Advanced Flasher (Wag)	Adv Fl	

MMU 2 :- (MENU : SET/VIEW CONFIG)

Field Check Enable	Channel 2: G, Y, R Channel 4: G, Y, R
Dual Indication Enable:	R+G: Channel 2,4 R+Y: Channel 2,4 G+Y: Channel 2,4
Red Fail Enable:	Enable: Channel 2,4
Unit Options:	All OFF except: Recurrent pulse Program Memory Card
Y & R Clearance Disable:	Channel 2,4 Enabled
Flashing Yellow Arrow:	None
Program Card:	Compatible Channels: None Min Flash Time: 4+2+1 Min Yellow Change Disable: None Voltage Monitor Latch: None

Advanced Flasher Notes:

Advanced Flasher flashes at all times.
Remove 9Y – LS9-5
Remove 10Y - LS10-5
Hook up 9Y field terminal to flasher unit (wig)
Hook up 10Y field terminal to flasher unit (wag)

TS2 SENSYS DETECTORS BIU #1

CO#

Detector # on print	Description	Phase	Output
1	X10 L	4	1
2	X10 R	4	2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
			16

CS #1 ②

INSTALL 2-WAY 24"x30"
ILLUMINATED CASE SIGN

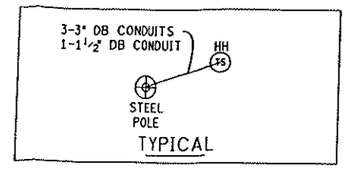
FACING WEST FACING EAST

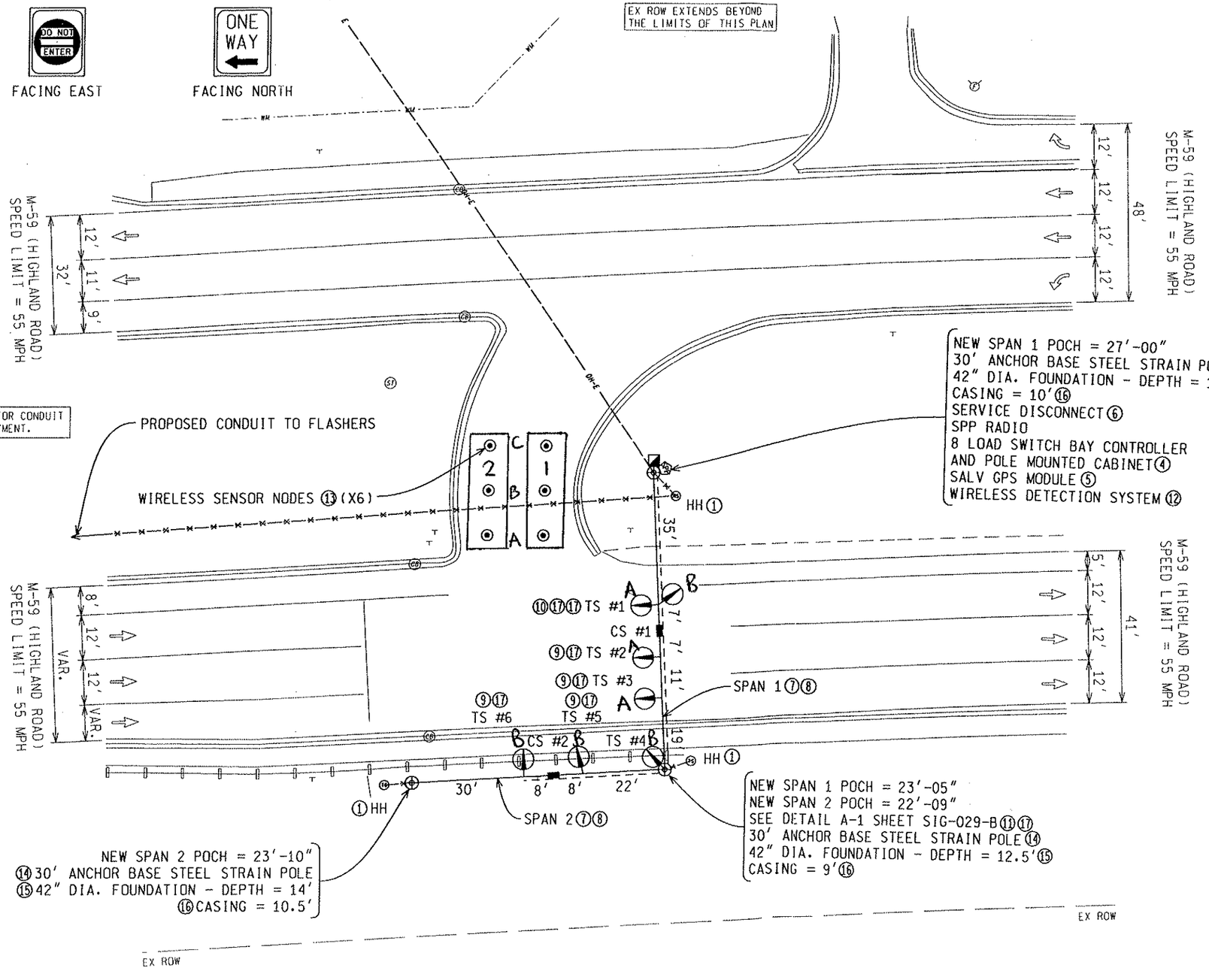
CS #2 ③

INSTALL 1-WAY 24"x30"
ILLUMINATED CASE SIGN

FACING NORTH

EX ROW EXTENDS BEYOND THE LIMITS OF THIS PLAN





CONTRACTOR TO PROVIDE MDOT WITH UNUSED SPP RADIO FOLLOWING CONSTRUCTION AT THIS INTERSECTION.

BACKPLATES TO BE USED FOR ALL TRAFFIC SIGNAL HEADS AND TETHER WIRE TO BE USED ALONG SPAN 1 AND SPAN 2. INSTALL AS DIRECTED BY THE ENGINEER.

LIST OF MATERIAL

NO.	ITEM	QUANTITIES
①	Hh, Round	3 Ea
②	Case Sign (LED), Two Way, 24 inch by 30 inch	1 Ea
③	Case Sign (LED), One Way, 24 inch by 30 inch	1 Ea
④	Controller and Cabinet, Digital Type	1 Ea
⑤	Global Positioning System Module, Salv	1 Ea
⑥	Serv Disconnect	1 Ea
⑦	Span Wire	2 Ea
⑧	Span Wire Tether	2 Ea
⑨	TS, One Way Span Wire Mtd (LED)	4 Ea
⑩	TS, Two Way Span Wire Mtd (LED)	1 Ea
⑪	TS, One Way Bracket Arm Mtd (LED)	1 Ea
⑫	Wireless Vehicle Detection System	1 Ea
⑬	Wireless Vehicle Sensor Node	6 Ea
⑭	Strain Pole, Steel, 6 bolt, 30 foot	3 Ea
⑮	Strain Pole Fdn, 6 Bolt	40 Ft
⑯	Casing	30 Ft
⑰	Backplate, TS	7 Ea
◯	Conduit, DB, 1, 1 1/2 inch	25 Ft
◯	Conduit, DB, 3, 3 inch	25 Ft
◯	Cable, Sec, 600V, 1, 3/C#6	250 Ft

PLAN

SIGNALS	
OPENINGS:	24
CYCLIC WATTS:	301
STEADY WATTS:	135
PLAN: 63041-01-101	

FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

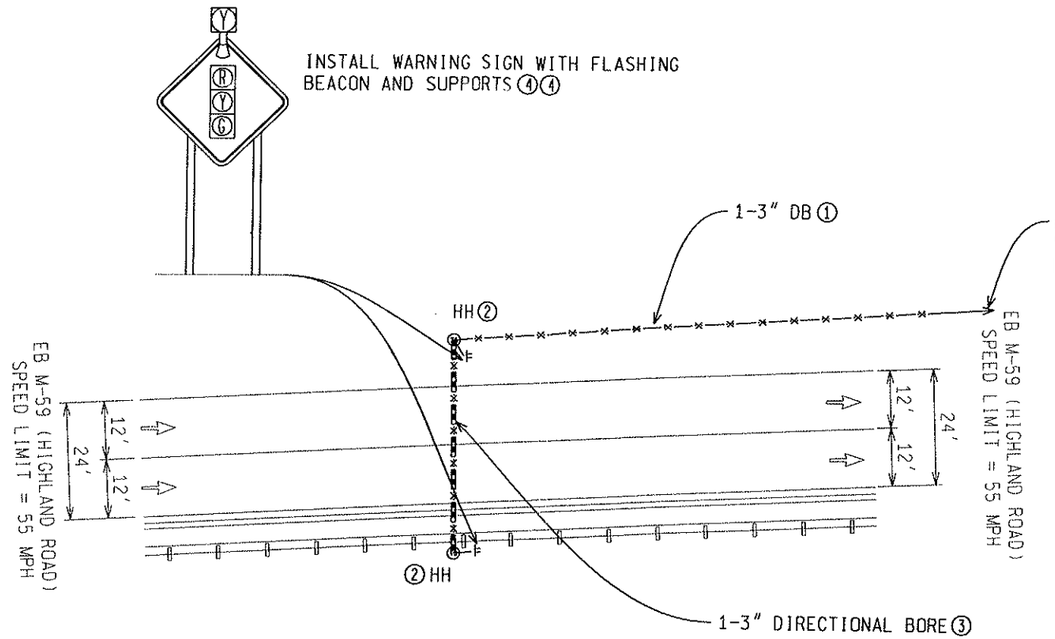
TETRA TECH

MDOT Michigan Department of Transportation

0 HORZ. (FT) 30

63041-01-101	DATE: 08/12/14	CS: 63900	M-59 (HIGHLAND ROAD) AT CROSSOVER
	DESIGN UNIT: PITT	JN: 114867A	WEST OF MILFORD ROAD
FILE: 114867 6304101101 CON001.DGN	TSC: OAKLAND		HIGHLAND TOWNSHIP, OAKLAND COUNTY

DRAWING	SHEET
M-59 SIGNAL 004	SECT 1 30



HH AND CONDUIT QUANTITIES ON THIS SHEET ACCOUNT FOR ALL MATERIALS TO CONNECT TO CROSSOVER WEST OF MILFORD ROAD. ②②② SPACE HH'S 250' APART BEGINNING FROM WEST END.

EX ROW EXTENDS BEYOND THE LIMITS OF THIS PLAN

LIST OF MATERIAL

NO.	ITEM	QUANTITIES
①	Conduit, DB, 1, 3 inch	835 Ft
②	Hh, Round	5 Ea
③	Conduit, Directional Bore, 1, 3 inch	45 Ft
④	Warning Sign	2 Ea

PLAN

SIGNALS	
OPENINGS:	2
CYCLIC WATTS:	44
STEADY WATTS:	0
PLAN:63041-01-101	

FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

TETRA TECH

MDOT Michigan Department of Transportation

0 HORZ. (FT) 30

63041-01-001	DATE: 09/12/14	CS: 63900	M-59 (HIGHLAND ROAD) AT FLASHER
	DESIGN UNIT: PITT	JN: 114867A	WEST OF MILFORD ROAD
FILE: 114867 6304101101 CON001.DGN	TSC: OAKLAND		HIGHLAND TOWNSHIP, OAKLAND COUNTY

DRAWING	SHEET
M-59 SIGNAL 005	SECT 1 31

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: Milford& Wardlow DATE: 6/5/20

CITY/TOWNSHIP: Highland Twp BY: Dawn Bierlein

COUNTY#: 309 STATE#: _____ CHARGES: 00309G

PLEASE PERFORM THE FOLLOWING:

_____ ELECTRICAL DEVICE: ____ INSTALL _____ MODERNIZE _____ MAINTENANCE

_____ UNDERGROUND: _____

_____ EDISON OK: _____ YES _____ NO JOB#: _____

_____ COORDINATE W/DISTRICT 7: _____

DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
_____ CHANGE TIMING.....																			
_____ CHANGE OFFSET.....																			
_____ CHANGE CYCLE LENGTH.....																			
_____ ADD DIAL/SPLIT.....																			

_____ CHANGE BREAKOUT OR EPROM: _____

_____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

ROAD COMMISSION FOR OAKLAND COUNTY
JUN 11 2020
TRAFFIC OPERATIONS

_____ REPROGRAM TBC

_____ INSTALL INTERCONNECT: _____ TBC _____ MINITROL _____ TONE

_____ MBT OK: _____ YES _____ NO

_____ NO CHANGE - RECORD CORRECTION

__X__ OTHER: Crew installed and hooked up GPS equipment on 5/26/20.

Please leave paperwork in the cabinet and check GPS and DST inputs.

(Rev 9)

APPROVED BY: _____ DATE: 6/5/20

DATE INSTALLED: 6/9/2020

INSTALLED BY: Richardson Electric

ZONE
WL-1

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

INTERSECTION: MILFORD & WARDLOW

CITY/VILLAGE/TOWNSHIP: HIGHLAND TWP.

COUNTY#: 309 MDOT#: _____ REV#: 9 DETROIT EDISON#: _____

DRAWN BY: DAWN BIERLEIN APPROVED BY: DP DATE DRAWN: 6/05/20

INSTALLED BY: _____ DATE INSTLD: / /

HOURS OF OPERATION: 7 Days: 6AM - 9PM

HOURS OF FLASHING: 7 Days: 9PM - 6AM

2. UTILITIES - 1. ACCESS

CODE.....: 1642 CODE: Four digits (0000 - 9999)

4. UNIT DATA - 5. RING STRUCTURE

********** NOTE: INSERT ALL RING #'S FIRST, THEN NXT & CONCUR **********

CHANNEL:	RING	PHNXT	CONCURRENT PHASES																CHANNEL	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	VEH	PED
PHASE 1:			1																	
PHASE 2:	1	4		1															2	9
PHASE 3:					1															
PHASE 4:	1	2				1													4	10
PHASE 5:							1													
PHASE 6:								1												
PHASE 7:									1											
PHASE 8:										1										
PHASE 9:											1									
PHASE 10:												1								
PHASE 11:													1							
PHASE 12:														1						
PHASE 13:															1					
PHASE 14:																1				
PHASE 15:																	1			
PHASE 16:																		1		

CODES:

RING ..... Ring Number for Phase (1-4)
PHNXT ..... Phase Next In Ring (1-16)
CONCUR PH Phases To Be Concurrent (0=NO, 1=YES)

For vehicle channel & ped channel, enter "1" under channel# shown.

3. PHASE DATA - 1. BASIC TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE
Minimum Green		10		07													00-99
Passage																	0.0-9.9
Maximum #1		37		25													000-999
Maximum #2																	000-999
Yellow Clearance		4.3		3.6													3.0-9.9
Red Clearance		1.4		1.8													0.0-9.9

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

3. PHASE DATA - 2. DENSITY TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE (SEC)
Seconds/Actuation																	0.0-9.9
Maximum Initial																	00-99
Time B4 Reduction																	00-99
Cars B4 Reduction																	00-99
Time To Reduce																	00-99
Minimum Gap																	0.0-9.9

3. PHASE DATA - 3. PEDESTRIAN TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE (SEC)
Walk		07		07													00-99
Pedest Clearance		26		20													00-99
Flashing Walk																	
Extend Ped Clear		1		1													
Act Rest in Walk																	

3. PHASE DATA - 4. INITIALIZE & NON ACTUATED RESPONSE

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Initial		4		1												
NA Response																

CODES:	0	1	2	3	4
Initial	none	inactive	red	yellow	green
NA Response	none	to 1	to 2	both	-------

3. PHASE DATA - 5. VEHICLE & PEDESTRIAN RECALLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Vehicle Recall		3		3												
Pedestrian Recall		2		2												

CODES:	0	1	2	3	4
Vehicle	none	1 call	min	max	soft
Pedestrian	none	1 call	ped	bot N. A.	-------

3. PHASE DATA - 6. NONLOCK & MISC CONTROLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nonlock Memory																
Dual Entry																
Last Car Passage																
Conditional Service																

CODES: 0 = NO 1 = YES

3. PHASE DATA - 8. SPECIAL DETECTOR

Detector # on Print	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"D" Conn Detector	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Assigned Phase																
Operation Mode																
Switched Phase																

CODES:	0	1	2	3	4
Operation Mode	Norm Veh	Norm Ped	1 call	St Bar A	St Bar B

A. CONTROLS

																	RANGE (SEC)
Extend Time																	00-99
Delay Time																	00-999

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

4. UNIT DATA - 1. STARTUP & MISCELLANEOUS

Start up time : 10 (00-99) State : 0 (0 = fl, 1 = red)
Auto ped clear : 0 Red revert : 07 (2.0 - 9.9)
Stop time reset : 0 (0 = No, 1 = Yes)

4. UNIT DATA - 2. REMOTE FLASH

Ph	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
FL																								
ALT																								
ENT				1																				
EXIT		1																						

Test A = Remote Flash: 0 (0 = no & 1 = yes & 2 = yellow)

6. TIME BASE - 0 FUNCTION MAPPING

FUNCTION NAME
AS8-15 = OLI - P FL G PHS
AS8-15 = OLI - P FL R PHS

SPC FUNC

1	2	3	4	5	6	7	8

NOTE: Go up after entering to get this screen.

4. UNIT DATA - 6. ALT SEQ. 08-15

EPAC ALT SEQ (PHASE PAIR TO REVERSE)

SEQ	.PP1.	.PP2.	.PP3.	.PP4.	.PP5.	.PP6.
08	-	-	-	-	-	-
09	-	-	-	-	-	-
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	-	-	-	-	-	-
14	-	-	-	-	-	-
15	-	-	-	-	-	-

4. UNIT DATA - 3. OVERLAP STANDARD

Phase	1	2	3	4	5	6	7	8	CH#
Overlap A									
Overlap B									
Overlap C									
Overlap D									
Overlap E									
Overlap F									
Overlap G									
Overlap H									

Phase	1	2	3	4	5	6	7	8	CH#
Overlap I									
Overlap J									
Overlap K									
Overlap L									
Overlap M									
Overlap N									
Overlap O									
Overlap P									

Enter a "1" in the channel # shown.
0 = Phase not part of overlap; 1 = Phase part of overlap.

4. UNIT DATA - 4. OVERLAP SPECIAL

Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Trail green																
Trail yellow																
Trail red																
Green / -yellow																

* Overlap green omitted by # - phase green; Overlap yellow omitted by # - phase yellow

4. UNIT DATA - 8. I/O MISCELLANEOUS

Ring#	1	2	3	4	CONN	MODE
Input Response	1	2			"D"	
Output Select	1	2			"D"	

Connector "D" : 0 = Standard & 1 = Alternate

I/O Modes	INPUT	OUTPUT
"ABC" Connector		
"D" Connector		

5. COORDINATION DATA - 1. COORD SETUP

		0	1	2	3	4	5
OPER:	1	FRE	AUT	MAN	-------	-------	-------
MODE:	6	PRM	YLD	PYL	POM	SOM	FAC
MAX :	0	INH	MX1	MX2	-------	-------	-------
CORR:	2	DWL	MDW	SWY	SW+	-------	-------
OFST:	0	BEG	END	OF GREEN			
FRCE:		PLN CYC LE TIME					
MX DWELL:		YIELD PERIOD:					

5. COORDINATION DATA - 2. MANUAL CONTROL

DIAL: _____ SPLIT: _____ OFFSET: _____ SYNC: _____

To set cycle zero in manual control enter "1" for sync then press "E".

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

Mode: 0 = actuated, 1 = coord phase, 2 = minimum recall, 3 = maximum recall, 4 = pedestrian recall, 5 = maximum + pedestrian recall, 6 = phase omit, 7 = dual coord phase.

Sequence: 00 - 15 (Unit data has definition)
Ring Lag: Ring offset from local cycle zero when not barrier locked to Ring #1.
Time: 00 - 99 seconds.

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 1 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		51		29				
MODE		1		5				

DIAL 1 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	69		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

DIAL 2 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		47		33				
MODE		1		5				

DIAL 2 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

OFFSET	1	2	3
TIME	56		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 3 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		46		34				
MODE		1		5				

DIAL 3 / SPLIT 2 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		46		34				
MODE		1		7				

DIAL 3 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 3 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	71		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME	69		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

DIAL 4 / SPLIT 1 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - MOD 52 EPAC

6. TIME BASE DATA - 2. SET TIME / DATE

-- DATE -- MM/DD/YY	-- TIME -- HH:MM:SS	MON & WEEK:	BEG -- DST MM	BEG SW	-- END MM	END SW
/ /	: :		03	02	11	01

CYCLE ZERO: 24 : 00 (HH:MM - EVENT)

STZ DIFF: -18000 (GPS OFFSET)

2. UTILITIES - 8. CONFIGURE PORTS - 8. GPS CONFIGURATION

GPS: 1 (0-NO, 1-YES) PORT: 4

6. TIME BASE DATA - 3. TRAFFIC EVENTS

PRO DAY	TIME HH : MM	COORD PATRN		MAX 2 PHASE #S									OMIT PHASE #S							
* * *	* * * * *	D / S / O		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*
02	14 : 15	3/ 2/ 1																		
02	16 : 00	3/ 1/ 1																		
01	00 : 00	5/ 5/																		
02	00 : 00	5/ 5/																		
02	06 : 00	2/ 1/ 1																		
02	09 : 00	1/ 1/ 1																		
02	19 : 00	1/ 1/ 1																		
02	21 : 00	5/ 5/																		
01	06 : 00	1/ 1/ 1																		
01	21 : 00	5/ 5/																		
	:	/ /																		
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REFERENCE DATA
PRO DAY = 01 - 99
(Program day)

HH:MM = 24 Hour clock

PATTERN: (D/S/O)
FLASH =5/5/
FREE =0/0/4

MAX2 & OMITS:
Call free, set pattern to 0/0/0.

D = DIAL #
S = SPLIT #
0 = OFFSET #

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER - MOD 52 EPAC

6. TIME BASE DATA - 4. AUXILIARY EVENTS

PRO DAY	TIME HH : MM		AUX A1	AUX A2	AUX A3		DET VALUE D1	DET VALUE D2	DET VALUE D3		DIM DIM
	:										
	:										
	:										
	:										
	:										
	:										
	:										
	:										
	:										
	:										
	:										
	:										

REFERENCE DATA:
PRO DAY = 00 - 99
(Program day)

HH:MM = 24 Hour clock

AUX = Output states
DET VALUE:
1 = Det diag value
2 = Enables report
3 = Repeat multiplier

DIM = Dimming state

ALL: 0 = off, 1 = on

6. TIME BASE DATA - 5. TIME 0F YEAR EVENTS

DATE MM / DD / YY		SPECIAL DAY	SPECIAL WEEK
/ /			
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DATE MM / DD / YY		SPECIAL DAY	SPECIAL WEEK
/ /			
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REFERENCE DATA
Special day = Any program day 00 - 99.

Special week:
Week 0 = Pro Day 01-07
Week 1 = Pro Day 11-17
Week 2 = Pro Day 21-27

6. TIME BASE DATA - 6. EQUATE/TRANSFER

CODE: 0 (0 = equate, 1 = transfer)

FROM							
01 = 07							
02 = 03	04	05	06				
=							
=							
=							
=							
=							

DAY EQUATE: Care must be taken to insure days are not equated to undefined days or days that are equated to other days. The result wil be a day without events to run.

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

7. PREEMPT DATA - 1. ALL PREEMPTS

RING TIMES		1	2	3	4	
MIN GREEN/WALK						
OVERRIDE	FL	1/2	2/3	3/4	4/5	5/6
STATUS						
CODES	0 = NO, 1 = YES					

7. PREEMPT DATA - PREEMPT 1

1. MISC DATA: (0 = no, 1 = yes)

TEST..: ____ N-LOCK.: ____ LINK PR#..: ____
DELAY: ____ EXTEND: ____ DURATION: ____
MXCALL: LOCK OUT: ____

PHASE	1	2	3	4	5	6	7	8
EXIT								
CALLS								

2. INTERVAL TIMES:

SEL PED CLR : _____ TRK YEL CHG : __ . __
SEL YEL CHG : __ . __ TRK RED CLR : __ . __
SEL RED CLR : __ . __ DWELL GREEN: _____
TRACK GREEN: _____ RET PED CLR : _____
TRK PED CLR : _____ RET YEL CHG : __ . __
RET RED CLR : __ . __

3. VEHICLE STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0=no, 1=act, 2=min recall, 3=max recall)

4. PEDESTRIAN STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=dont wlk, 1=wlk, 2=flwlk, 3=dark)

CYCLE								

(0 = no, 1 = act, 2 = recall)

5. OVERLAP STATUS:

OVERLAP	A	B	C	D
TRK GRN				
DWELL				

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0 = no, 1 = act)

6. LOW PRIORITY: (0=no, 1=yes)

TEST..: __ N-LOCK.: __ SKIP.....: __
DELAY: __ EXTEND: __ DURATION: __
DWELL: MXCALL: LOCK OUT:

RING	1	2	3	4	5	6	7	8
DWELL								
CALLS								

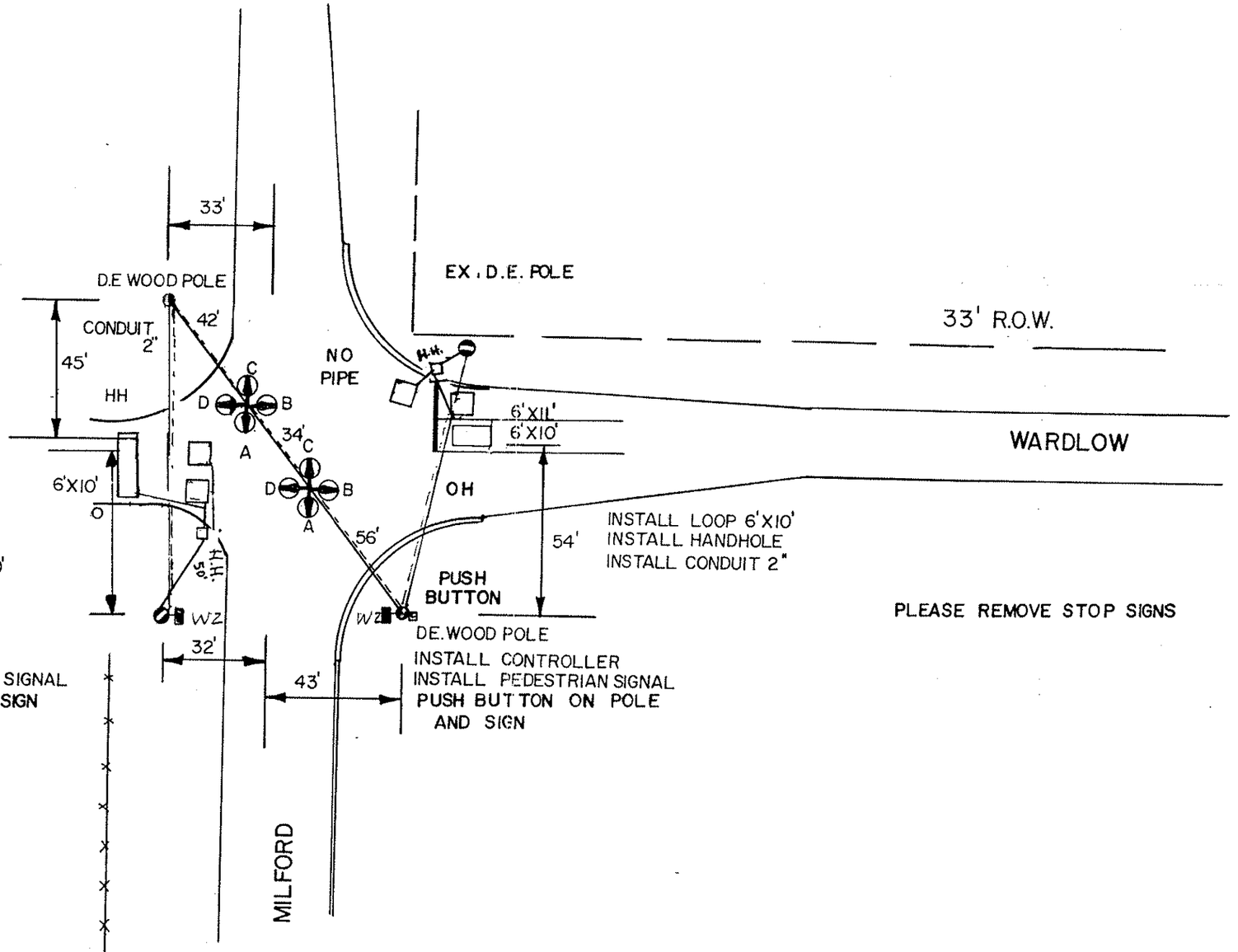
SIGNAL PHASING

PHASE#	ROAD	PHASE	LOAD SW	FLASH
1				
2	MILFORD RD	A&C	2	A
3				
4	WARDLOW RD	B&D	4	R
5				
6				
7				
8				
OLA				
OLB				
OLC				
OLD				
1PED				
2PED	MILFORD RD PED WEST	WC	6	
3PED				
4PED	WARDLOW RD PED SOUTH	WD	8	
5PED				
6PED				
7PED				
8PED				

MATERIALS

INSTALL CONTROLLER-1
INSTALL PEDESTAL & FOUNDATION-1
INSTALL PEDESTRIAN SIGNAL-2
INSTALL HANDHOLE -3
INSTALL CONDUIT
INSTALL LOOP 3-6'X10'
INSTALL SPAN
INSTALL 2-3C-4W SIGNAL 12"

#14/20 = 140'
#14/7 = 350'
#14/2 SHIELDED = 450'



PLEASE REMOVE STOP SIGNS

LEGEND

- NEW SIGNAL 12"
- NEW SIGNAL 8"
- SIGNAL TO REMAIN
- SIGNAL TO BE REMOVED
- PEDESTRIAN SIGNAL (INC.)
- WOOD POLE
- STEEL POLE
- LIGHT STANDARD
- PEDESTAL
- CONTROLLER

LOAD	AMPS	WATTS
SIGNALS	13	4200
CASE SIGNS	—	—

DRAWN M.R.W.
CHECKED
APPROVED

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC – SAFETY DEPARTMENT
Pontiac, Michigan

DATE 2-22-88
SCALE 1"= 40'
LOCATION NO. 309

MILFORD ROAD
WARDLOW ROAD

TELEDYNE POST N71197

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: LIVINGSTON + MILFORD DATE: 01/08/07

CITY/TOWNSHIP: HIGHLAND BY: C. MARKEL

COUNTY#: 1 STATE#: — CHARGES: 78000010

PLEASE PERFORM THE FOLLOWING:

_____ ELECTRICAL DEVICE: ____ INSTALL _____ MODERNIZE _____ MAINTENANCE

_____ UNDERGROUND: _____

_____ EDISON OK: _____ YES _____ NO JOB#: _____

_____ COORDINATE W/DISTRICT 7: _____

DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
_____ CHANGE TIMING.....																			
_____ CHANGE OFFSET.....																			
_____ CHANGE CYCLE LENGTH.....																			
_____ ADD DIAL/SPLIT.....																			

_____ CHANGE BREAKOUT OR EPROM: _____

_____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

_____ REPROGRAM TBC

_____ INSTALL INTERCONNECT: _____ TBC _____ MINITROL _____ TONE

_____ MBT OK: _____ YES _____ NO

_____ NO CHANGE - RECORD CORRECTION

_X_ OTHER: DST SCHEDULE (6. TIME BASE DATA - 2. SET TIME / DATE)

APPROVED BY: DD DATE: 1/12/07

DATE INSTALLED: 1-19-2007

INSTALLED BY: ROB DODE

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

3. PHASE DATA - 3. PEDESTRIAN TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE (SEC)
Walk		40		7													00-99
Pedest Clearance		12		13													00-99
Flashing Walk																	
Extend Ped Clear		1		1													
Act Rest in Walk																	

3. PHASE DATA - 4. INITIALIZE & NON ACTUATED RESPONSE

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Initial		4		1												
NA Response																

CODES:	0	1	2	3	4
Initial	none	inactive	red	yellow	green
NA Response	none	to 1	to 2	both	------

3. PHASE DATA - 5. VEHICLE & PEDESTRIAN RECALLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Vehicle Recall		3		3												
Pedestrian Recall		2		2												

CODES:	0	1	2	3	4
Vehicle	none	1 call	min	max	soft
Pedestrian	none	1 call	ped	bot N. A.	------

3. PHASE DATA - 6. NONLOCK & MISC CONTROLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nonlock Memory																
Dual Entry																
Last Car Passage																
Conditional Service																

CODES: 0 = NO 1 = YES

3. PHASE DATA - 8. SPECIAL DETECTOR - 0. SPC 1-8 (Epac 300/M52)

Detector # on Print	1	2	3	4	5	6	7	8
EPAC/M52 "D" Connector	1	6	7	8	4	5	2	3
Assigned Phase								

CODES: 0 1 2 3 4
Operation Mode: Norm Veh Norm Ped 1 call St Bar A St Bar B

A. CONTROLS									RANGE (SEC)
Extend Time									00-99
Delay Time									00-999

3. PHASE DATA - 8. SPECIAL DETECTOR - 2. VEH 9-16 (2070)

Detector # on Print	1	2	3	4	5	6	7	8
2070 "D" Connector	9	10	11	12	13	14	15	16
Assigned Phase								

CODES: 0 1 2 3 4
Operation Mode: Norm Veh Norm Ped 1 call St Bar A St Bar B

A. CONTROLS									RANGE (SEC)
Extend Time									00-99
Delay Time									00-999

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

4. UNIT DATA - 1. STARTUP & MISCELLANEOUS

Start up time : 10 (00-99) State : 0 (0 = fl, 1 = red)
Auto ped clear : 0 Red revert : 7.0 (2.0 - 9.9)
Stop time reset : 0 (0 = No, 1 = Yes)

4. UNIT DATA - 2. REMOTE FLASH

Phase	1	2	3	4	5	6	7	8	A	B	C	D	E	F	G	H
FLASH																
YEL																
ALT																
ENTER				1												
EXIT		1														

Test A = Remote Flash: 0 (0 = no & 1 = yes)

6. TIME BASE - 0. SPC FUNCTION MAPPING

FUNCTION NAME	SPC FUNC 1	2	3	4	5	6	7	8
AS12-15 = OLE - H FL G PHS								
AS12-15 = OLE - H FL R PHS								
SPEC FUNCTION 1								

NOTE: Go up after entering to get this screen.

4. UNIT DATA - 6. ALT SEQ. 08-15

EPAC ALT SEQ (PHAE PAIR TO REVERSE)

SEQ	.PP1.	.PP2.	.PP3.	.PP4.	.PP5.	.PP6.
08						
09						
10						
11						

SEQ	.PP1.	.PP2.	.PP3.	.PP4.	.PP5.	.PP6.
12						
13						
14						
15						

4. UNIT DATA - 3. OVERLAP STANDARD

Phase	1	2	3	4	5	6	7	8	CH#
Overlap A									
Overlap B									
Overlap C									
Overlap D									
Overlap E									
Overlap F									
Overlap G									
Overlap H									

Phase	1	2	3	4	5	6	7	8	CH#
Overlap I									
Overlap J									
Overlap K									
Overlap L									
Overlap M									
Overlap N									
Overlap 0									
Overlap P									

Enter a "1" in the channel # shown.

0 = Phase not part of overlap; 1 = Phase part of overlap.

4. UNIT DATA - 4. OVERLAP SPECIAL

Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Trail green																
Trail yellow																
Trail red																
-Green / -yellow																

* Overlap green omitted by # - phase green; Overlap yellow omitted by # - phase yellow

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

4. UNIT DATA - 8. I/O MISCELLANEOUS

Ring#	1	2	3	4	CONN	MODE
Input Response	1				"D"	
Output Select	1				"D"	

Connector "D" : 0 = Standard & 1 = Alternate

I/O Modes	INPUT	OUTPUT
"ABC" Connector		
"D" Connector		

Controller with Solo Detection:
EPAC300/M52 enter "1" under D Conn Input
2070 enter "0" under D Conn Input

5. COORDINATION DATA - 1. COORD SETUP

		0	1	2	3	4	5
OPER:	1	FRE	AUT	MAN	--------	--------	--------
MODE:	0	PRM	YLD	PYL	POM	SOM	FAC
MAX :	0	INH	MX1	MX2	--------	--------	--------
CORR:	2	DWL	MDW	SWY	SW+	--------	--------
OFST:		BEG	END	OF GREEN			
FRCE:		PLN CYC LE TIME					
MX DWELL:		YIELD PERIOD:					

5. COORDINATION DATA - 2. MANUAL CONTROL

DIAL: _____ SPLIT: _____ OFFSET: _____ SYNC: _____

To set cycle zero in manual control enter "1" for sync then press "E".

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

Mode: 0 = actuated, 1 = coord phase, 2 = minimum recall, 3 = maximum recall,
4 = pedestrian recall, 5 = maximum + pedestrian recall, 6 = phase omit,
7 = dual coord phase.

Sequence: 00 - 15 (Unit data has definition)
Ring Lag: Ring offset from local cycle zero when not barrier locked to Ring #1.
Time: 00 - 99 seconds.

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 1 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		56		24				
MODE		1		7				

DIAL 1 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	16		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

DIAL 2 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		54		26				
MODE		1		7				

DIAL 2 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

OFFSET	1	2	3
TIME	8		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 3 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		55		25				
MODE		1		7				

DIAL 3 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME		54		26				
MODE		1		7				

DIAL 3 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 3 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	19		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME	16		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

DIAL 4 / SPLIT 1 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

6. TIME BASE DATA - 2. SET TIME / DATE

-- DATE --	-- TIME --		BEG -- DST --		END	
MM/DD/YY	HH:MM:SS	MON & WEEK:	MM	SW	MM	SW
/ /	: :		03	02	11	01

CYCLE ZERO: 24 : 00 (HH:MM - EVENT)

STZ DIFF: -18000 (GPS OFFSET)

2. UTILITIES - 8. CONFIGURE PORTS - 8. GPS CONFIGURATION

GPS: 1 (0-NO, 1-YES) PORT: 4

6. TIME BASE DATA - 3. TRAFFIC EVENTS

PRO	TIME	COORD		MAX 2									OMIT							
DAY	HH : MM	PATRN		PHASE #S									PHASE #S							
* * *	* * * * *	D / S / O		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*
01	00 : 00	1/1/1																		
02	00 : 00	1/1/1																		
02	06 : 00	2/1/1																		
02	09 : 00	1/1/1																		
02	14 : 20	3/2/1																		
02	15 : 14	3/1/1																		
02	19 : 00	1/1/1																		
	:	/ /																		
	:	/ /																		
	:	/ /																		
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REFERENCE DATA
PRO DAY = 01 - 99
(Program day)

HH:MM = 24 Hour clock

PATTERN: (D/S/O)
FLASH =5/5/
FREE =0/0/4

MAX2 & OMITS:
Call free, set pattern to 0/0/0.

D = DIAL #
S = SPLIT #
0 = OFFSET #

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

6. TIME BASE DATA - 4. AUXILIARY EVENTS

PRO DAY	TIME HH : MM	AUX A1	AUX A2	AUX A3	DET VALUE D1	DET VALUE D2	DET VALUE D3	DIM DIM
	:							
	:							
	:							
	:							
	:							
	:							
	:							
	:							
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	:							
	:							
	:							
	:							
	:							
	:							
	:							

REFERENCE DATA:
PRO DAY = 00 - 99
(Program day)

HH:MM = 24 Hour clock

AUX = Output states
DET VALUE:
1 = Det diag value
2 = Enables report
3 = Repeat multiplier

DIM = Dimming state

ALL: 0 = off, 1 = on

6. TIME BASE DATA - 5. TIME 0F YEAR EVENTS

DATE MM / DD / YY	SPECIAL DAY	SPECIAL WEEK	DATE MM / DD / YY	SPECIAL DAY	SPECIAL WEEK
/ /			/ /		
/ /			/ /		
/ /			/ /		
/ /			/ /		
/ /			/ /		
/ /			/ /		
/ /			/ /		
/ /			/ /		

REFERENCE DATA
Special day = Any program day 00 - 99.

Special week:
Week 0 = Pro Day 01-07
Week 1 = Pro Day 11-17
Week 2 = Pro Day 21-27

6. TIME BASE DATA - 6. EQUATE/TRANSFER

CODE: (0 = equate, 1 = transfer)

FROM							
01 = 07							
02 = 03	04	05	06				
=							
=							
=							
=							
=							

DAY EQUATE: Care must be taken to insure days are not equated to undefined days or days that are equated to other days. The result wil be a day without events to run.

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

7. PREEMPT DATA - 1. ALL PREEMPTS

RING TIMES	1	2	3	4		
MIN GREEN/WALK						
OVERRIDE	FL	1/2	2/3	3/4	4/5	5/6
STATUS						

CODES 0 = NO, 1 = YES

7. PREEMPT DATA - PREEMPT 1

1. MISC DATA: (0 = no, 1 = yes)

TEST..: ____ N-LOCK.: ____ LINK PR#..: ____
DELAY: ____ EXTEND: ____ DURATION: ____
MXCALL: ____ LOCK OUT: ____

RING	1	2	3	4	5	6	7	8
EXIT								
CALLS								

4. PEDESTRIAN STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=dont wlk, 1=wlk, 2=flwlk, 3=dark)

CYCLE								

(0 = no, 1 = act, 2 = recall)

2. INTERVAL TIMES:

SEL PED CLR : _____ TRK YEL CHG : __.__
SEL YEL CHG : __.__ TRK RED CLR : __.__
SEL RED CLR : __.__ DWELL GREEN: _____
TRACK GREEN: _____ RET PED CLR : _____
TRK PED CLR : _____ RET YEL CHG : __.__
RET YEL CLR : __.__

5. OVERLAP STATUS:

OVERLAP	A	B	C	D
TRK GRN				
DWELL				

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0 = no, 1 = act)

3. VEHICLE STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0=no, 1=act, 2=min recall, 3=max recall)

6. LOW PRIORITY: (0=no, 1=yes)

TEST..: __ N-LOCK.: __ SKIP.....: __
DELAY: __ EXTEND: __ DURATION: __
DWELL: MXCALL: LOCK OUT:

RING	1	2	3	4	5	6	7	8
DWELL								
CALLS								

SIGNAL PHASING

PHASE#	ROAD	PHASE	LOAD SW	FLASH
1				
2	MILFORD	A & C	2	A
3				
4	LIVINGSTON	B & D	4	B
5				
6				
7				
8				
OLA				
OLB				
OLC				
OLD				
1PED				
2PED	LIVINGSTON PED	W1	6	
3PED				
4PED	LIVINGSTON PED	W2	8	
5PED				
6PED				
7PED				
8PED				

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL CONTROLLER Epac300, Mod 52 and 2070

INTERSECTION: LIVINGSTON & MILFORD

CITY/VILLAGE/TOWNSHIP: HIGHLAND

COUNTY#: 1 MDOT#: — REV#: 3 DETROIT EDISON#: 82

DRAWN BY: Carissa Markel APPROVED BY: DD DATE DRAWN: 01/08/07

INSTALLED BY: DATE INSTLD: / /

HOURS OF OPERATION: 7 DAYS : 24 HOURS

HOURS OF FLASHING: NONE

2. UTILITIES - 1. ACCESS

CODE.....: 1642 CODE: Four digits (0000 - 9999)

4. UNIT DATA - 5. RING STRUCTURE

***** NOTE: INSERT ALL RING #'S FIRST, THEN NXT & CONCUR *****

CHANNEL:	RING	PHNXT	CONCURRENT PHASES																CHANNEL	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	VEH	PED
PHASE 1:			1																	
PHASE 2:	1	4		1															2	9
PHASE 3:					1															
PHASE 4:	1	2				1													4	10
PHASE 5:							1													
PHASE 6:								1												
PHASE 7:									1											
PHASE 8:										1										
PHASE 9:											1									
PHASE 10:												1								
PHASE 11:													1							
PHASE 12:														1						
PHASE 13:															1					
PHASE 14:																1				
PHASE 15:																	1			
PHASE 16:																		1		

CODES:

RING ..... Ring Number for Phase (1-4)
PHNXT ..... Phase Next In Ring (1-16)
CONCUR PH Phases To Be Concurrent (0=NO, 1=YES)

For vehicle channel & ped channel, enter "1" under channel# shown.

3. PHASE DATA - 1. BASIC TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE
Minimum Green		10		5													00-99
Passage																	0.0-9.9
Maximum #1		50		20													000-999
Maximum #2																	000-999
Yellow Clearance		3.6		3.5													3.0-9.9
Red Clearance		1.5		2.5													0.0-9.9

Controller Information Sheet
4 Phase EPAC

Intersection	:	Livingston & Milford
City/Twp	:	Highland
State No.	:	-
County No.	:	1
Prepared By	:	Rachel Jones
Date	:	2/7/06

Phasing:

Load Switch 2:	Milford	A&C	FLA
Load Switch 4:	Livingston	B&D	FLR
Load Switch 6:	Milford Ped	W1	
Load Switch 8:	Livingston Ped	W2	

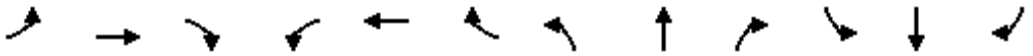
Jumpers:

121-213, 151-152, 153-154, 155-156, 173-174,175-176, 177-178, 179-180, 185-186, 223-224, 229-230, 233-PB1, 237-PB1, 241-PB1, 255-256, 257-258, 259-260, 261-262, 263-PB1, 268-269, 273-274.

Conflict Monitor : None

All switched OFF EXCEPT: Dual Select A&B; G&Y Enable; SSM 2,4.
Minimum Flash = 4+2+1

Appendix D – 2024 Existing Conditions Synchro Analysis Reports



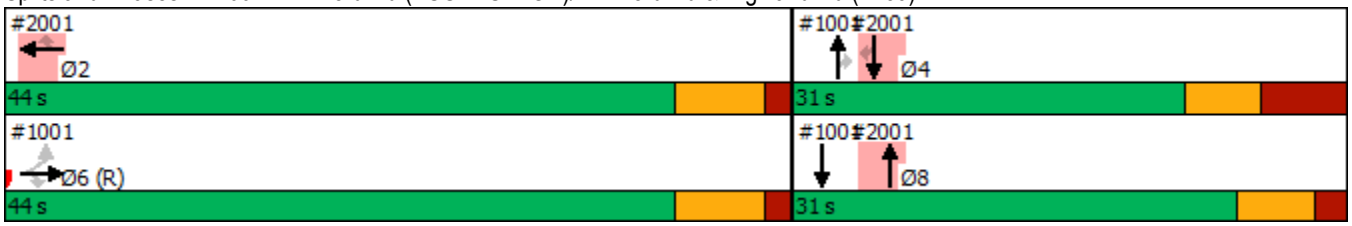
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	787	229	0	0	0	0	128	103	0	301	0
Future Volume (vph)	126	787	229	0	0	0	0	128	103	0	301	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		85	0		0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (ft)	160			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected	0.950											
Satd. Flow (prot)	1703	3406	1524	0	0	0	0	1792	1524	0	1845	0
Flt Permitted	0.950											
Satd. Flow (perm)	1703	3406	1524	0	0	0	0	1792	1524	0	1845	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			246						116			
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		421			982			386			92	
Travel Time (s)		5.2			12.2			7.5			1.4	
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.85	0.85	0.85	0.86	0.86	0.86
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	6%	6%	6%	3%	3%	3%
Parking (#/hr)					0							
Adj. Flow (vph)	135	846	246	0	0	0	0	151	121	0	350	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	135	846	246	0	0	0	0	151	121	0	350	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0	0					1	1		0	
Detector Template												
Leading Detector (ft)	0	0	0					20	20		0	
Trailing Detector (ft)	0	0	0					0	0		0	
Detector 1 Position(ft)	0	0	0					0	0		0	
Detector 1 Size(ft)	20	6	20					20	20		6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Turn Type	Perm	NA	Perm					NA	Perm		NA	
Protected Phases		6						4			8	
Permitted Phases	6		6						4			
Detector Phase	6	6	6					4	4		8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					7.0	7.0		7.0	

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	36.6	36.6	36.6					18.0	18.0		16.2	
Total Split (s)	44.0	44.0	44.0					31.0	31.0		31.0	
Total Split (%)	58.7%	58.7%	58.7%					41.3%	41.3%		41.3%	
Maximum Green (s)	37.4	37.4	37.4					21.8	21.8		24.8	
Yellow Time (s)	5.0	5.0	5.0					4.3	4.3		4.3	
All-Red Time (s)	1.6	1.6	1.6					4.9	4.9		1.9	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	6.6	6.6	6.6					9.2	9.2		6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0		3.0	
Recall Mode	C-Max	C-Max	C-Max					Min	Min		Min	
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	23.0	23.0	23.0					15.0	15.0		15.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	
Act Effct Green (s)	40.5	40.5	40.5					18.7	18.7		21.7	
Actuated g/C Ratio	0.54	0.54	0.54					0.25	0.25		0.29	
v/c Ratio	0.15	0.46	0.26					0.34	0.26		0.65	
Control Delay	7.3	10.0	2.4					24.3	6.4		4.6	
Queue Delay	1.2	0.0	0.0					0.0	0.0		0.0	
Total Delay	8.5	10.0	2.4					24.3	6.4		4.6	
LOS	A	B	A					C	A		A	
Approach Delay		8.3						16.4			4.6	
Approach LOS		A						B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 8.8		Intersection LOS: A	
Intersection Capacity Utilization 97.6%		ICU Level of Service F	
Analysis Period (min) 15			

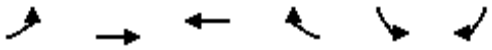
Splits and Phases: 1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59)



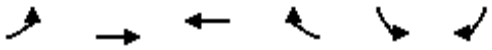
Lane Group	Ø2
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.



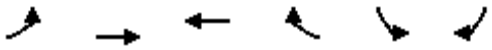
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	979	0	0	201	0
Future Volume (vph)	0	979	0	0	201	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	0	4893	0	0	1687	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	4893	0	0	1687	0
Right Turn on Red				Yes	Yes	Yes
Satd. Flow (RTOR)					79	
Link Speed (mph)		55	55		25	
Link Distance (ft)		215	243		69	
Travel Time (s)		2.7	3.0		1.9	
Peak Hour Factor	0.91	0.91	0.94	0.94	0.95	0.95
Heavy Vehicles (%)	6%	6%	7%	7%	7%	7%
Adj. Flow (vph)	0	1076	0	0	212	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1076	0	0	212	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		0			1	
Detector Template						
Leading Detector (ft)		0			20	
Trailing Detector (ft)		0			0	
Detector 1 Position(ft)		0			0	
Detector 1 Size(ft)		6			20	
Detector 1 Type		Cl+Ex			Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)		0.0			0.0	
Detector 1 Queue (s)		0.0			0.0	
Detector 1 Delay (s)		0.0			5.0	
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Detector Phase		2			4	
Switch Phase						
Minimum Initial (s)		10.0			7.0	
Minimum Split (s)		16.1			12.0	
Total Split (s)		47.0			28.0	
Total Split (%)		62.7%			37.3%	
Maximum Green (s)		40.9			23.0	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Yellow Time (s)		5.0			3.0	
All-Red Time (s)		1.1			2.0	
Lost Time Adjust (s)		0.0			0.0	
Total Lost Time (s)		6.1			5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		0.2			3.0	
Recall Mode		C-Max			Min	
Act Effct Green (s)		52.1			11.8	
Actuated g/C Ratio		0.69			0.16	
v/c Ratio		0.32			0.64	
Control Delay		5.2			23.3	
Queue Delay		0.0			0.0	
Total Delay		5.2			23.3	
LOS		A			C	
Approach Delay		5.2			23.3	
Approach LOS		A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 67 (89%), Referenced to phase 2:EBT, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 8.2		Intersection LOS: A	
Intersection Capacity Utilization 47.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1101: Highland Rd (M-59)

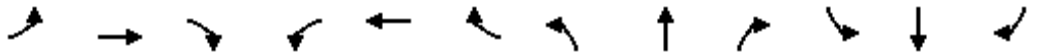


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰	
Traffic Volume (veh/h)	0	979	0	0	201	0
Future Volume (veh/h)	0	979	0	0	201	0
Initial Q (Qb), veh	0	0			0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00
Parking Bus, Adj	1.00	1.00			1.00	1.00
Work Zone On Approach		No			No	
Adj Sat Flow, veh/h/ln	0	1811			1796	0
Adj Flow Rate, veh/h	0	1076			212	0
Peak Hour Factor	0.91	0.91			0.95	0.95
Percent Heavy Veh, %	0	6			7	0
Cap, veh/h	0	4542			0	0
Arrive On Green	0.00	0.92			0.00	0.00
Sat Flow, veh/h	0	5270			0	
Grp Volume(v), veh/h	0	1076			0.0	
Grp Sat Flow(s),veh/h/ln	0	1648				
Q Serve(g_s), s	0.0	1.7				
Cycle Q Clear(g_c), s	0.0	1.7				
Prop In Lane	0.00					
Lane Grp Cap(c), veh/h	0	4542				
V/C Ratio(X)	0.00	0.24				
Avail Cap(c_a), veh/h	0	4542				
HCM Platoon Ratio	1.00	1.00				
Upstream Filter(I)	0.00	1.00				
Uniform Delay (d), s/veh	0.0	0.3				
Incr Delay (d2), s/veh	0.0	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0				
%ile BackOfQ(50%),veh/ln	0.0	0.1				
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.4				
LnGrp LOS	A	A				
Approach Vol, veh/h		1076				
Approach Delay, s/veh		0.4				
Approach LOS		A				
Timer - Assigned Phs		2				
Phs Duration (G+Y+Rc), s		75.0				
Change Period (Y+Rc), s		* 6.1				
Max Green Setting (Gmax), s		* 41				
Max Q Clear Time (g_c+I1), s		0.0				
Green Ext Time (p_c), s		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	0.4
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

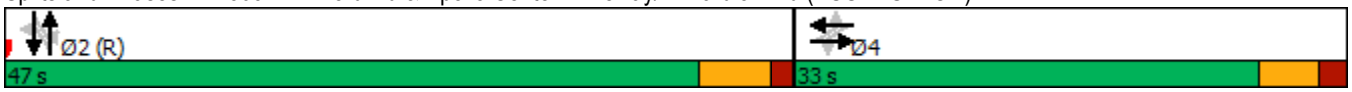


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	13	31	115	4	36	5	180	64	48	314	1
Future Volume (vph)	6	13	31	115	4	36	5	180	64	48	314	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	135		0	95		0	0		0	0		130
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.895			0.865				0.850			
Flt Protected	0.950			0.950				0.999			0.993	
Satd. Flow (prot)	1556	1466	0	1752	1596	0	0	1758	1495	0	3480	0
Flt Permitted	0.725			0.709				0.989			0.887	
Satd. Flow (perm)	1187	1466	0	1308	1596	0	0	1740	1495	0	3109	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		52			44				71			
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		458			1556			241			1268	
Travel Time (s)		12.5			30.3			3.7			19.2	
Peak Hour Factor	0.60	0.60	0.60	0.81	0.81	0.81	0.90	0.90	0.90	0.89	0.89	0.89
Heavy Vehicles (%)	16%	16%	16%	3%	3%	3%	8%	8%	8%	3%	3%	3%
Adj. Flow (vph)	10	22	52	142	5	44	6	200	71	54	353	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	74	0	142	49	0	0	206	71	0	408	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0	0	1	0	
Detector Template							Left			Left		
Leading Detector (ft)	20	20		20	20		20	0	0	20	0	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	20		20	20		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		4	4		2	2	2	2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		39.0	39.0	39.0	39.0	39.0	

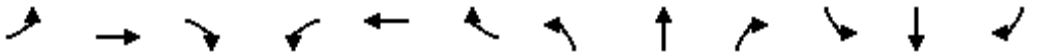
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	33.0	33.0		33.0	33.0		47.0	47.0	47.0	47.0	47.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.8%	58.8%	58.8%	58.8%	58.8%	
Maximum Green (s)	27.6	27.6		27.6	27.6		41.3	41.3	41.3	41.3	41.3	
Yellow Time (s)	3.6	3.6		3.6	3.6		4.3	4.3	4.3	4.3	4.3	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.4	1.4	1.4	1.4	1.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	5.4	5.4		5.4	5.4			5.7	5.7		5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		26.0	26.0	26.0	26.0	26.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)	27.6	27.6		27.6	27.6			41.3	41.3		41.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34			0.52	0.52		0.52	
v/c Ratio	0.02	0.14		0.31	0.08			0.23	0.09		0.25	
Control Delay	17.7	8.8		21.7	7.2			11.5	3.0		11.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	17.7	8.8		21.7	7.2			11.5	3.0		11.3	
LOS	B	A		C	A			B	A		B	
Approach Delay		9.9			18.0			9.3			11.3	
Approach LOS		A			B			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 56 (70%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.31			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 46.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON)



HCM 6th Edition methodology does not support Non-NEMA phasing.



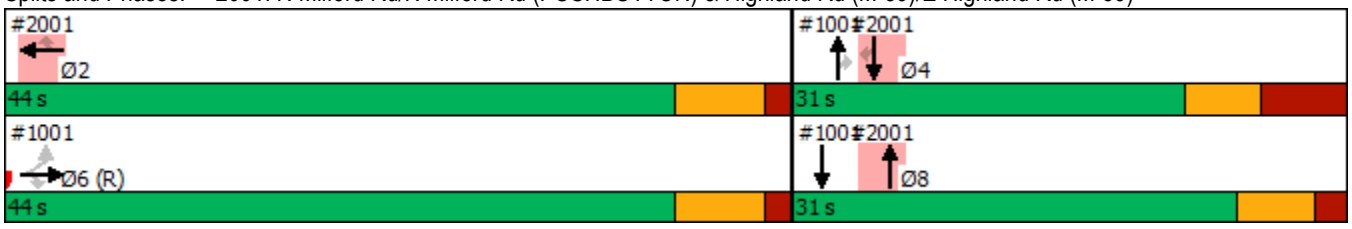
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1053	75	0	252	0	0	302	188
Future Volume (vph)	0	0	0	0	1053	75	0	252	0	0	302	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		230	0		0	0		285
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						0.99						0.99
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3471	1553	0	3406	0	0	1810	1538
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3471	1532	0	3406	0	0	1810	1518
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						90						55
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		660			975			92			492	
Travel Time (s)		8.2			12.1			1.8			7.5	
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.92	0.92	0.92	0.95	0.95	0.95	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	6%	6%	6%	5%	5%	5%
Adj. Flow (vph)	0	0	0	0	1108	79	0	283	0	0	351	219
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1108	79	0	283	0	0	351	219
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					0	0		0			1	1
Detector Template												
Leading Detector (ft)					0	0		0			20	20
Trailing Detector (ft)					0	0		0			0	0
Detector 1 Position(ft)					0	0		0			0	0
Detector 1 Size(ft)					6	20		6			20	20
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)					0.0	0.0		0.0			0.0	0.0
Turn Type					NA	Perm		NA			NA	Perm
Protected Phases					2			8			4	
Permitted Phases						2						4
Detector Phase					2	2		8			4	4

Lane Group	Ø6
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)					10.0	10.0		7.0			7.0	7.0
Minimum Split (s)					36.6	36.6		16.2			18.0	18.0
Total Split (s)					44.0	44.0		31.0			31.0	31.0
Total Split (%)					58.7%	58.7%		41.3%			41.3%	41.3%
Maximum Green (s)					37.4	37.4		24.8			21.8	21.8
Yellow Time (s)					5.0	5.0		4.3			4.3	4.3
All-Red Time (s)					1.6	1.6		1.9			4.9	4.9
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					6.6	6.6		6.2			9.2	9.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0		3.0			3.0	3.0
Recall Mode					Max	Max		Min			Min	Min
Walk Time (s)					7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)					23.0	23.0		15.0			15.0	15.0
Pedestrian Calls (#/hr)					0	0		0			0	0
Act Effct Green (s)					40.5	40.5		21.7			18.7	18.7
Actuated g/C Ratio					0.54	0.54		0.29			0.25	0.25
v/c Ratio					0.59	0.09		0.29			0.78	0.52
Control Delay					14.0	2.4		17.5			38.2	22.0
Queue Delay					0.0	0.0		0.0			0.0	0.0
Total Delay					14.0	2.4		17.5			38.2	22.0
LOS					B	A		B			D	C
Approach Delay					13.2			17.5			32.0	
Approach LOS					B			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 19.1		Intersection LOS: B	
Intersection Capacity Utilization 96.9%		ICU Level of Service F	
Analysis Period (min) 15			

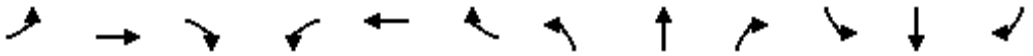
Splits and Phases: 2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59)



Lane Group	Ø6
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.

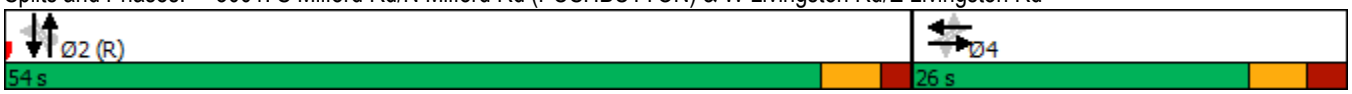


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	11	75	22	15	12	31	206	17	23	486	3
Future Volume (vph)	12	11	75	22	15	12	31	206	17	23	486	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							1.00				1.00	
Frt		0.897			0.966			0.989			0.999	
Flt Protected		0.994			0.978		0.950			0.950		
Satd. Flow (prot)	0	1645	0	0	1726	0	1752	1824	0	1736	1825	0
Flt Permitted		0.965			0.845		0.388			0.596		
Satd. Flow (perm)	0	1597	0	0	1491	0	715	1824	0	1089	1825	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			18			9			1	
Link Speed (mph)		35			35			45			35	
Link Distance (ft)		1319			1267			1270			959	
Travel Time (s)		25.7			24.7			19.2			18.7	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.91	0.91	0.91	0.68	0.68	0.68	0.84	0.84	0.84	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	13	12	82	32	22	18	37	245	20	25	534	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	107	0	0	72	0	37	265	0	25	537	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Minimum Split (s)	26.0	26.0		26.0	26.0		53.4	53.4		53.4	53.4	
Total Split (s)	26.0	26.0		26.0	26.0		54.0	54.0		54.0	54.0	
Total Split (%)	32.5%	32.5%		32.5%	32.5%		67.5%	67.5%		67.5%	67.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		48.6	48.6		48.6	48.6	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.5	2.5		2.5	2.5		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		36.0	36.0		36.0	36.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		20.0			20.0		48.6	48.6		48.6	48.6	
Actuated g/C Ratio		0.25			0.25		0.61	0.61		0.61	0.61	
v/c Ratio		0.23			0.19		0.09	0.24		0.04	0.48	
Control Delay		10.1			20.3		7.2	7.6		6.6	10.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.1			20.3		7.2	7.6		6.6	10.6	
LOS		B			C		A	A		A	B	
Approach Delay		10.1			20.3			7.6			10.4	
Approach LOS		B			C			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 8 (10%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd



HCM 6th Edition methodology does not support Non-NEMA phasing.

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Del/Veh (s)	17.6	6.8	3.3	22.6	7.4	3.9	7.9

1101: Highland Rd (M-59) Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	4.3	7.7	4.9

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.4	0.1	0.2	2.7	0.3	0.3	0.0	0.0	0.0	0.3	0.3	
Total Del/Veh (s)	20.7	17.8	3.7	19.1	21.7	3.2	14.5	8.7	1.9	14.5	12.6	

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	11.4

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Movement	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.6	3.0	16.6	27.5	8.3	14.3

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.2	0.1	0.1	0.1	3.7	0.3	0.2	0.1	0.0	0.0
Total Del/Veh (s)	21.3	23.7	8.5	21.9	21.1	7.6	16.4	7.3	4.5	12.2	9.8	8.8

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	10.1

Total Zone Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	332.9

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	EB	NB	NB	SB	All
Movements Served	L	T	T	R	T	R	T	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	17.2	6.6	7.4	3.3	23.4	6.3	3.9	7.9

1101: Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	SB	All
Movements Served	T	T	T	L	
Denied Del/Veh (s)					0.0
Total Del/Veh (s)	4.5	3.9	4.4	7.7	4.9

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by lane

Lane	EB	EB	WB	WB	NB	NB	SB	SB	All
Movements Served	L	TR	L	TR	LT	R	LT	TR	
Denied Del/Veh (s)									0.6
Total Del/Veh (s)	20.5	7.8	17.6	9.9	9.1	1.8	13.4	9.1	11.4

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Lane	WB	WB	WB	NB	NB	SB	SB	All
Movements Served	T	T	R	T	T	T	R	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	12.5	10.7	1.6	18.5	14.5	27.7	7.8	14.3

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by lan

Lane	EB	WB	NB	NB	SB	SB	All
Movements Served	LTR	LTR	L	TR	L	TR	
Denied Del/Veh (s)							0.2
Total Del/Veh (s)	11.5	17.8	15.8	7.3	8.7	10.0	10.1

Total Zone Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	332.9

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0
Total Del/Veh (s)	7.3	16.2	3.9	7.9

1101: Highland Rd (M-59) Performance by approach

Approach	EB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	4.3	7.7	4.9

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.7	2.1	0.0	0.3	0.6
Total Del/Veh (s)	9.3	15.6	7.2	12.9	11.4

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

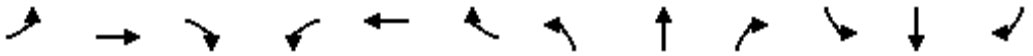
Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.0	16.6	20.6	14.3

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by ap

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.7	0.0	0.2
Total Del/Veh (s)	11.5	18.2	8.3	9.9	10.1

Total Zone Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	332.9



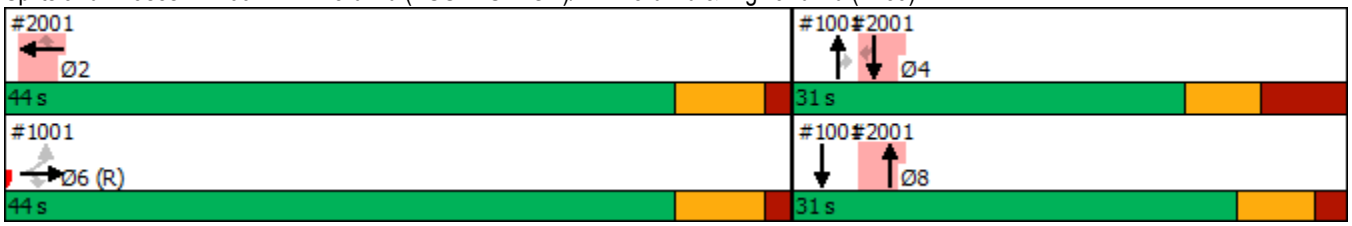
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	166	908	285	0	0	0	0	330	296	0	309	0
Future Volume (vph)	166	908	285	0	0	0	0	330	296	0	309	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		85	0		0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (ft)	160			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected	0.950											
Satd. Flow (prot)	1752	3505	1568	0	0	0	0	1863	1583	0	1863	0
Flt Permitted	0.950											
Satd. Flow (perm)	1752	3505	1568	0	0	0	0	1863	1583	0	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			243						85			
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		421			982			386			92	
Travel Time (s)		5.2			12.2			7.5			1.4	
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.86	0.86	0.86	0.81	0.81	0.81
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)					0							
Adj. Flow (vph)	175	956	300	0	0	0	0	384	344	0	381	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	956	300	0	0	0	0	384	344	0	381	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		12	15		9	15		9	15		9
Number of Detectors	0	0	0					1	1		0	
Detector Template												
Leading Detector (ft)	0	0	0					20	20		0	
Trailing Detector (ft)	0	0	0					0	0		0	
Detector 1 Position(ft)	0	0	0					0	0		0	
Detector 1 Size(ft)	20	6	20					20	20		6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Turn Type	Perm	NA	Perm					NA	Perm		NA	
Protected Phases		6						4			8	
Permitted Phases	6		6						4			
Detector Phase	6	6	6					4	4		8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					7.0	7.0		7.0	

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	36.6	36.6	36.6					18.0	18.0		15.0	
Total Split (s)	44.0	44.0	44.0					31.0	31.0		31.0	
Total Split (%)	58.7%	58.7%	58.7%					41.3%	41.3%		41.3%	
Maximum Green (s)	37.4	37.4	37.4					21.8	21.8		24.8	
Yellow Time (s)	5.0	5.0	5.0					4.3	4.3		4.3	
All-Red Time (s)	1.6	1.6	1.6					4.9	4.9		1.9	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	6.6	6.6	6.6					9.2	9.2		6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0		3.0	
Recall Mode	C-Max	C-Max	C-Max					Min	Min		Min	
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	23.0	23.0	23.0					15.0	15.0		15.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	
Act Effct Green (s)	39.4	39.4	39.4					19.8	19.8		22.8	
Actuated g/C Ratio	0.53	0.53	0.53					0.26	0.26		0.30	
v/c Ratio	0.19	0.52	0.32					0.78	0.72		0.67	
Control Delay	7.3	10.8	2.5					37.6	27.5		6.4	
Queue Delay	70.7	0.0	0.0					0.1	0.0		0.0	
Total Delay	78.0	10.8	2.5					37.7	27.5		6.4	
LOS	E	B	A					D	C		A	
Approach Delay		17.3						32.9			6.4	
Approach LOS		B						C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 20.1		Intersection LOS: C	
Intersection Capacity Utilization 119.9%		ICU Level of Service H	
Analysis Period (min) 15			

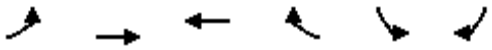
Splits and Phases: 1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59)



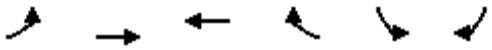
Lane Group	Ø2
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.



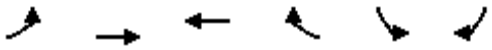
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1128	0	0	243	0
Future Volume (vph)	0	1128	0	0	243	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	0	5036	0	0	1736	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	5036	0	0	1736	0
Right Turn on Red				Yes	Yes	Yes
Satd. Flow (RTOR)					55	
Link Speed (mph)		55	55		25	
Link Distance (ft)		215	243		69	
Travel Time (s)		2.7	3.0		1.9	
Peak Hour Factor	0.95	0.95	0.94	0.94	0.88	0.88
Heavy Vehicles (%)	3%	3%	2%	2%	4%	4%
Adj. Flow (vph)	0	1187	0	0	276	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1187	0	0	276	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		0			1	
Detector Template						
Leading Detector (ft)		0			20	
Trailing Detector (ft)		0			0	
Detector 1 Position(ft)		0			0	
Detector 1 Size(ft)		6			20	
Detector 1 Type		Cl+Ex			Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)		0.0			0.0	
Detector 1 Queue (s)		0.0			0.0	
Detector 1 Delay (s)		0.0			5.0	
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Detector Phase		2			4	
Switch Phase						
Minimum Initial (s)		10.0			7.0	
Minimum Split (s)		16.1			12.0	
Total Split (s)		46.0			29.0	
Total Split (%)		61.3%			38.7%	
Maximum Green (s)		39.9			24.0	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Yellow Time (s)		5.0			3.0	
All-Red Time (s)		1.1			2.0	
Lost Time Adjust (s)		0.0			0.0	
Total Lost Time (s)		6.1			5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		0.2			3.0	
Recall Mode		C-Max			Min	
Act Effct Green (s)		48.8			15.1	
Actuated g/C Ratio		0.65			0.20	
v/c Ratio		0.36			0.70	
Control Delay		7.0			23.7	
Queue Delay		0.0			0.0	
Total Delay		7.0			23.7	
LOS		A			C	
Approach Delay		7.0			23.7	
Approach LOS		A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 67 (89%), Referenced to phase 2:EBT, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 55.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1101: Highland Rd (M-59)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰	
Traffic Volume (veh/h)	0	1128	0	0	243	0
Future Volume (veh/h)	0	1128	0	0	243	0
Initial Q (Qb), veh	0	0			0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00
Parking Bus, Adj	1.00	1.00			1.00	1.00
Work Zone On Approach		No			No	
Adj Sat Flow, veh/h/ln	0	1856			1841	0
Adj Flow Rate, veh/h	0	1187			276	0
Peak Hour Factor	0.95	0.95			0.88	0.88
Percent Heavy Veh, %	0	3			4	0
Cap, veh/h	0	4654			0	0
Arrive On Green	0.00	0.92			0.00	0.00
Sat Flow, veh/h	0	5400			0	
Grp Volume(v), veh/h	0	1187			0.0	
Grp Sat Flow(s),veh/h/ln	0	1689				
Q Serve(g_s), s	0.0	1.9				
Cycle Q Clear(g_c), s	0.0	1.9				
Prop In Lane	0.00					
Lane Grp Cap(c), veh/h	0	4654				
V/C Ratio(X)	0.00	0.26				
Avail Cap(c_a), veh/h	0	4654				
HCM Platoon Ratio	1.00	1.00				
Upstream Filter(I)	0.00	1.00				
Uniform Delay (d), s/veh	0.0	0.3				
Incr Delay (d2), s/veh	0.0	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0				
%ile BackOfQ(50%),veh/ln	0.0	0.1				
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.5				
LnGrp LOS	A	A				
Approach Vol, veh/h		1187				
Approach Delay, s/veh		0.5				
Approach LOS		A				
Timer - Assigned Phs		2				
Phs Duration (G+Y+Rc), s		75.0				
Change Period (Y+Rc), s		* 6.1				
Max Green Setting (Gmax), s		* 40				
Max Q Clear Time (g_c+I1), s		0.0				
Green Ext Time (p_c), s		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	0.5
HCM 6th LOS	A

Notes

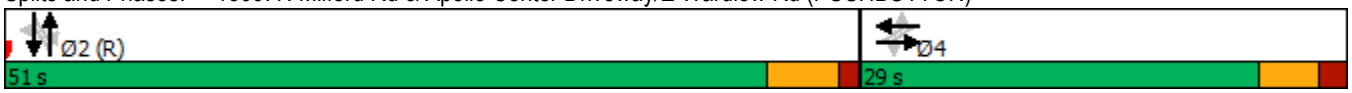
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	10	11	136	7	65	1	417	175	48	319	1
Future Volume (vph)	2	10	11	136	7	65	1	417	175	48	319	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	135		0	95		0	0		0	0		130
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor		0.99		1.00				1.00			1.00	
Frt		0.923			0.864				0.850			
Flt Protected	0.950			0.950							0.993	
Satd. Flow (prot)	1805	1739	0	1787	1625	0	0	1863	1583	0	3480	0
Flt Permitted	0.702			0.736							0.842	
Satd. Flow (perm)	1334	1739	0	1380	1625	0	0	1863	1583	0	2951	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			76				208			
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		458			1556			241			1268	
Travel Time (s)		12.5			30.3			3.7			19.2	
Confl. Peds. (#/hr)			4	4			1					1
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.64	0.64	0.64	0.85	0.85	0.85	0.84	0.85	0.84	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	2%	2%	2%	3%	3%	3%
Adj. Flow (vph)	3	16	17	160	8	76	1	491	208	55	363	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	33	0	160	84	0	0	492	208	0	419	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0	0	1	0	
Detector Template							Left			Left		
Leading Detector (ft)	20	20		20	20		20	0	0	20	0	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	20		20	20		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		4	4		2	2	2	2	2	

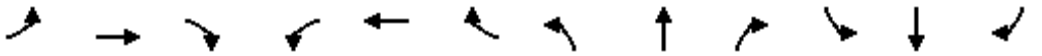
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		39.0	39.0	39.0	39.0	39.0	
Total Split (s)	29.0	29.0		29.0	29.0		51.0	51.0	51.0	51.0	51.0	
Total Split (%)	36.3%	36.3%		36.3%	36.3%		63.8%	63.8%	63.8%	63.8%	63.8%	
Maximum Green (s)	23.6	23.6		23.6	23.6		45.3	45.3	45.3	45.3	45.3	
Yellow Time (s)	3.6	3.6		3.6	3.6		4.3	4.3	4.3	4.3	4.3	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.4	1.4	1.4	1.4	1.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	5.4	5.4		5.4	5.4			5.7	5.7		5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		26.0	26.0	26.0	26.0	26.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)	23.6	23.6		23.6	23.6			45.3	45.3		45.3	
Actuated g/C Ratio	0.30	0.30		0.30	0.30			0.57	0.57		0.57	
v/c Ratio	0.01	0.06		0.39	0.16			0.47	0.21		0.25	
Control Delay	20.0	13.5		26.0	7.3			12.1	1.9		9.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	20.0	13.5		26.0	7.3			12.1	1.9		9.3	
LOS	B	B		C	A			B	A		A	
Approach Delay		14.0			19.6			9.0			9.3	
Approach LOS		B			B			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 69 (86%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.47			
Intersection Signal Delay: 11.1		Intersection LOS: B	
Intersection Capacity Utilization 77.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON)



HCM 6th Edition methodology does not support Non-NEMA phasing.



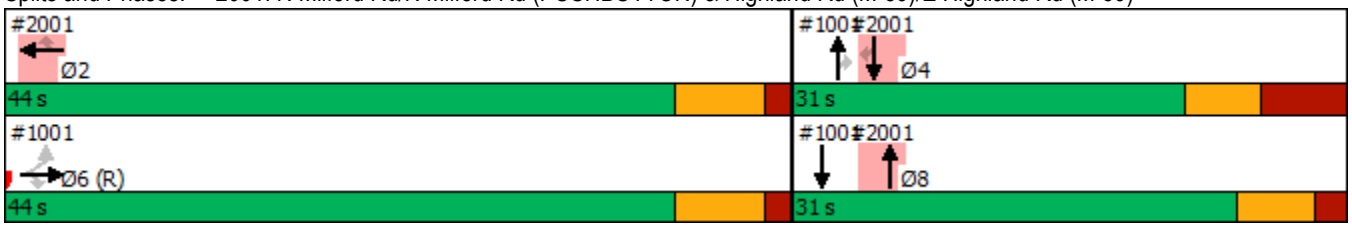
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1315	126	0	498	0	0	304	217
Future Volume (vph)	0	0	0	0	1315	126	0	498	0	0	304	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		230	0		0	0		285
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												0.99
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3539	1583	0	3505	0	0	1845	1568
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3539	1583	0	3505	0	0	1845	1545
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						107						52
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		660			975			92			492	
Travel Time (s)		8.2			12.1			1.8			7.5	
Confl. Peds. (#/hr)												2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	0	0	0	0	1429	137	0	579	0	0	353	252
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1429	137	0	579	0	0	353	252
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					0	0		0			1	1
Detector Template												
Leading Detector (ft)					0	0		0			20	20
Trailing Detector (ft)					0	0		0			0	0
Detector 1 Position(ft)					0	0		0			0	0
Detector 1 Size(ft)					6	20		6			20	20
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)					0.0	0.0		0.0			0.0	0.0
Turn Type					NA	Perm		NA			NA	Perm
Protected Phases					2			8			4	
Permitted Phases						2						4
Detector Phase					2	2		8			4	4

Lane Group	Ø6
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)					10.0	10.0		7.0			7.0	7.0
Minimum Split (s)					36.6	36.6		15.0			18.0	18.0
Total Split (s)					44.0	44.0		31.0			31.0	31.0
Total Split (%)					58.7%	58.7%		41.3%			41.3%	41.3%
Maximum Green (s)					37.4	37.4		24.8			21.8	21.8
Yellow Time (s)					5.0	5.0		4.3			4.3	4.3
All-Red Time (s)					1.6	1.6		1.9			4.9	4.9
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					6.6	6.6		6.2			9.2	9.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0		3.0			3.0	3.0
Recall Mode					Max	Max		Min			Min	Min
Walk Time (s)					7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)					23.0	23.0		15.0			15.0	15.0
Pedestrian Calls (#/hr)					0	0		0			0	0
Act Effct Green (s)					39.4	39.4		22.8			19.8	19.8
Actuated g/C Ratio					0.53	0.53		0.30			0.26	0.26
v/c Ratio					0.77	0.16		0.54			0.73	0.57
Control Delay					18.3	3.9		13.4			34.2	23.7
Queue Delay					0.0	0.0		0.0			0.0	0.0
Total Delay					18.3	3.9		13.4			34.2	23.7
LOS					B	A		B			C	C
Approach Delay					17.0			13.4			29.8	
Approach LOS					B			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 19.1		Intersection LOS: B	
Intersection Capacity Utilization 119.3%		ICU Level of Service H	
Analysis Period (min) 15			

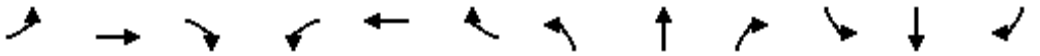
Splits and Phases: 2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59)



Lane Group	Ø6
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.

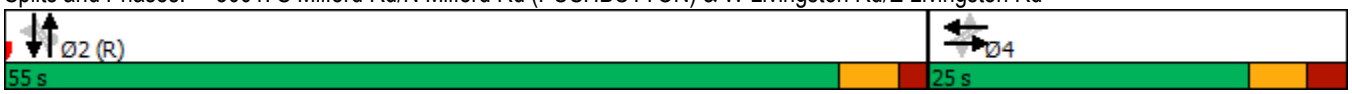


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	25	117	49	25	26	98	568	32	22	533	20
Future Volume (vph)	13	25	117	49	25	26	98	568	32	22	533	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			1.00		1.00		
Frt		0.898			0.965			0.992			0.995	
Flt Protected		0.996			0.976		0.950			0.950		
Satd. Flow (prot)	0	1650	0	0	1647	0	1787	1864	0	1752	1835	0
Flt Permitted		0.970			0.721		0.346			0.313		
Satd. Flow (perm)	0	1606	0	0	1216	0	651	1864	0	577	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		148			21			7			4	
Link Speed (mph)		35			35			45			35	
Link Distance (ft)		1319			1267			1270			959	
Travel Time (s)		25.7			24.7			19.2			18.7	
Confl. Peds. (#/hr)	2					2			2	2		
Peak Hour Factor	0.79	0.79	0.79	0.78	0.78	0.78	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	16	32	148	63	32	33	108	624	35	24	586	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	196	0	0	128	0	108	659	0	24	608	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Minimum Split (s)	25.0	25.0		25.0	25.0		54.4	54.4		54.4	54.4	
Total Split (s)	25.0	25.0		25.0	25.0		55.0	55.0		55.0	55.0	
Total Split (%)	31.3%	31.3%		31.3%	31.3%		68.8%	68.8%		68.8%	68.8%	
Maximum Green (s)	19.0	19.0		19.0	19.0		49.6	49.6		49.6	49.6	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.5	2.5		2.5	2.5		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	6.0	6.0		6.0	6.0		37.0	37.0		37.0	37.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		19.0			19.0		49.6	49.6		49.6	49.6	
Actuated g/C Ratio		0.24			0.24		0.62	0.62		0.62	0.62	
v/c Ratio		0.40			0.42		0.27	0.57		0.07	0.53	
Control Delay		10.5			26.5		9.1	11.2		6.7	10.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.5			26.5		9.1	11.2		6.7	10.7	
LOS		B			C		A	B		A	B	
Approach Delay		10.5			26.5			10.9			10.6	
Approach LOS		B			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 19 (24%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 83.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd



HCM 6th Edition methodology does not support Non-NEMA phasing.

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	36.3	8.4	3.6	24.9	15.0	3.4	12.3

1101: Highland Rd (M-59) Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	5.0	7.2	5.4

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	5.0	0.1	0.1	2.8	0.4	0.4	0.0	0.1	0.0	0.3	0.3	4.9
Total Del/Veh (s)	39.8	30.4	6.5	30.8	24.3	7.1	3.0	7.8	2.0	18.0	11.6	4.8

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	11.2

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Movement	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	15.3	5.4	11.9	24.7	8.6	14.7

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.2	0.1	0.1	0.2	3.1	0.7	0.9	0.0	0.0	0.1
Total Del/Veh (s)	25.2	24.9	11.4	27.0	24.2	15.1	20.3	12.0	7.0	18.6	9.9	6.3

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	12.7

Total Zone Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	701.4

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	EB	NB	NB	SB	All
Movements Served	L	T	T	R	T	R	T	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	35.5	8.3	8.9	3.6	28.3	11.0	3.4	12.3

1101: Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	SB	All
Movements Served	T	T	T	L	
Denied Del/Veh (s)					0.0
Total Del/Veh (s)	5.5	4.5	4.4	7.2	5.4

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by lane

Lane	EB	EB	WB	WB	NB	NB	SB	SB	All
Movements Served	L	TR	L	TR	LT	R	LT	TR	
Denied Del/Veh (s)									0.5
Total Del/Veh (s)	39.3	17.9	28.0	14.0	8.0	1.9	13.2	7.2	11.2

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Lane	WB	WB	WB	NB	NB	SB	SB	All
Movements Served	T	T	R	T	T	T	R	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	16.9	14.1	2.9	12.7	11.0	24.9	8.2	14.7

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by lan

Lane	EB	WB	NB	NB	SB	SB	All
Movements Served	LTR	LTR	L	TR	L	TR	
Denied Del/Veh (s)							0.5
Total Del/Veh (s)	15.2	23.4	16.9	12.3	14.7	9.9	12.7

Total Zone Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	701.4

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.1	0.0
Total Del/Veh (s)	10.6	20.3	3.4	12.3

1101: Highland Rd (M-59) Performance by approach

Approach	EB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	5.0	7.2	5.4

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.6	2.0	0.0	0.3	0.5
Total Del/Veh (s)	19.8	22.9	6.1	12.4	11.2

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0
Total Del/Veh (s)	14.4	11.9	18.2	14.7

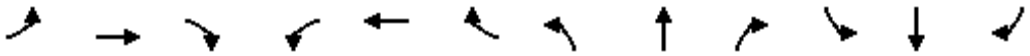
3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by ap

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	1.1	0.0	0.5
Total Del/Veh (s)	15.2	23.4	12.9	10.1	12.7

Total Zone Performance

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	701.4

Appendix E – 2026 Background Conditions Synchro Analysis Reports



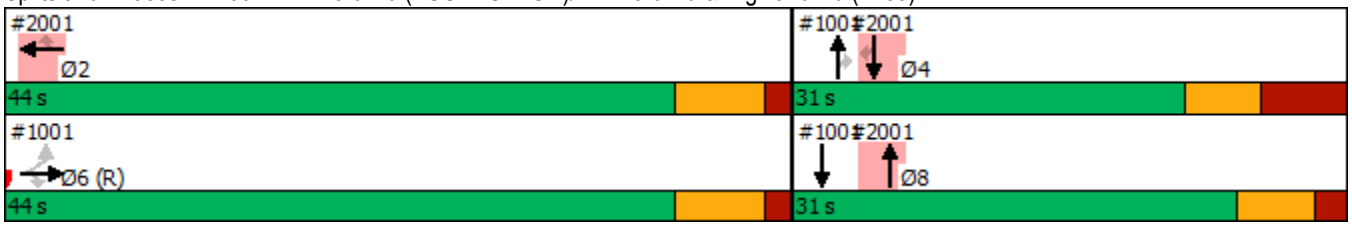
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	803	234	0	0	0	0	131	105	0	307	0
Future Volume (vph)	129	803	234	0	0	0	0	131	105	0	307	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		85	0		0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (ft)	160			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected	0.950											
Satd. Flow (prot)	1703	3406	1524	0	0	0	0	1792	1524	0	1845	0
Flt Permitted	0.950											
Satd. Flow (perm)	1703	3406	1524	0	0	0	0	1792	1524	0	1845	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			252						110			
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		421			982			386			92	
Travel Time (s)		5.2			12.2			7.5			1.4	
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.85	0.85	0.85	0.86	0.86	0.86
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	6%	6%	6%	3%	3%	3%
Parking (#/hr)					0							
Adj. Flow (vph)	139	863	252	0	0	0	0	154	124	0	357	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	139	863	252	0	0	0	0	154	124	0	357	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0	0					1	1		0	
Detector Template												
Leading Detector (ft)	0	0	0					20	20		0	
Trailing Detector (ft)	0	0	0					0	0		0	
Detector 1 Position(ft)	0	0	0					0	0		0	
Detector 1 Size(ft)	20	6	20					20	20		6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Turn Type	Perm	NA	Perm					NA	Perm		NA	
Protected Phases		6						4			8	
Permitted Phases	6		6						4			
Detector Phase	6	6	6					4	4		8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					7.0	7.0		7.0	

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	36.6	36.6	36.6					18.0	18.0		15.0	
Total Split (s)	44.0	44.0	44.0					31.0	31.0		31.0	
Total Split (%)	58.7%	58.7%	58.7%					41.3%	41.3%		41.3%	
Maximum Green (s)	37.4	37.4	37.4					21.8	21.8		24.8	
Yellow Time (s)	5.0	5.0	5.0					4.3	4.3		4.3	
All-Red Time (s)	1.6	1.6	1.6					4.9	4.9		1.9	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	6.6	6.6	6.6					9.2	9.2		6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0		3.0	
Recall Mode	C-Max	C-Max	C-Max					Min	Min		Min	
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	23.0	23.0	23.0					15.0	15.0		15.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	
Act Effct Green (s)	40.3	40.3	40.3					18.9	18.9		21.9	
Actuated g/C Ratio	0.54	0.54	0.54					0.25	0.25		0.29	
v/c Ratio	0.15	0.47	0.27					0.34	0.27		0.66	
Control Delay	7.2	10.1	2.4					24.3	7.3		4.6	
Queue Delay	1.6	0.0	0.0					0.0	0.0		0.0	
Total Delay	8.8	10.1	2.4					24.3	7.3		4.6	
LOS	A	B	A					C	A		A	
Approach Delay		8.4						16.7			4.6	
Approach LOS		A						B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 8.9		Intersection LOS: A	
Intersection Capacity Utilization 99.1%		ICU Level of Service F	
Analysis Period (min) 15			

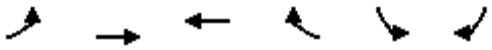
Splits and Phases: 1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59)



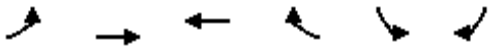
Lane Group	Ø2
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.



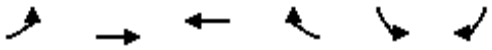
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	999	0	0	205	0
Future Volume (vph)	0	999	0	0	205	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	0	4893	0	0	1687	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	4893	0	0	1687	0
Right Turn on Red				Yes	Yes	Yes
Satd. Flow (RTOR)					75	
Link Speed (mph)		55	55		25	
Link Distance (ft)		215	243		69	
Travel Time (s)		2.7	3.0		1.9	
Peak Hour Factor	0.91	0.91	0.94	0.94	0.95	0.95
Heavy Vehicles (%)	6%	6%	7%	7%	7%	7%
Adj. Flow (vph)	0	1098	0	0	216	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1098	0	0	216	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		0			1	
Detector Template						
Leading Detector (ft)		0			20	
Trailing Detector (ft)		0			0	
Detector 1 Position(ft)		0			0	
Detector 1 Size(ft)		6			20	
Detector 1 Type		Cl+Ex			Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)		0.0			0.0	
Detector 1 Queue (s)		0.0			0.0	
Detector 1 Delay (s)		0.0			5.0	
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Detector Phase		2			4	
Switch Phase						
Minimum Initial (s)		10.0			7.0	
Minimum Split (s)		16.1			12.0	
Total Split (s)		47.0			28.0	
Total Split (%)		62.7%			37.3%	
Maximum Green (s)		40.9			23.0	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Yellow Time (s)		5.0			3.0	
All-Red Time (s)		1.1			2.0	
Lost Time Adjust (s)		0.0			0.0	
Total Lost Time (s)		6.1			5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		0.2			3.0	
Recall Mode		C-Max			Min	
Act Effct Green (s)		51.8			12.1	
Actuated g/C Ratio		0.69			0.16	
v/c Ratio		0.32			0.65	
Control Delay		5.4			23.8	
Queue Delay		0.0			0.0	
Total Delay		5.4			23.8	
LOS		A			C	
Approach Delay		5.4			23.8	
Approach LOS		A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 67 (89%), Referenced to phase 2:EBT, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 8.4		Intersection LOS: A	
Intersection Capacity Utilization 48.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1101: Highland Rd (M-59)

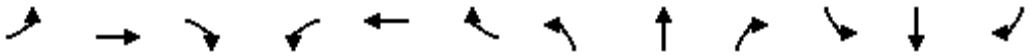


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰	
Traffic Volume (veh/h)	0	999	0	0	205	0
Future Volume (veh/h)	0	999	0	0	205	0
Initial Q (Qb), veh	0	0			0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00
Parking Bus, Adj	1.00	1.00			1.00	1.00
Work Zone On Approach		No			No	
Adj Sat Flow, veh/h/ln	0	1811			1796	0
Adj Flow Rate, veh/h	0	1098			216	0
Peak Hour Factor	0.91	0.91			0.95	0.95
Percent Heavy Veh, %	0	6			7	0
Cap, veh/h	0	4542			0	0
Arrive On Green	0.00	0.92			0.00	0.00
Sat Flow, veh/h	0	5270			0	
Grp Volume(v), veh/h	0	1098			0.0	
Grp Sat Flow(s),veh/h/ln	0	1648				
Q Serve(g_s), s	0.0	1.7				
Cycle Q Clear(g_c), s	0.0	1.7				
Prop In Lane	0.00					
Lane Grp Cap(c), veh/h	0	4542				
V/C Ratio(X)	0.00	0.24				
Avail Cap(c_a), veh/h	0	4542				
HCM Platoon Ratio	1.00	1.00				
Upstream Filter(I)	0.00	1.00				
Uniform Delay (d), s/veh	0.0	0.3				
Incr Delay (d2), s/veh	0.0	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0				
%ile BackOfQ(50%),veh/ln	0.0	0.1				
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.4				
LnGrp LOS	A	A				
Approach Vol, veh/h		1098				
Approach Delay, s/veh		0.4				
Approach LOS		A				
Timer - Assigned Phs		2				
Phs Duration (G+Y+Rc), s		75.0				
Change Period (Y+Rc), s		* 6.1				
Max Green Setting (Gmax), s		* 41				
Max Q Clear Time (g_c+I1), s		0.0				
Green Ext Time (p_c), s		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	0.4
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

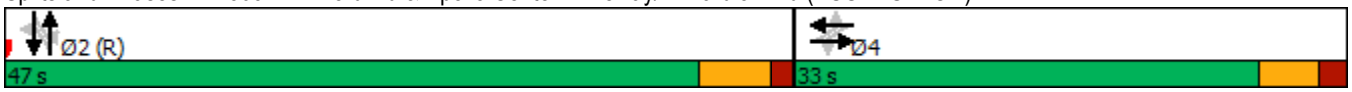


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	13	32	117	4	37	5	184	65	49	320	1
Future Volume (vph)	6	13	32	117	4	37	5	184	65	49	320	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	135		0	95		0	0		0	0		130
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.894			0.865				0.850			
Flt Protected	0.950			0.950				0.999			0.993	
Satd. Flow (prot)	1556	1464	0	1752	1596	0	0	1758	1495	0	3480	0
Flt Permitted	0.724			0.708				0.989			0.886	
Satd. Flow (perm)	1186	1464	0	1306	1596	0	0	1740	1495	0	3105	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		53			46				72			
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		458			1556			241			1268	
Travel Time (s)		12.5			30.3			3.7			19.2	
Peak Hour Factor	0.60	0.60	0.60	0.81	0.81	0.81	0.90	0.90	0.90	0.89	0.89	0.89
Heavy Vehicles (%)	16%	16%	16%	3%	3%	3%	8%	8%	8%	3%	3%	3%
Adj. Flow (vph)	10	22	53	144	5	46	6	204	72	55	360	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	75	0	144	51	0	0	210	72	0	416	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0	0	1	0	
Detector Template							Left			Left		
Leading Detector (ft)	20	20		20	20		20	0	0	20	0	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	20		20	20		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		4	4		2	2	2	2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		39.0	39.0	39.0	39.0	39.0	

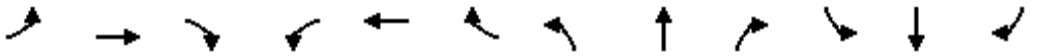
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	33.0	33.0		33.0	33.0		47.0	47.0	47.0	47.0	47.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.8%	58.8%	58.8%	58.8%	58.8%	
Maximum Green (s)	27.6	27.6		27.6	27.6		41.3	41.3	41.3	41.3	41.3	
Yellow Time (s)	3.6	3.6		3.6	3.6		4.3	4.3	4.3	4.3	4.3	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.4	1.4	1.4	1.4	1.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	5.4	5.4		5.4	5.4			5.7	5.7		5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		26.0	26.0	26.0	26.0	26.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)	27.6	27.6		27.6	27.6			41.3	41.3		41.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34			0.52	0.52		0.52	
v/c Ratio	0.02	0.14		0.32	0.09			0.23	0.09		0.26	
Control Delay	17.7	8.7		21.8	7.1			11.5	3.0		11.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	17.7	8.7		21.8	7.1			11.5	3.0		11.3	
LOS	B	A		C	A			B	A		B	
Approach Delay		9.8			17.9			9.3			11.3	
Approach LOS		A			B			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 56 (70%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 47.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON)



HCM 6th Edition methodology does not support Non-NEMA phasing.



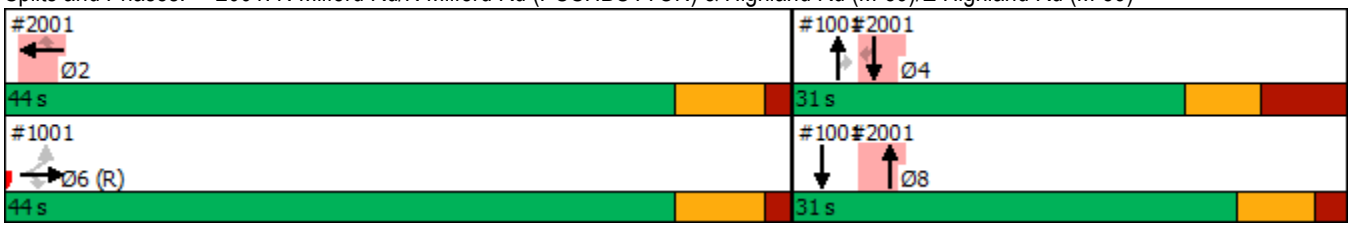
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1074	77	0	257	0	0	308	192
Future Volume (vph)	0	0	0	0	1074	77	0	257	0	0	308	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		230	0		0	0		285
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						0.99						0.99
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3471	1553	0	3406	0	0	1810	1538
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3471	1532	0	3406	0	0	1810	1518
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						90						52
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		660			975			92			492	
Travel Time (s)		8.2			12.1			1.8			7.5	
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.92	0.92	0.92	0.95	0.95	0.95	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	6%	6%	6%	5%	5%	5%
Adj. Flow (vph)	0	0	0	0	1131	81	0	289	0	0	358	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1131	81	0	289	0	0	358	223
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					0	0		0			1	1
Detector Template												
Leading Detector (ft)					0	0		0			20	20
Trailing Detector (ft)					0	0		0			0	0
Detector 1 Position(ft)					0	0		0			0	0
Detector 1 Size(ft)					6	20		6			20	20
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)					0.0	0.0		0.0			0.0	0.0
Turn Type					NA	Perm		NA			NA	Perm
Protected Phases					2			8			4	
Permitted Phases						2						4
Detector Phase					2	2		8			4	4

Lane Group	Ø6
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)					10.0	10.0		7.0			7.0	7.0
Minimum Split (s)					36.6	36.6		15.0			18.0	18.0
Total Split (s)					44.0	44.0		31.0			31.0	31.0
Total Split (%)					58.7%	58.7%		41.3%			41.3%	41.3%
Maximum Green (s)					37.4	37.4		24.8			21.8	21.8
Yellow Time (s)					5.0	5.0		4.3			4.3	4.3
All-Red Time (s)					1.6	1.6		1.9			4.9	4.9
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					6.6	6.6		6.2			9.2	9.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0		3.0			3.0	3.0
Recall Mode					Max	Max		Min			Min	Min
Walk Time (s)					7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)					23.0	23.0		15.0			15.0	15.0
Pedestrian Calls (#/hr)					0	0		0			0	0
Act Effct Green (s)					40.3	40.3		21.9			18.9	18.9
Actuated g/C Ratio					0.54	0.54		0.29			0.25	0.25
v/c Ratio					0.61	0.09		0.29			0.79	0.53
Control Delay					14.3	2.5		17.6			38.8	22.6
Queue Delay					0.0	0.0		0.0			0.0	0.0
Total Delay					14.3	2.5		17.6			38.8	22.6
LOS					B	A		B			D	C
Approach Delay					13.5			17.6			32.5	
Approach LOS					B			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 19.4		Intersection LOS: B	
Intersection Capacity Utilization 98.4%		ICU Level of Service F	
Analysis Period (min) 15			

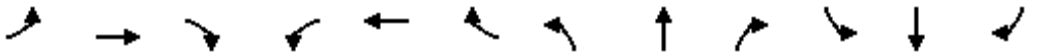
Splits and Phases: 2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59)



Lane Group	Ø6
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.

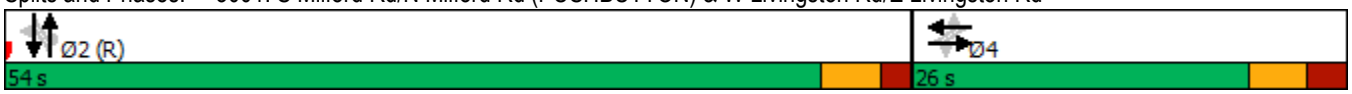


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	11	77	22	15	12	32	210	17	23	496	3
Future Volume (vph)	12	11	77	22	15	12	32	210	17	23	496	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							1.00				1.00	
Frt		0.896			0.966			0.989			0.999	
Flt Protected		0.994			0.978		0.950			0.950		
Satd. Flow (prot)	0	1643	0	0	1726	0	1752	1824	0	1736	1825	0
Flt Permitted		0.966			0.844		0.380			0.591		
Satd. Flow (perm)	0	1597	0	0	1489	0	701	1824	0	1080	1825	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			18			9			1	
Link Speed (mph)		35			35			45			35	
Link Distance (ft)		1319			1267			1270			959	
Travel Time (s)		25.7			24.7			19.2			18.7	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.91	0.91	0.91	0.68	0.68	0.68	0.84	0.84	0.84	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	13	12	85	32	22	18	38	250	20	25	545	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	110	0	0	72	0	38	270	0	25	548	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Minimum Split (s)	26.0	26.0		26.0	26.0		53.4	53.4		53.4	53.4	
Total Split (s)	26.0	26.0		26.0	26.0		54.0	54.0		54.0	54.0	
Total Split (%)	32.5%	32.5%		32.5%	32.5%		67.5%	67.5%		67.5%	67.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		48.6	48.6		48.6	48.6	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.5	2.5		2.5	2.5		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		36.0	36.0		36.0	36.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		20.0			20.0		48.6	48.6		48.6	48.6	
Actuated g/C Ratio		0.25			0.25		0.61	0.61		0.61	0.61	
v/c Ratio		0.24			0.19		0.09	0.24		0.04	0.49	
Control Delay		10.0			20.3		7.2	7.7		6.6	10.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.0			20.3		7.2	7.7		6.6	10.7	
LOS		A			C		A	A		A	B	
Approach Delay		10.0			20.3			7.6			10.5	
Approach LOS		A			C			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 8 (10%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 10.3		Intersection LOS: B	
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd



HCM 6th Edition methodology does not support Non-NEMA phasing.

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Del/Veh (s)	15.1	6.6	3.7	20.5	6.6	3.8	7.4

1101: Highland Rd (M-59) Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	4.4	8.9	5.2

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.5	0.1	0.2	2.9	0.3	0.3	0.0	0.0	0.0	0.3	0.3	2.6
Total Del/Veh (s)	22.6	15.4	3.8	20.5	16.4	4.0	18.9	9.1	1.7	13.6	12.4	1.7

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	11.5

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Movement	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.9	3.0	17.8	25.9	7.5	14.2

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.1	0.1	0.1	0.1	0.1	3.7	0.3	0.2	0.0	0.0	0.0
Total Del/Veh (s)	22.9	25.2	7.9	22.5	21.9	7.5	17.2	7.2	3.2	13.2	9.6	3.6

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	10.0

Total Zone Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	337.5

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	EB	NB	NB	SB	All
Movements Served	L	T	T	R	T	R	T	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	14.7	6.4	7.1	3.7	21.2	5.7	3.8	7.4

1101: Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	SB	All
Movements Served	T	T	T	L	
Denied Del/Veh (s)					0.0
Total Del/Veh (s)	4.7	4.2	4.1	8.9	5.2

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by lane

Lane	EB	EB	WB	WB	NB	NB	SB	SB	All
Movements Served	L	TR	L	TR	LT	R	LT	TR	
Denied Del/Veh (s)									0.6
Total Del/Veh (s)	22.3	7.8	18.9	10.1	9.5	1.6	13.3	7.4	11.5

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Lane	WB	WB	WB	NB	NB	SB	SB	All
Movements Served	T	T	R	T	T	T	R	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	12.9	10.9	1.7	18.9	16.5	26.2	7.0	14.2

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by lan

Lane	EB	WB	NB	NB	SB	SB	All
Movements Served	LTR	LTR	L	TR	L	TR	
Denied Del/Veh (s)							0.2
Total Del/Veh (s)	11.5	18.5	16.1	7.0	10.4	9.7	10.0

Total Zone Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	337.5

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0
Total Del/Veh (s)	6.9	14.4	3.8	7.4

1101: Highland Rd (M-59) Performance by approach

Approach	EB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	4.4	8.9	5.2

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.5	2.2	0.0	0.3	0.6
Total Del/Veh (s)	9.0	16.6	7.5	12.5	11.5

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

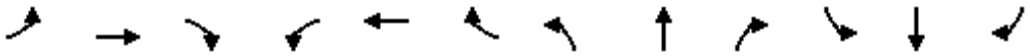
Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.3	17.8	18.9	14.2

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by ap

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.1	0.7	0.0	0.2
Total Del/Veh (s)	11.5	18.9	8.1	9.7	10.0

Total Zone Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	337.5



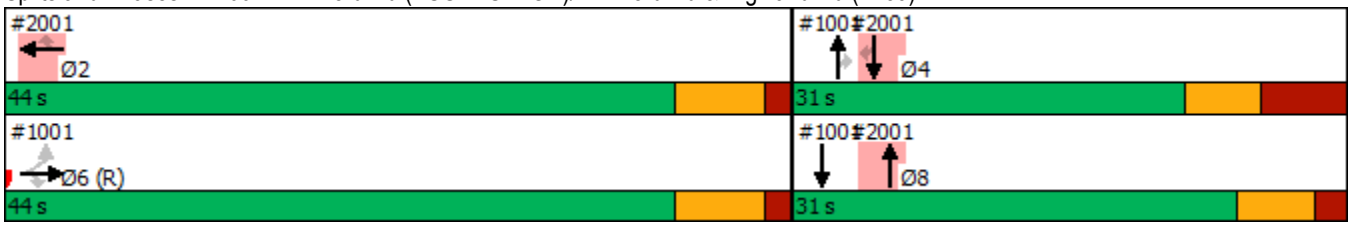
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	926	291	0	0	0	0	337	302	0	315	0
Future Volume (vph)	169	926	291	0	0	0	0	337	302	0	315	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	0		85	0		0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (ft)	160			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected	0.950											
Satd. Flow (prot)	1752	3505	1568	0	0	0	0	1863	1583	0	1863	0
Flt Permitted	0.950											
Satd. Flow (perm)	1752	3505	1568	0	0	0	0	1863	1583	0	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			235						81			
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		421			982			386			92	
Travel Time (s)		5.2			12.2			7.5			1.4	
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.86	0.86	0.86	0.81	0.81	0.81
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)					0							
Adj. Flow (vph)	178	975	306	0	0	0	0	392	351	0	389	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	975	306	0	0	0	0	392	351	0	389	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		12	15		9	15		9	15		9
Number of Detectors	0	0	0					1	1		0	
Detector Template												
Leading Detector (ft)	0	0	0					20	20		0	
Trailing Detector (ft)	0	0	0					0	0		0	
Detector 1 Position(ft)	0	0	0					0	0		0	
Detector 1 Size(ft)	20	6	20					20	20		6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Turn Type	Perm	NA	Perm					NA	Perm		NA	
Protected Phases		6						4			8	
Permitted Phases	6		6						4			
Detector Phase	6	6	6					4	4		8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					7.0	7.0		7.0	

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Parking (#/hr)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	36.6	36.6	36.6					18.0	18.0		15.0	
Total Split (s)	44.0	44.0	44.0					31.0	31.0		31.0	
Total Split (%)	58.7%	58.7%	58.7%					41.3%	41.3%		41.3%	
Maximum Green (s)	37.4	37.4	37.4					21.8	21.8		24.8	
Yellow Time (s)	5.0	5.0	5.0					4.3	4.3		4.3	
All-Red Time (s)	1.6	1.6	1.6					4.9	4.9		1.9	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	6.6	6.6	6.6					9.2	9.2		6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0		3.0	
Recall Mode	C-Max	C-Max	C-Max					Min	Min		Min	
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	23.0	23.0	23.0					15.0	15.0		15.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	
Act Effct Green (s)	39.3	39.3	39.3					19.9	19.9		22.9	
Actuated g/C Ratio	0.52	0.52	0.52					0.27	0.27		0.31	
v/c Ratio	0.19	0.53	0.33					0.80	0.73		0.68	
Control Delay	7.2	10.8	2.5					38.4	28.7		6.6	
Queue Delay	71.1	0.0	0.0					0.1	0.0		0.0	
Total Delay	78.3	10.8	2.5					38.5	28.7		6.6	
LOS	E	B	A					D	C		A	
Approach Delay		17.3						33.9			6.6	
Approach LOS		B						C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 20.4		Intersection LOS: C	
Intersection Capacity Utilization 121.8%		ICU Level of Service H	
Analysis Period (min) 15			

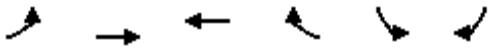
Splits and Phases: 1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59)



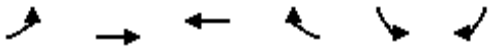
Lane Group	Ø2
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.



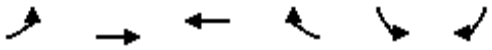
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1151	0	0	248	0
Future Volume (vph)	0	1151	0	0	248	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	0	5036	0	0	1736	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	5036	0	0	1736	0
Right Turn on Red				Yes	Yes	Yes
Satd. Flow (RTOR)					51	
Link Speed (mph)		55	55		25	
Link Distance (ft)		215	243		69	
Travel Time (s)		2.7	3.0		1.9	
Peak Hour Factor	0.95	0.95	0.94	0.94	0.88	0.88
Heavy Vehicles (%)	3%	3%	2%	2%	4%	4%
Adj. Flow (vph)	0	1212	0	0	282	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1212	0	0	282	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		0			1	
Detector Template						
Leading Detector (ft)		0			20	
Trailing Detector (ft)		0			0	
Detector 1 Position(ft)		0			0	
Detector 1 Size(ft)		6			20	
Detector 1 Type		Cl+Ex			Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)		0.0			0.0	
Detector 1 Queue (s)		0.0			0.0	
Detector 1 Delay (s)		0.0			5.0	
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Detector Phase		2			4	
Switch Phase						
Minimum Initial (s)		10.0			7.0	
Minimum Split (s)		16.1			12.0	
Total Split (s)		46.0			29.0	
Total Split (%)		61.3%			38.7%	
Maximum Green (s)		39.9			24.0	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Yellow Time (s)		5.0			3.0	
All-Red Time (s)		1.1			2.0	
Lost Time Adjust (s)		0.0			0.0	
Total Lost Time (s)		6.1			5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		0.2			3.0	
Recall Mode		C-Max			Min	
Act Effct Green (s)		48.4			15.5	
Actuated g/C Ratio		0.65			0.21	
v/c Ratio		0.37			0.71	
Control Delay		7.3			23.8	
Queue Delay		0.0			0.0	
Total Delay		7.3			23.8	
LOS		A			C	
Approach Delay		7.3			23.8	
Approach LOS		A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 67 (89%), Referenced to phase 2:EBT, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 10.4		Intersection LOS: B	
Intersection Capacity Utilization 56.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1101: Highland Rd (M-59)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰	
Traffic Volume (veh/h)	0	1151	0	0	248	0
Future Volume (veh/h)	0	1151	0	0	248	0
Initial Q (Qb), veh	0	0			0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00
Parking Bus, Adj	1.00	1.00			1.00	1.00
Work Zone On Approach		No			No	
Adj Sat Flow, veh/h/ln	0	1856			1841	0
Adj Flow Rate, veh/h	0	1212			282	0
Peak Hour Factor	0.95	0.95			0.88	0.88
Percent Heavy Veh, %	0	3			4	0
Cap, veh/h	0	4654			0	0
Arrive On Green	0.00	0.92			0.00	0.00
Sat Flow, veh/h	0	5400			0	
Grp Volume(v), veh/h	0	1212			0.0	
Grp Sat Flow(s),veh/h/ln	0	1689				
Q Serve(g_s), s	0.0	1.9				
Cycle Q Clear(g_c), s	0.0	1.9				
Prop In Lane	0.00					
Lane Grp Cap(c), veh/h	0	4654				
V/C Ratio(X)	0.00	0.26				
Avail Cap(c_a), veh/h	0	4654				
HCM Platoon Ratio	1.00	1.00				
Upstream Filter(I)	0.00	1.00				
Uniform Delay (d), s/veh	0.0	0.3				
Incr Delay (d2), s/veh	0.0	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0				
%ile BackOfQ(50%),veh/ln	0.0	0.1				
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.5				
LnGrp LOS	A	A				
Approach Vol, veh/h		1212				
Approach Delay, s/veh		0.5				
Approach LOS		A				
Timer - Assigned Phs		2				
Phs Duration (G+Y+Rc), s		75.0				
Change Period (Y+Rc), s		* 6.1				
Max Green Setting (Gmax), s		* 40				
Max Q Clear Time (g_c+I1), s		0.0				
Green Ext Time (p_c), s		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	0.5
HCM 6th LOS	A

Notes

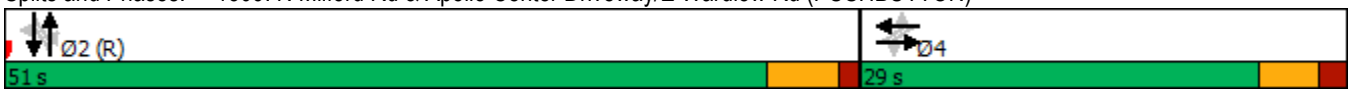
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	10	11	139	7	66	1	425	179	49	325	1
Future Volume (vph)	2	10	11	139	7	66	1	425	179	49	325	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	135		0	95		0	0		0	0		130
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor		0.99		1.00				1.00			1.00	
Frt		0.923			0.864				0.850			
Flt Protected	0.950			0.950							0.993	
Satd. Flow (prot)	1805	1739	0	1787	1625	0	0	1863	1583	0	3480	0
Flt Permitted	0.701			0.736							0.839	
Satd. Flow (perm)	1332	1739	0	1380	1625	0	0	1863	1583	0	2940	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			78				213			
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		458			1556			241			1268	
Travel Time (s)		12.5			30.3			3.7			19.2	
Confl. Peds. (#/hr)			4	4			1					1
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.64	0.64	0.64	0.85	0.85	0.85	0.84	0.85	0.84	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	2%	2%	2%	3%	3%	3%
Adj. Flow (vph)	3	16	17	164	8	78	1	500	213	56	369	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	33	0	164	86	0	0	501	213	0	426	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0	0	1	0	
Detector Template							Left			Left		
Leading Detector (ft)	20	20		20	20		20	0	0	20	0	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	20		20	20		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		4	4		2	2	2	2	2	

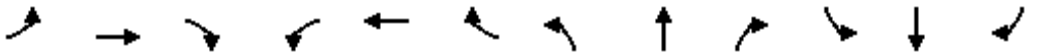
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		39.0	39.0	39.0	39.0	39.0	
Total Split (s)	29.0	29.0		29.0	29.0		51.0	51.0	51.0	51.0	51.0	
Total Split (%)	36.3%	36.3%		36.3%	36.3%		63.8%	63.8%	63.8%	63.8%	63.8%	
Maximum Green (s)	23.6	23.6		23.6	23.6		45.3	45.3	45.3	45.3	45.3	
Yellow Time (s)	3.6	3.6		3.6	3.6		4.3	4.3	4.3	4.3	4.3	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.4	1.4	1.4	1.4	1.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	5.4	5.4		5.4	5.4			5.7	5.7		5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		26.0	26.0	26.0	26.0	26.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)	23.6	23.6		23.6	23.6			45.3	45.3		45.3	
Actuated g/C Ratio	0.30	0.30		0.30	0.30			0.57	0.57		0.57	
v/c Ratio	0.01	0.06		0.40	0.16			0.48	0.22		0.26	
Control Delay	20.0	13.5		26.2	7.3			12.2	1.9		9.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	20.0	13.5		26.2	7.3			12.2	1.9		9.3	
LOS	B	B		C	A			B	A		A	
Approach Delay		14.0			19.7			9.1			9.3	
Approach LOS		B			B			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 69 (86%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 11.1		Intersection LOS: B	
Intersection Capacity Utilization 78.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON)



HCM 6th Edition methodology does not support Non-NEMA phasing.



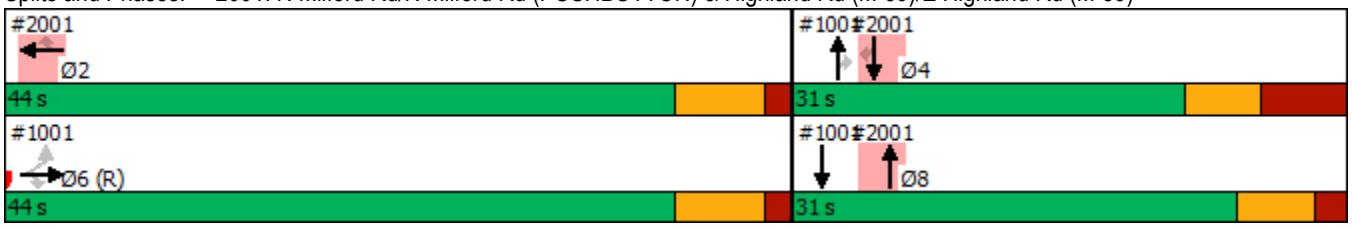
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1341	129	0	508	0	0	310	221
Future Volume (vph)	0	0	0	0	1341	129	0	508	0	0	310	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		230	0		0	0		285
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor												0.99
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3539	1583	0	3505	0	0	1845	1568
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3539	1583	0	3505	0	0	1845	1545
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						102						52
Link Speed (mph)		55			55			35			45	
Link Distance (ft)		660			975			92			492	
Travel Time (s)		8.2			12.1			1.8			7.5	
Confl. Peds. (#/hr)												2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	0	0	0	0	1458	140	0	591	0	0	360	257
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1458	140	0	591	0	0	360	257
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					0	0		0			1	1
Detector Template												
Leading Detector (ft)					0	0		0			20	20
Trailing Detector (ft)					0	0		0			0	0
Detector 1 Position(ft)					0	0		0			0	0
Detector 1 Size(ft)					6	20		6			20	20
Detector 1 Type					Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Queue (s)					0.0	0.0		0.0			0.0	0.0
Detector 1 Delay (s)					0.0	0.0		0.0			0.0	0.0
Turn Type					NA	Perm		NA			NA	Perm
Protected Phases					2			8			4	
Permitted Phases						2						4
Detector Phase					2	2		8			4	4

Lane Group	Ø6
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)					10.0	10.0		7.0			7.0	7.0
Minimum Split (s)					36.6	36.6		15.0			18.0	18.0
Total Split (s)					44.0	44.0		31.0			31.0	31.0
Total Split (%)					58.7%	58.7%		41.3%			41.3%	41.3%
Maximum Green (s)					37.4	37.4		24.8			21.8	21.8
Yellow Time (s)					5.0	5.0		4.3			4.3	4.3
All-Red Time (s)					1.6	1.6		1.9			4.9	4.9
Lost Time Adjust (s)					0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)					6.6	6.6		6.2			9.2	9.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0		3.0			3.0	3.0
Recall Mode					Max	Max		Min			Min	Min
Walk Time (s)					7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)					23.0	23.0		15.0			15.0	15.0
Pedestrian Calls (#/hr)					0	0		0			0	0
Act Effct Green (s)					39.3	39.3		22.9			19.9	19.9
Actuated g/C Ratio					0.52	0.52		0.31			0.27	0.27
v/c Ratio					0.79	0.16		0.55			0.74	0.57
Control Delay					19.0	4.2		13.5			34.6	23.9
Queue Delay					0.0	0.0		0.0			0.0	0.0
Total Delay					19.0	4.2		13.5			34.6	23.9
LOS					B	A		B			C	C
Approach Delay					17.7			13.5			30.2	
Approach LOS					B			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 19.6		Intersection LOS: B	
Intersection Capacity Utilization 121.1%		ICU Level of Service H	
Analysis Period (min) 15			

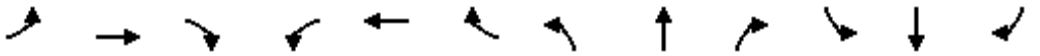
Splits and Phases: 2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59)



Lane Group	Ø6
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	36.6
Total Split (s)	44.0
Total Split (%)	59%
Maximum Green (s)	37.4
Yellow Time (s)	5.0
All-Red Time (s)	1.6
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	C-Max
Walk Time (s)	7.0
Flash Dont Walk (s)	23.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

HCM 6th Edition methodology does not support clustered intersections.

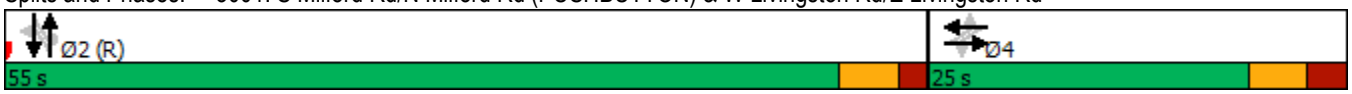


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	26	119	50	26	27	100	579	33	22	544	20
Future Volume (vph)	13	26	119	50	26	27	100	579	33	22	544	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	75		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			1.00		1.00		
Frt		0.898			0.964			0.992			0.995	
Flt Protected		0.996			0.976		0.950			0.950		
Satd. Flow (prot)	0	1650	0	0	1645	0	1787	1864	0	1752	1835	0
Flt Permitted		0.970			0.714		0.338			0.305		
Satd. Flow (perm)	0	1606	0	0	1203	0	636	1864	0	562	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		151			21			7			4	
Link Speed (mph)		35			35			45			35	
Link Distance (ft)		1319			1267			1270			959	
Travel Time (s)		25.7			24.7			19.2			18.7	
Confl. Peds. (#/hr)	2					2			2	2		
Peak Hour Factor	0.79	0.79	0.79	0.78	0.78	0.78	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	1%	1%	1%	3%	3%	3%
Adj. Flow (vph)	16	33	151	64	33	35	110	636	36	24	598	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	200	0	0	132	0	110	672	0	24	620	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Minimum Split (s)	25.0	25.0		25.0	25.0		54.4	54.4		54.4	54.4	
Total Split (s)	25.0	25.0		25.0	25.0		55.0	55.0		55.0	55.0	
Total Split (%)	31.3%	31.3%		31.3%	31.3%		68.8%	68.8%		68.8%	68.8%	
Maximum Green (s)	19.0	19.0		19.0	19.0		49.6	49.6		49.6	49.6	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.5	2.5		2.5	2.5		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	6.0	6.0		6.0	6.0		37.0	37.0		37.0	37.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		19.0			19.0		49.6	49.6		49.6	49.6	
Actuated g/C Ratio		0.24			0.24		0.62	0.62		0.62	0.62	
v/c Ratio		0.40			0.44		0.28	0.58		0.07	0.54	
Control Delay		10.6			27.1		9.3	11.4		6.7	10.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		10.6			27.1		9.3	11.4		6.7	10.9	
LOS		B			C		A	B		A	B	
Approach Delay		10.6			27.1			11.1			10.7	
Approach LOS		B			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 19 (24%), Referenced to phase 2:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 12.1		Intersection LOS: B	
Intersection Capacity Utilization 83.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd



HCM 6th Edition methodology does not support Non-NEMA phasing.

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.6	0.8	0.2	0.2
Total Del/Veh (s)	40.5	8.7	3.6	27.7	16.4	3.6	13.5

1101: Highland Rd (M-59) Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	5.2	7.3	5.5

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.5	0.1	0.1	2.7	0.4	0.4	0.0	0.1	0.0	0.3	0.3	4.2
Total Del/Veh (s)	16.5	22.2	3.9	34.7	29.9	7.8	1.0	8.3	2.0	18.8	12.1	1.8

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	12.0

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Movement	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	15.5	6.2	11.6	24.0	8.2	14.7

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.2	0.2	0.2	0.1	0.1	3.0	0.8	0.8	0.1	0.0	0.0
Total Del/Veh (s)	23.9	26.6	11.9	27.4	22.8	15.4	20.9	12.0	7.9	21.3	9.9	7.9

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	12.8

Total Zone Performance

Denied Del/Veh (s)	1.2
Total Del/Veh (s)	680.9

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	EB	NB	NB	SB	All
Movements Served	L	T	T	R	T	R	T	
Denied Del/Veh (s)								0.2
Total Del/Veh (s)	39.6	8.8	9.0	3.5	32.4	10.8	3.6	13.5

1101: Highland Rd (M-59) Performance by lane

Lane	EB	EB	EB	SB	All
Movements Served	T	T	T	L	
Denied Del/Veh (s)					0.0
Total Del/Veh (s)	5.6	4.5	4.7	7.3	5.5

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by lane

Lane	EB	EB	WB	WB	NB	NB	SB	SB	All
Movements Served	L	TR	L	TR	LT	R	LT	TR	
Denied Del/Veh (s)									0.5
Total Del/Veh (s)	16.3	12.4	32.1	15.4	8.4	2.0	13.8	7.4	12.0

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Lane	WB	WB	WB	NB	NB	SB	SB	All
Movements Served	T	T	R	T	T	T	R	
Denied Del/Veh (s)								0.0
Total Del/Veh (s)	16.9	14.4	3.7	12.3	10.8	24.3	7.7	14.7

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by lan

Lane	EB	WB	NB	NB	SB	SB	All
Movements Served	LTR	LTR	L	TR	L	TR	
Denied Del/Veh (s)							0.5
Total Del/Veh (s)	14.9	22.8	17.9	12.3	18.1	10.0	12.8

Total Zone Performance

Denied Del/Veh (s)	1.2
Total Del/Veh (s)	680.9

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by approach

Approach	EB	NB	SB	All
Denied Del/Veh (s)	0.0	0.7	0.2	0.2
Total Del/Veh (s)	11.4	22.6	3.6	13.5

1101: Highland Rd (M-59) Performance by approach

Approach	EB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	5.2	7.3	5.5

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	1.9	0.1	0.3	0.5
Total Del/Veh (s)	12.0	26.3	6.5	12.9	12.0

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Approach	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0
Total Del/Veh (s)	14.7	11.6	17.8	14.7

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by ap

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.2	1.1	0.0	0.5
Total Del/Veh (s)	14.9	23.0	13.0	10.3	12.8

Total Zone Performance

Denied Del/Veh (s)	1.2
Total Del/Veh (s)	680.9

Appendix F – ITE Land Use Codes and Estimation Tool

Fast-Food Restaurant with Drive-Through Window and No Indoor Seating (935)

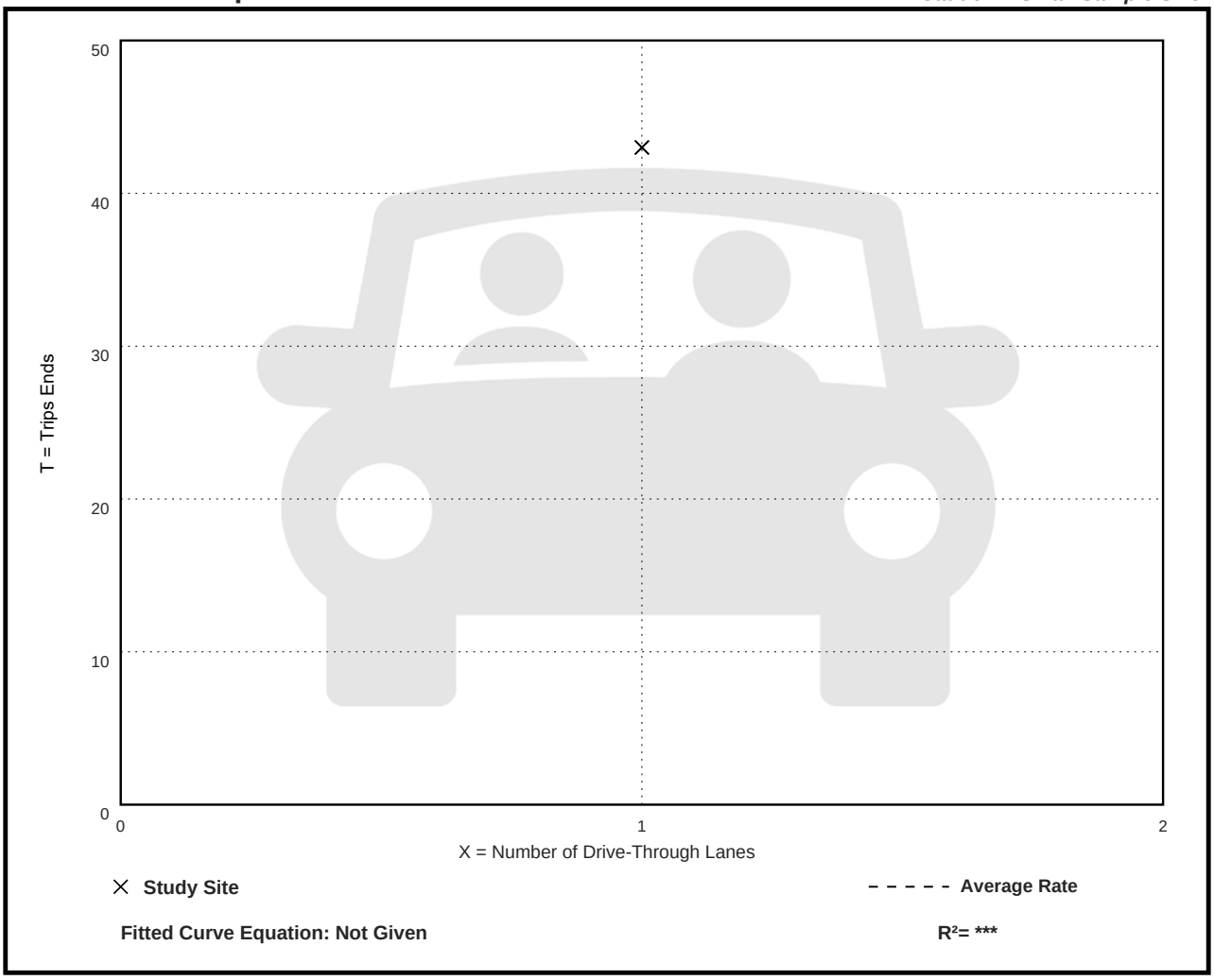
Vehicle Trip Ends vs: Drive-Through Lanes
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Drive-Through Lanes: 1
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per Drive-Through Lane

Average Rate	Range of Rates	Standard Deviation
43.00	43.00 - 43.00	***

Data Plot and Equation

Caution – Small Sample Size



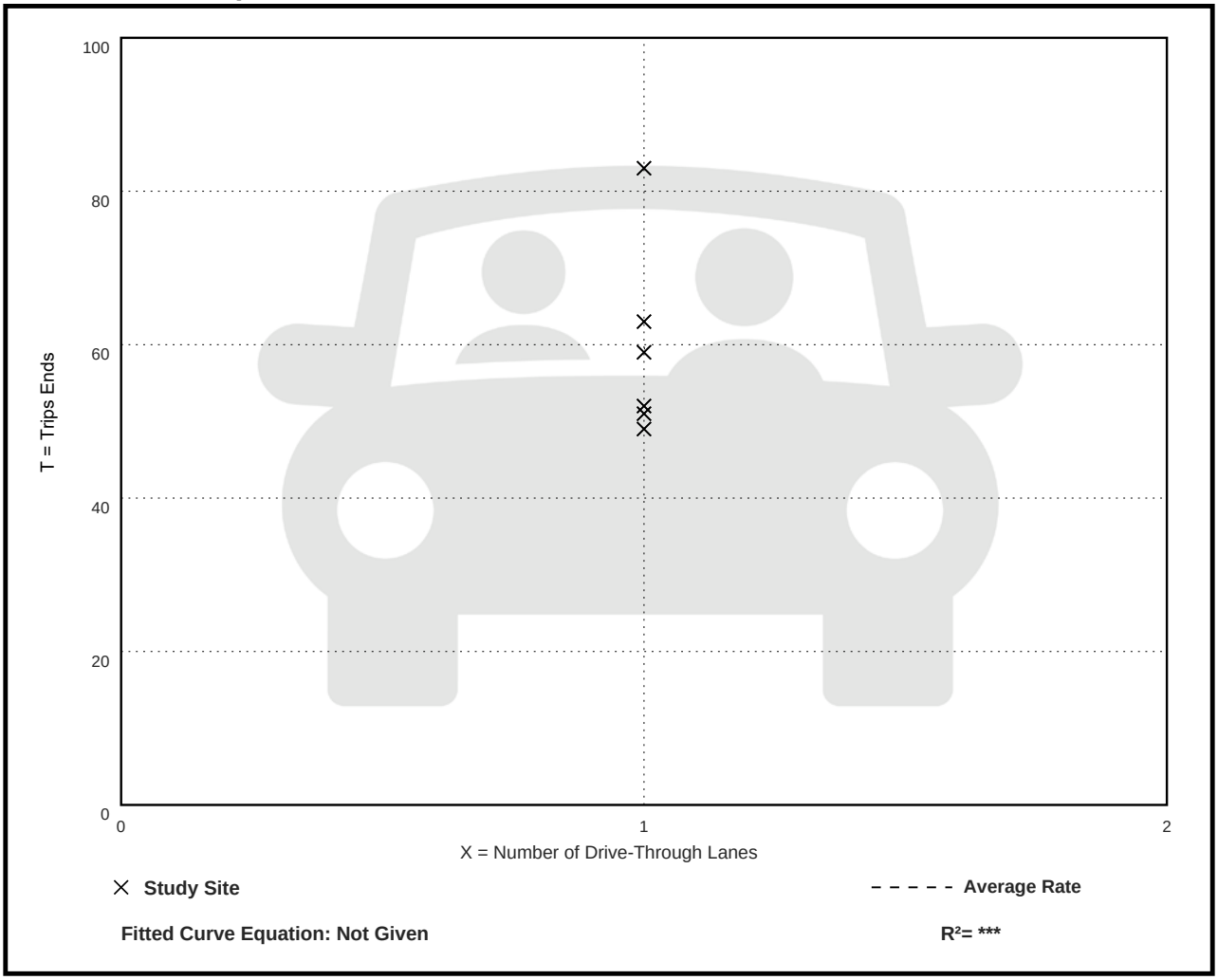
Fast-Food Restaurant with Drive-Through Window and No Indoor Seating (935)

Vehicle Trip Ends vs: Drive-Through Lanes
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. Num. of Drive-Through Lanes: 1
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per Drive-Through Lane

Average Rate	Range of Rates	Standard Deviation
59.50	49.00 - 83.00	12.68

Data Plot and Equation



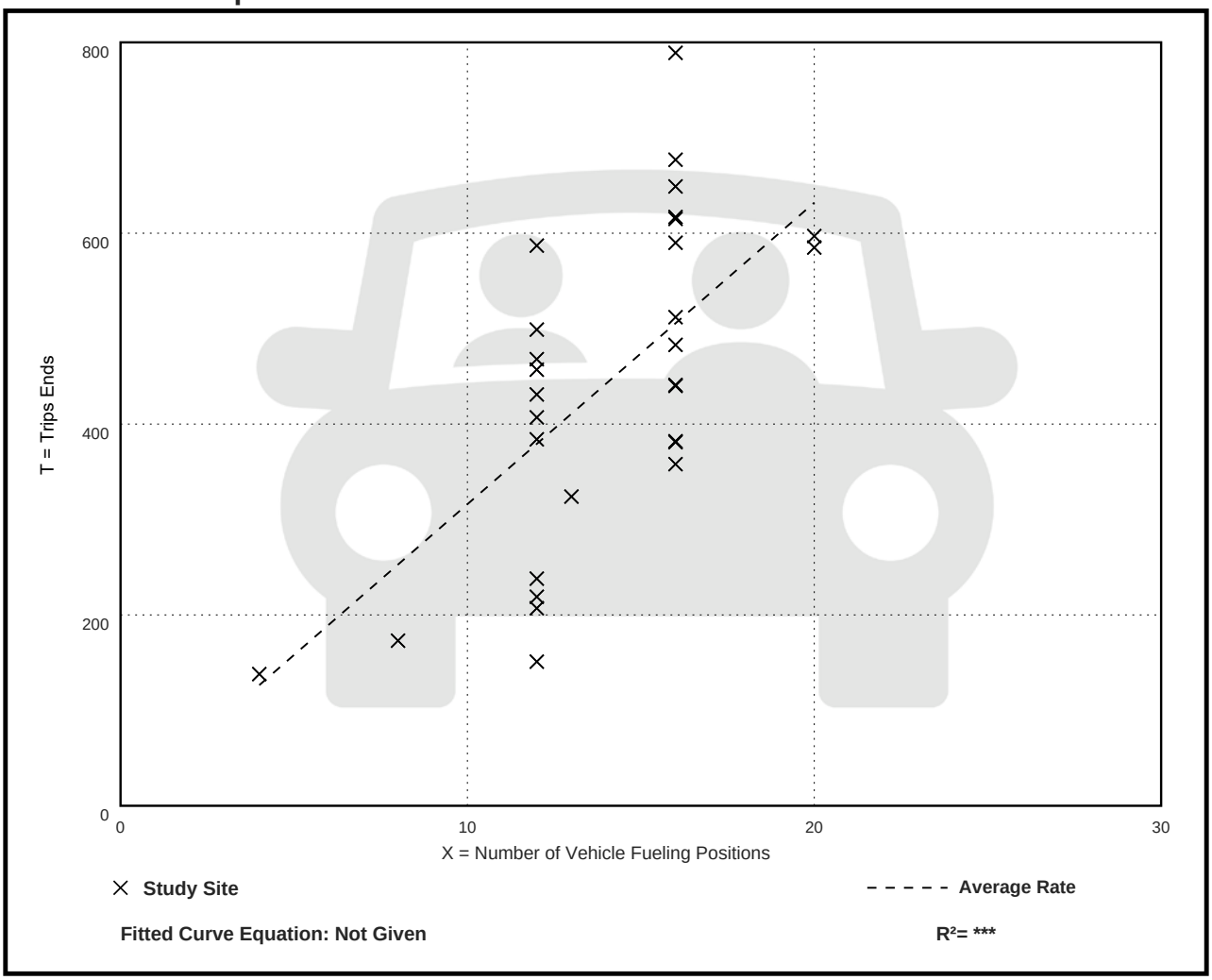
Convenience Store/Gas Station - GFA (5.5-10k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 29
Avg. Num. of Vehicle Fueling Positions: 14
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
31.60	12.58 - 49.31	9.10

Data Plot and Equation



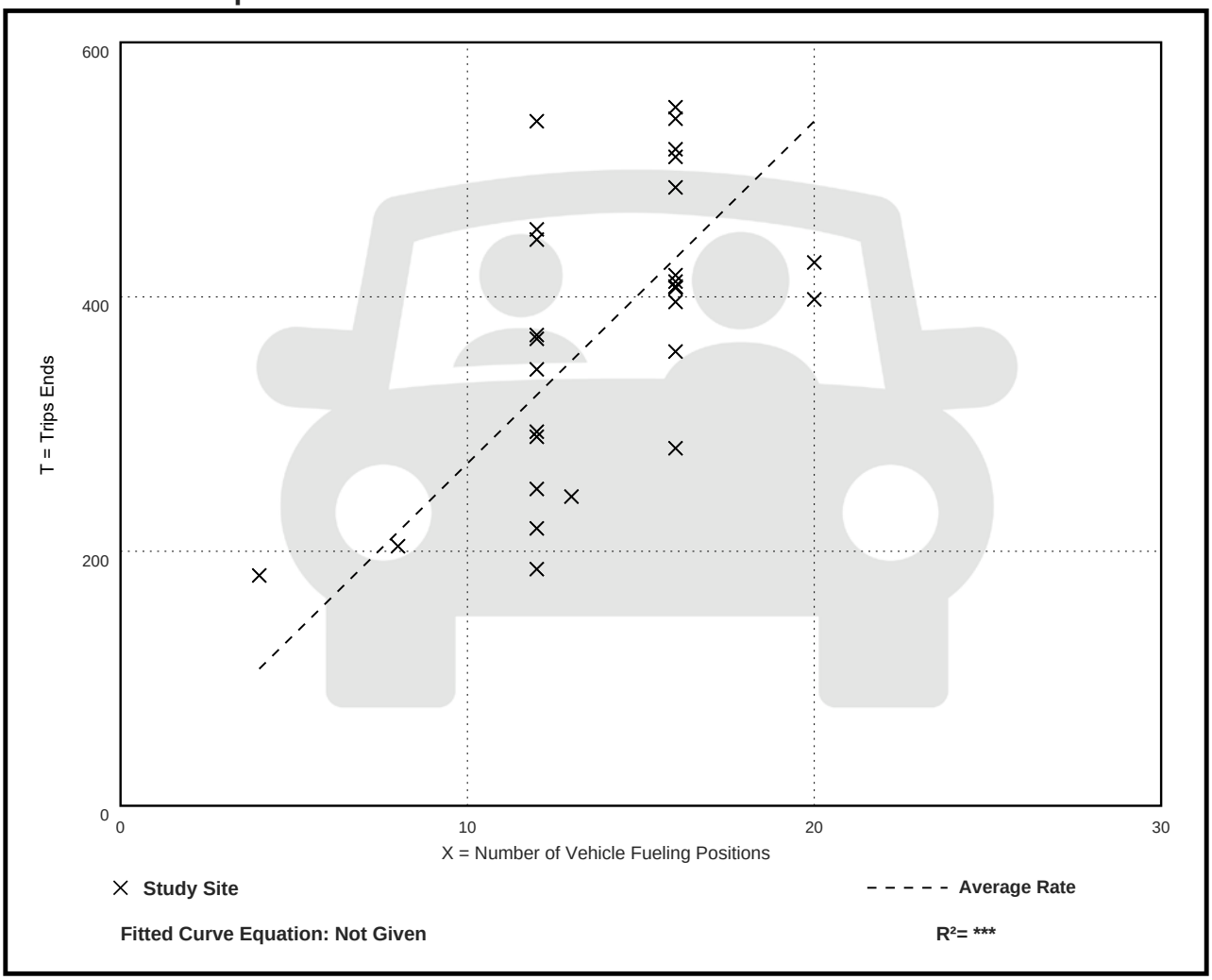
Convenience Store/Gas Station - GFA (5.5-10k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 29
Avg. Num. of Vehicle Fueling Positions: 14
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
26.90	15.50 - 45.25	6.87

Data Plot and Equation



Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 11th Edition

Land Use Code	934
Land Use	Fast-Food Restaurant with Drive-Through Window
Setting	General Urban/Suburban
Time Period	Weekday AM Peak Period
# Data Sites	5
Average Pass-By Rate	50%

Pass-By Characteristics for Individual Sites

GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
1.4	Kentucky	1993	—	62	22	16	38	1407	2
3	Kentucky	1993	—	43	14	43	57	2903	2
3.3	--	1996	—	68	—	—	32	—	21
3.6	Kentucky	1993	—	32	47	21	68	437	2
4.2	Indiana	1993	—	46	23	31	54	1049	2

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 11th Edition

Land Use Code	934
Land Use	Fast-Food Restaurant with Drive-Through Window
Setting	General Urban/Suburban
Time Period	Weekday PM Peak Period
# Data Sites	11
Average Pass-By Rate	55%

Pass-By Characteristics for Individual Sites

GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
1.3	Kentucky	1993	—	68	22	10	32	2055	2
1.9	Kentucky	1993	33	67	24	9	33	2447	2
2.8	Florida	1995	47	66	—	—	34	—	30
2.9	Florida	1996	271	41	41	18	59	—	30
3	Kentucky	1993	—	31	31	38	69	4250	2
3.1	Florida	1995	28	71	—	—	29	—	30
3.1	Florida	1996	29	38	—	—	62	—	30
3.2	Florida	1996	202	40	39	21	60	—	30
3.3	—	1996	—	62	—	—	38	—	21
4.2	Indiana	1993	—	56	25	19	44	1632	2
4.3	Florida	1994	304	62	—	—	38	—	30

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	945									
Land Use	Convenience Store/Gas Station									
Setting	General Urban/Suburban									
Time Period	Weekday AM Peak Period									
# Data Sites	16 Sites with between 2 and 8 VFP					28 Sites with between 9 and 20 VFP				
Average Pass-By Rate	60% for Sites with between 2 and 8 VFP					76% for Sites with between 9 and 20 VFP				
	Pass-By Characteristics for Individual Sites									
			Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
GFA (000)	VFP	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
2	8	Maryland	1992	46	87	13	0	13	2235	25
2.1	6	Maryland	1992	26	58	23	19	42	2080	25
2.1	6	Maryland	1992	26	58	23	19	42	2080	25
2.2	8	Maryland	1992	31	47	34	19	53	1785	25
2.2	< 8	Indiana	1993	79	56	6	38	44	635	2
2.2	8	Maryland	1992	35	78	9	13	22	7080	25
2.3	6	Maryland	1992	37	32	41	27	68	2080	25
2.3	< 8	Kentucky	1993	58	64	5	31	36	1255	2
2.3	6	Maryland	1992	37	32	41	27	68	2080	25
2.4	< 8	Kentucky	1993	—	48	17	35	52	1210	2
2.6	< 8	Kentucky	1993	—	72	15	13	28	940	2
2.8	< 8	Kentucky	1993	—	54	11	35	46	1240	2
3	< 8	Indiana	1993	62	74	10	16	26	790	2
3.6	< 8	Kentucky	1993	49	67	4	29	33	1985	2
3.7	< 8	Kentucky	1993	49	66	16	18	34	990	2
4.694	12	Maryland	2000	—	72	—	—	28	2440	30
4.694	12	Maryland	2000	—	78	—	—	22	1561	30
4.694	12	Maryland	2000	—	79	—	—	21	2764	30
4.848	12	Virginia	2000	—	55	—	—	45	1398	30
5.06	12	Pennsylvania	2000	—	84	—	—	16	3219	30
5.242	12	Virginia	2000	—	74	—	—	26	1160	30
5.242	12	Virginia	2000	—	71	—	—	29	548	30
5.488	12	Delaware	2000	—	80	—	—	20	—	30
5.5	12	Pennsylvania	2000	—	85	—	—	15	2975	30
4.2	< 8	Kentucky	1993	47	62	19	19	38	1705	2
4.694	16	Maryland	2000	—	90	—	—	10	2278	30
4.694	16	Delaware	2000	—	74	—	—	26	2185	30
4.694	16	Delaware	2000	—	58	—	—	42	962	30
4.694	16	Delaware	2000	—	84	—	—	16	2956	30
4.694	16	New Jersey	2000	—	79	—	—	21	1859	30
4.694	20	Delaware	2000	—	84	—	—	16	3864	30
4.848	16	Virginia	2000	—	68	—	—	32	2106	30
4.848	16	Virginia	2000	—	85	—	—	15	2676	30
4.848	16	Virginia	2000	—	75	—	—	25	3244	30
4.848	16	Virginia	2000	—	71	—	—	29	1663	30
4.993	16	Pennsylvania	2000	—	75	—	—	25	1991	30
5.094	16	New Jersey	2000	—	86	—	—	14	1260	30
5.5	16	Pennsylvania	2000	—	82	—	—	18	1570	30
5.543	16	Pennsylvania	2000	—	84	—	—	16	1933	30
5.565	16	Pennsylvania	2000	—	77	—	—	23	2262	30
5.565	16	Pennsylvania	2000	—	68	—	—	32	2854	30
5.565	16	New Jersey	2000	—	58	—	—	42	1253	30
5.565	16	New Jersey	2000	—	79	—	—	21	1928	30
5.565	16	New Jersey	2000	---	84	---	---	16	1953	30

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	945									
Land Use	Convenience Store/Gas Station									
Setting	General Urban/Suburban									
Time Period	Weekday PM Peak Period									
# Data Sites	12 Sites with between 2 and 8 VFP					28 Sites with between 9 and 20 VFP				
Average Pass-By Rate	56% for Sites with between 2 and 8 VFP					75% for Sites with between 9 and 20 VFP				
	Pass-By Characteristics for Individual Sites									
			Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
GFA (000)	VFP	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
2.1	8	Maryland	1992	31	52	13	35	48	1785	25
2.1	6	Maryland	1992	30	53	20	27	47	1060	25
2.2	< 8	Indiana	1993	115	48	16	36	52	820	2
2.3	< 8	Kentucky	1993	67	57	16	27	43	1954	2
2.3	6	Maryland	1992	55	40	11	49	60	2760	25
2.4	< 8	Kentucky	1993	—	58	13	29	42	2655	2
2.6	< 8	Kentucky	1993	68	67	15	18	33	950	2
2.8	< 8	Kentucky	1993	—	62	11	27	38	2875	2
3	< 8	Indiana	1993	80	65	15	20	35	1165	2
3.6	< 8	Kentucky	1993	60	56	17	27	44	2505	2
3.7	< 8	Kentucky	1993	70	61	16	23	39	2175	2
4.2	< 8	Kentucky	1993	61	58	26	16	42	2300	2
4.694	12	Maryland	2000	—	78	—	—	22	3549	30
4.694	12	Maryland	2000	—	67	—	—	33	2272	30
4.694	12	Maryland	2000	—	66	—	—	34	3514	30
4.848	12	Virginia	2000	—	71	—	—	29	2350	30
5.06	12	Pennsylvania	2000	—	91	—	—	9	4181	30
5.242	12	Virginia	2000	—	70	—	—	30	2445	30
5.242	12	Virginia	2000	—	56	—	—	44	950	30
5.488	12	Delaware	2000	—	73	—	—	27	—	30
5.5	12	Pennsylvania	2000	—	84	—	—	16	4025	30
4.694	16	Maryland	2000	—	89	—	—	11	2755	30
4.694	16	Delaware	2000	—	73	—	—	27	1858	30
4.694	16	Delaware	2000	—	59	—	—	41	1344	30
4.694	16	Delaware	2000	—	72	—	—	28	3434	30
4.694	16	New Jersey	2000	—	81	—	—	19	1734	30
4.694	20	Delaware	2000	—	76	—	—	24	1616	30
4.848	16	Virginia	2000	—	67	—	—	33	2.954	30
4.848	16	Virginia	2000	—	78	—	—	22	3086	30
4.848	16	Virginia	2000	—	83	—	—	17	4143	30
4.848	16	Virginia	2000	—	73	—	—	27	2534	30
4.993	16	Pennsylvania	2000	—	72	—	—	28	2917	30
5.094	16	New Jersey	2000	—	86	—	—	14	1730	30
5.5	16	Pennsylvania	2000	—	90	—	—	10	2616	30
5.543	16	Pennsylvania	2000	—	87	—	—	13	2363	30
5.565	16	Pennsylvania	2000	—	81	—	—	19	2770	30
5.565	16	Pennsylvania	2000	—	76	—	—	24	3362	30
5.565	16	New Jersey	2000	—	61	—	—	39	1713	30
5.565	16	New Jersey	2000	—	86	—	—	14	1721	30
5.565	16	New Jersey	2000	---	81	---	---	19	2227	30

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:		**Organization:**	
Project Location:		**Performed By:**	
Scenario Description:		**Date:**	
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	LUC - 945			442	221	221
Restaurant	LUC - 935			43	20	23
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
Total				485	241	244

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		10	0	0	0
Restaurant	0	3		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	485	241	244
Internal Capture Percentage	5%	5%	5%
External Vehicle-Trips[3]	459	228	231
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	1%	5%
Restaurant	50%	13%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:		**Organization:**	
Project Location:		**Performed By:**	
Scenario Description:		**Date:**	
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	LUC - 945			378	189	189
Restaurant	LUC - 935			60	31	29
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
Total				438	220	218

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		9	0	0	0
Restaurant	0	12		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	438	220	218
Internal Capture Percentage	10%	10%	10%
External Vehicle-Trips[3]	396	199	197
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	6%	5%
Restaurant	29%	41%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

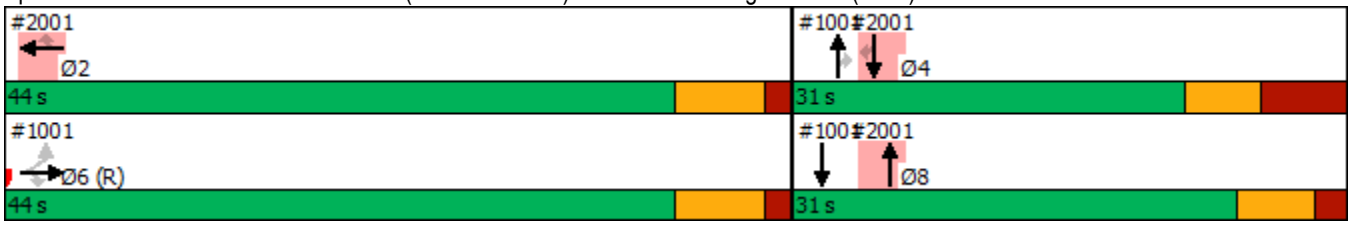
Estimation Tool Developed by the Texas Transportation Institute

Appendix G – 2026 Project Conditions Synchro Analysis Reports

Lane Group	EBL	EBT	EBR	NBT	NBR	SBT	Ø2
Lane Configurations							
Traffic Volume (vph)	129	745	234	136	180	317	
Future Volume (vph)	129	745	234	136	180	317	
Turn Type	Perm	NA	Perm	NA	Perm	NA	
Protected Phases		6		4		8	2
Permitted Phases	6		6		4		
Detector Phase	6	6	6	4	4	8	
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	7.0	7.0	10.0
Minimum Split (s)	36.6	36.6	36.6	18.0	18.0	15.0	36.6
Total Split (s)	44.0	44.0	44.0	31.0	31.0	31.0	44.0
Total Split (%)	58.7%	58.7%	58.7%	41.3%	41.3%	41.3%	59%
Yellow Time (s)	5.0	5.0	5.0	4.3	4.3	4.3	5.0
All-Red Time (s)	1.6	1.6	1.6	4.9	4.9	1.9	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	9.2	9.2	6.2	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Max
Act Effct Green (s)	39.8	39.8	39.8	19.4	19.4	22.4	
Actuated g/C Ratio	0.53	0.53	0.53	0.26	0.26	0.30	
v/c Ratio	0.15	0.44	0.27	0.35	0.43	0.67	
Control Delay	7.3	10.0	2.0	24.1	11.9	4.6	
Queue Delay	1.9	0.0	0.0	0.0	0.0	0.0	
Total Delay	9.2	10.0	2.0	24.1	11.9	4.6	
LOS	A	A	A	C	B	A	
Approach Delay		8.2		17.2		4.6	
Approach LOS		A		B		A	

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 105.0%	ICU Level of Service G
Analysis Period (min) 15	

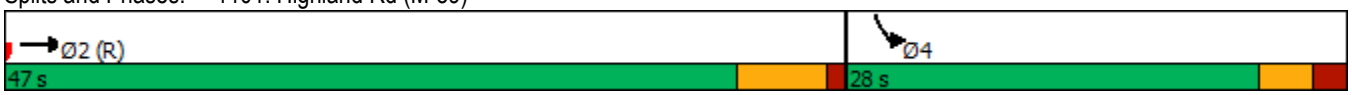
Splits and Phases: 1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59)



Lane Group	EBT	SBL
Lane Configurations		
Traffic Volume (vph)	1017	225
Future Volume (vph)	1017	225
Turn Type	NA	Prot
Protected Phases	2	4
Permitted Phases		
Detector Phase	2	4
Switch Phase		
Minimum Initial (s)	10.0	7.0
Minimum Split (s)	16.1	12.0
Total Split (s)	47.0	28.0
Total Split (%)	62.7%	37.3%
Yellow Time (s)	5.0	3.0
All-Red Time (s)	1.1	2.0
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.1	5.0
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	C-Max	Min
Act Effct Green (s)	50.9	13.0
Actuated g/C Ratio	0.68	0.17
v/c Ratio	0.34	0.68
Control Delay	5.9	24.0
Queue Delay	0.0	0.0
Total Delay	5.9	24.0
LOS	A	C
Approach Delay	5.9	24.0
Approach LOS	A	C

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 67 (89%), Referenced to phase 2:EBT, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 50.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1101: Highland Rd (M-59)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	13	119	4	5	188	66	49	326
Future Volume (vph)	6	13	119	4	5	188	66	49	326
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		4		2			2
Permitted Phases	4		4		2		2	2	
Detector Phase	4	4	4	4	2	2	2	2	2
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	14.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	33.0	33.0	33.0	33.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	41.3%	41.3%	41.3%	41.3%	58.8%	58.8%	58.8%	58.8%	58.8%
Yellow Time (s)	3.6	3.6	3.6	3.6	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	1.8	1.8	1.8	1.8	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	5.4	5.4	5.4	5.4		5.7	5.7		5.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	27.6	27.6	27.6	27.6		41.3	41.3		41.3
Actuated g/C Ratio	0.34	0.34	0.34	0.34		0.52	0.52		0.52
v/c Ratio	0.02	0.14	0.33	0.09		0.24	0.09		0.26
Control Delay	17.7	8.6	21.9	7.1		11.6	3.0		11.4
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	17.7	8.6	21.9	7.1		11.6	3.0		11.4
LOS	B	A	C	A		B	A		B
Approach Delay		9.7		18.1		9.4			11.4
Approach LOS		A		B		A			B

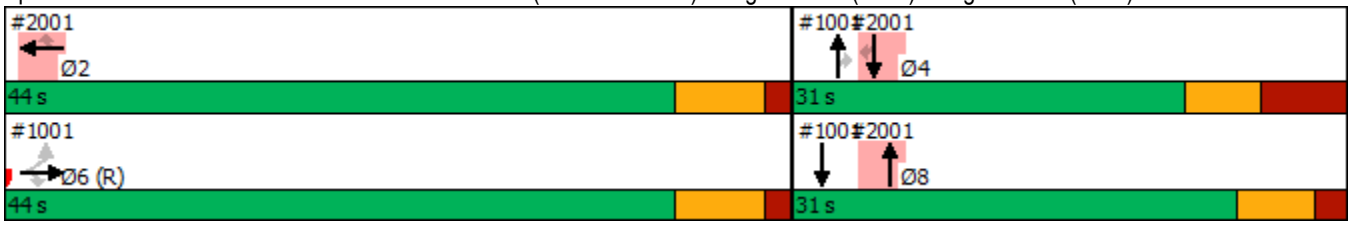
Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 56 (70%), Referenced to phase 2:NBSB, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.33	
Intersection Signal Delay: 12.0	Intersection LOS: B
Intersection Capacity Utilization 47.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON)

Lane Group	WBT	WBR	NBT	SBT	SBR	Ø6
Lane Configurations						
Traffic Volume (vph)	1176	77	262	317	192	
Future Volume (vph)	1176	77	262	317	192	
Turn Type	NA	Perm	NA	NA	Perm	
Protected Phases	2		8	4		6
Permitted Phases		2			4	
Detector Phase	2	2	8	4	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	10.0
Minimum Split (s)	36.6	36.6	15.0	18.0	18.0	36.6
Total Split (s)	44.0	44.0	31.0	31.0	31.0	44.0
Total Split (%)	58.7%	58.7%	41.3%	41.3%	41.3%	59%
Yellow Time (s)	5.0	5.0	4.3	4.3	4.3	5.0
All-Red Time (s)	1.6	1.6	1.9	4.9	4.9	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.2	9.2	9.2	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Min	Min	Min	C-Max
Act Effct Green (s)	39.8	39.8	22.4	19.4	19.4	
Actuated g/C Ratio	0.53	0.53	0.30	0.26	0.26	
v/c Ratio	0.67	0.09	0.29	0.79	0.52	
Control Delay	15.7	2.5	17.2	38.8	22.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.7	2.5	17.2	38.8	22.1	
LOS	B	A	B	D	C	
Approach Delay	14.9		17.2	32.5		
Approach LOS	B		B	C		

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 19.9	Intersection LOS: B
Intersection Capacity Utilization 104.3%	ICU Level of Service G
Analysis Period (min) 15	

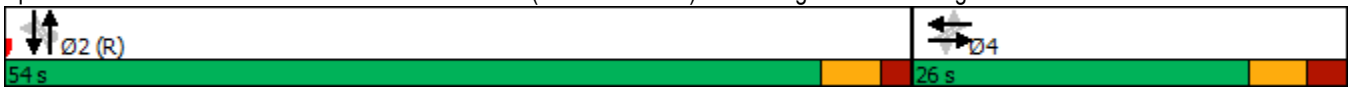
Splits and Phases: 2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	12	11	22	15	32	214	23	507
Future Volume (vph)	12	11	22	15	32	214	23	507
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		4		2		2
Permitted Phases	4		4		2		2	
Detector Phase	4	4	4	4	2	2	2	2
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
Minimum Split (s)	26.0	26.0	26.0	26.0	53.4	53.4	53.4	53.4
Total Split (s)	26.0	26.0	26.0	26.0	54.0	54.0	54.0	54.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	67.5%	67.5%	67.5%	67.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.6
All-Red Time (s)	2.5	2.5	2.5	2.5	1.8	1.8	1.8	1.8
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		20.0		20.0	48.6	48.6	48.6	48.6
Actuated g/C Ratio		0.25		0.25	0.61	0.61	0.61	0.61
v/c Ratio		0.24		0.19	0.09	0.25	0.04	0.50
Control Delay		10.0		20.3	7.2	7.7	6.6	10.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		10.0		20.3	7.2	7.7	6.6	10.9
LOS		A		C	A	A	A	B
Approach Delay		10.0		20.3		7.6		10.7
Approach LOS		A		C		A		B

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 8 (10%), Referenced to phase 2:NBSB, Start of Green	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 56.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd



Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	78	0	0	173	38
Future Vol, veh/h	0	78	0	0	173	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	85	0	0	188	41

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	417	0	0	0	0	0
Stage 1	0	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	592	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	592	-	-	-	-	-
Mov Cap-2 Maneuver	592	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	665	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		0	
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	-	-	-
HCM Lane LOS	-	-	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	94	38	17	223	511	39
Future Vol, veh/h	94	38	17	223	511	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	102	41	18	242	555	42

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	854	576	597	0	-	0
Stage 1	576	-	-	-	-	-
Stage 2	278	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	329	517	980	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	322	517	980	-	-	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	769	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.8	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	980	-	322	517	-	-
HCM Lane V/C Ratio	0.019	-	0.317	0.08	-	-
HCM Control Delay (s)	8.7	0	21.3	12.6	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.3	0.3	-	-

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	18.0	7.3	4.7	20.8	7.3	4.0	8.3

1101: Highland Rd (M-59) Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	5.4	7.1	5.7

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.1	0.1	0.1	2.7	0.3	0.3	0.0	0.1	0.0	0.3	0.3	3.8
Total Del/Veh (s)	15.2	15.1	4.4	20.1	13.3	2.9	10.2	9.1	1.8	14.1	12.9	2.8

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	11.5

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Movement	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.2	3.6	16.8	27.1	8.4	14.5

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.1	0.2	0.2	0.1	0.2	3.6	0.3	0.3	0.2	0.0	0.0
Total Del/Veh (s)	20.1	24.3	8.7	22.0	22.2	8.9	15.9	7.9	3.0	12.6	10.4	5.7

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	10.5

8030: N John St & Access 1 (John St) Performance by movement

Movement	WBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Del/Veh (s)	2.9	0.7	0.2	1.2

8031: N Milford Rd (PUSHBUTTON) & Access 2 (Milford Rd) Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	16.8	6.1	5.2	1.0	1.3	0.5	2.9

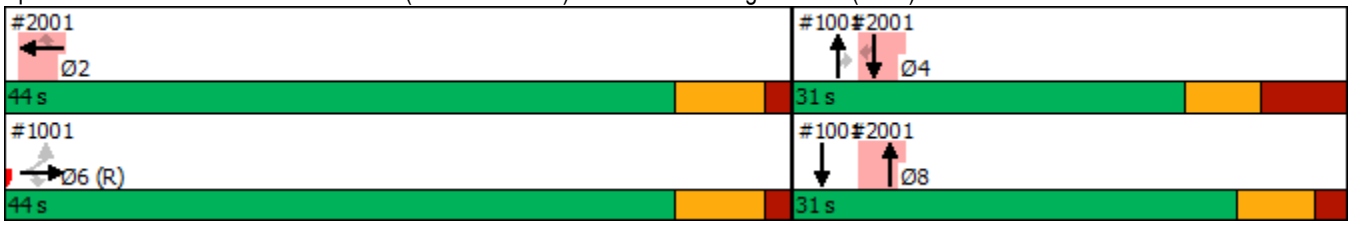
Total Zone Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	324.7

Lane Group	EBL	EBT	EBR	NBT	NBR	SBT	Ø2
Lane Configurations							
Traffic Volume (vph)	169	868	291	344	368	321	
Future Volume (vph)	169	868	291	344	368	321	
Turn Type	Perm	NA	Perm	NA	Perm	NA	
Protected Phases		6		4		8	2
Permitted Phases	6		6		4		
Detector Phase	6	6	6	4	4	8	
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	7.0	7.0	10.0
Minimum Split (s)	36.6	36.6	36.6	18.0	18.0	15.0	36.6
Total Split (s)	44.0	44.0	44.0	31.0	31.0	31.0	44.0
Total Split (%)	58.7%	58.7%	58.7%	41.3%	41.3%	41.3%	59%
Yellow Time (s)	5.0	5.0	5.0	4.3	4.3	4.3	5.0
All-Red Time (s)	1.6	1.6	1.6	4.9	4.9	1.9	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	9.2	9.2	6.2	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min	Max
Act Effct Green (s)	38.9	38.9	38.9	20.3	20.3	23.3	
Actuated g/C Ratio	0.52	0.52	0.52	0.27	0.27	0.31	
v/c Ratio	0.20	0.50	0.33	0.79	0.86	0.68	
Control Delay	7.4	10.5	2.5	38.1	38.4	6.4	
Queue Delay	72.5	0.0	0.0	0.1	0.0	0.0	
Total Delay	79.9	10.5	2.5	38.2	38.4	6.4	
LOS	E	B	A	D	D	A	
Approach Delay		17.6		38.3		6.4	
Approach LOS		B		D		A	

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 22.5	Intersection LOS: C
Intersection Capacity Utilization 127.0%	ICU Level of Service H
Analysis Period (min) 15	

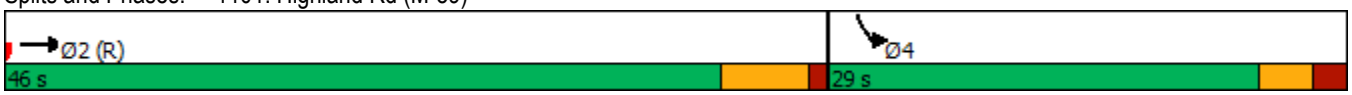
Splits and Phases: 1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59)



Lane Group	EBT	SBL
Lane Configurations		
Traffic Volume (vph)	1164	263
Future Volume (vph)	1164	263
Turn Type	NA	Prot
Protected Phases	2	4
Permitted Phases		
Detector Phase	2	4
Switch Phase		
Minimum Initial (s)	10.0	7.0
Minimum Split (s)	16.1	12.0
Total Split (s)	46.0	29.0
Total Split (%)	61.3%	38.7%
Yellow Time (s)	5.0	3.0
All-Red Time (s)	1.1	2.0
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.1	5.0
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	C-Max	Min
Act Effct Green (s)	47.6	16.3
Actuated g/C Ratio	0.63	0.22
v/c Ratio	0.38	0.72
Control Delay	7.7	22.9
Queue Delay	0.0	0.0
Total Delay	7.7	22.9
LOS	A	C
Approach Delay	7.7	22.9
Approach LOS	A	C

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 67 (89%), Referenced to phase 2:EBT, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

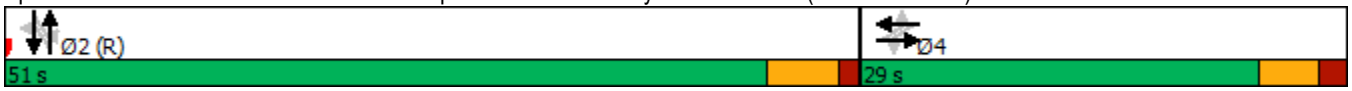
Splits and Phases: 1101: Highland Rd (M-59)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	10	141	7	1	430	181	49	329
Future Volume (vph)	2	10	141	7	1	430	181	49	329
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		4		2			2
Permitted Phases	4		4		2		2	2	
Detector Phase	4	4	4	4	2	2	2	2	2
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	14.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	29.0	29.0	29.0	29.0	51.0	51.0	51.0	51.0	51.0
Total Split (%)	36.3%	36.3%	36.3%	36.3%	63.8%	63.8%	63.8%	63.8%	63.8%
Yellow Time (s)	3.6	3.6	3.6	3.6	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	1.8	1.8	1.8	1.8	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	5.4	5.4	5.4	5.4		5.7	5.7		5.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	23.6	23.6	23.6	23.6		45.3	45.3		45.3
Actuated g/C Ratio	0.30	0.30	0.30	0.30		0.57	0.57		0.57
v/c Ratio	0.01	0.06	0.41	0.16		0.48	0.22		0.26
Control Delay	20.0	13.5	26.3	7.3		12.3	1.9		9.3
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	20.0	13.5	26.3	7.3		12.3	1.9		9.3
LOS	B	B	C	A		B	A		A
Approach Delay		14.0		19.8		9.2			9.3
Approach LOS		B		B		A			A

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 69 (86%), Referenced to phase 2:NBSB, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 11.2	Intersection LOS: B
Intersection Capacity Utilization 79.0%	ICU Level of Service D
Analysis Period (min) 15	

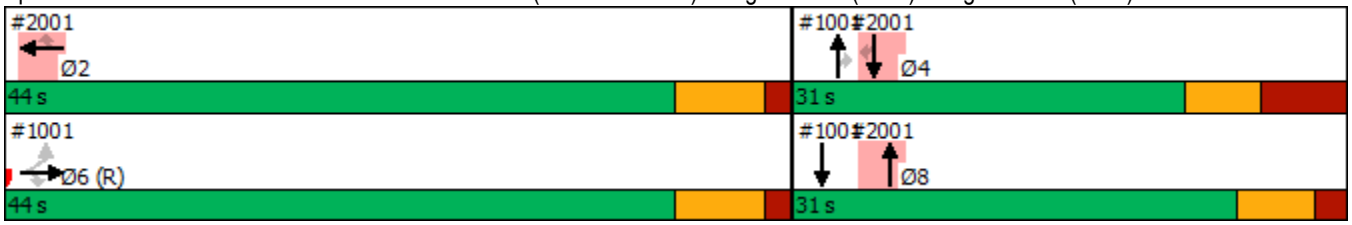
Splits and Phases: 1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON)



Lane Group	WBT	WBR	NBT	SBT	SBR	Ø6
Lane Configurations						
Traffic Volume (vph)	1429	129	515	316	221	
Future Volume (vph)	1429	129	515	316	221	
Turn Type	NA	Perm	NA	NA	Perm	
Protected Phases	2		8	4		6
Permitted Phases		2			4	
Detector Phase	2	2	8	4	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	10.0
Minimum Split (s)	36.6	36.6	15.0	18.0	18.0	36.6
Total Split (s)	44.0	44.0	31.0	31.0	31.0	44.0
Total Split (%)	58.7%	58.7%	41.3%	41.3%	41.3%	59%
Yellow Time (s)	5.0	5.0	4.3	4.3	4.3	5.0
All-Red Time (s)	1.6	1.6	1.9	4.9	4.9	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.2	9.2	9.2	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Min	Min	Min	C-Max
Act Effct Green (s)	38.9	38.9	23.3	20.3	20.3	
Actuated g/C Ratio	0.52	0.52	0.31	0.27	0.27	
v/c Ratio	0.85	0.16	0.55	0.74	0.56	
Control Delay	21.9	4.3	13.1	34.3	23.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.9	4.3	13.1	34.3	23.5	
LOS	C	A	B	C	C	
Approach Delay	20.4		13.1	29.9		
Approach LOS	C		B	C		

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 0 (0%), Referenced to phase 6:EBTL, Start of Green, Master Intersection	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 21.0	Intersection LOS: C
Intersection Capacity Utilization 126.4%	ICU Level of Service H
Analysis Period (min) 15	

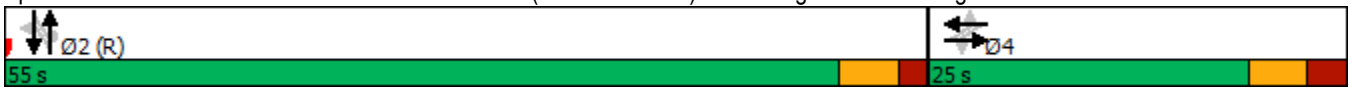
Splits and Phases: 2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	26	50	26	100	586	22	551
Future Volume (vph)	13	26	50	26	100	586	22	551
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		4		2		2
Permitted Phases	4		4		2		2	
Detector Phase	4	4	4	4	2	2	2	2
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.0	25.0	25.0	25.0	54.4	54.4	54.4	54.4
Total Split (s)	25.0	25.0	25.0	25.0	55.0	55.0	55.0	55.0
Total Split (%)	31.3%	31.3%	31.3%	31.3%	68.8%	68.8%	68.8%	68.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.6
All-Red Time (s)	2.5	2.5	2.5	2.5	1.8	1.8	1.8	1.8
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	5.4	5.4	5.4	5.4
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		19.0		19.0	49.6	49.6	49.6	49.6
Actuated g/C Ratio		0.24		0.24	0.62	0.62	0.62	0.62
v/c Ratio		0.40		0.44	0.28	0.59	0.07	0.55
Control Delay		10.6		27.1	9.4	11.6	6.7	11.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		10.6		27.1	9.4	11.6	6.7	11.0
LOS		B		C	A	B	A	B
Approach Delay		10.6		27.1		11.3		10.8
Approach LOS		B		C		B		B

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 19 (24%), Referenced to phase 2:NBSB, Start of Green	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 83.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd



Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	69	0	0	155	13
Future Vol, veh/h	0	69	0	0	155	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	0	168	14

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	350	0	0	0	0	0
Stage 1	0	-	-	-	-	-
Stage 2	350	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	647	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	647	-	-	-	-	-
Mov Cap-2 Maneuver	647	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	713	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		0	
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	-	-	-
HCM Lane LOS	-	-	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	99	30	36	610	582	30
Future Vol, veh/h	99	30	36	610	582	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	33	39	663	633	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1391	650	666	0	-	0
Stage 1	650	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	157	469	923	-	-	-
Stage 1	520	-	-	-	-	-
Stage 2	471	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	146	469	923	-	-	-
Mov Cap-2 Maneuver	146	-	-	-	-	-
Stage 1	485	-	-	-	-	-
Stage 2	471	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	63.4	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	923	-	146	469	-	-
HCM Lane V/C Ratio	0.042	-	0.737	0.07	-	-
HCM Control Delay (s)	9.1	0	78.6	13.2	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	4.4	0.2	-	-

1001: N Milford Rd (PUSHBUTTON)/N Milford Rd & Highland Rd (M-59) Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.0	0.1	0.0
Total Del/Veh (s)	47.7	9.7	5.1	24.3	13.8	3.9	13.9

1101: Highland Rd (M-59) Performance by movement

Movement	EBT	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	5.6	7.2	5.9

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.9	0.1	0.1	2.6	0.4	0.5	0.0	0.0	0.0	0.4	0.3	1.9
Total Del/Veh (s)	25.8	32.1	10.5	30.9	25.1	6.4	18.4	7.8	2.1	17.5	11.7	1.4

1309: N Milford Rd & Apollo Center Driveway/E Wardlow Rd (PUSHBUTTON) Performance by movemen

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	11.2

2001: N Milford Rd/N Milford Rd (PUSHBUTTON) & Highland Rd (M-59)/E Highland Rd (M-59) Performar

Movement	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	17.5	7.1	12.6	24.2	10.0	16.2

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.2	0.2	0.2	0.2	0.2	3.2	0.8	0.7	0.1	0.0	0.0
Total Del/Veh (s)	24.6	24.8	12.8	29.6	33.3	14.3	20.5	11.5	7.7	20.0	10.7	8.1

3001: S Milford Rd/N Milford Rd (PUSHBUTTON) & W Livingston Rd/E Livingston Rd Performance by mo

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	13.1

8030: N John St & Access 1 (John St) Performance by movement

Movement	WBR	SBL	SBT	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0
Total Del/Veh (s)	3.0	0.6	0.2	1.3

8031: N Milford Rd (PUSHBUTTON) & Access 2 (Milford Rd) Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	163.3	189.9	0.0	0.0	0.0	0.0	16.3
Total Del/Veh (s)	286.0	31.5	8.7	5.6	1.1	0.5	24.4

Total Zone Performance

Denied Del/Veh (s)	12.8
Total Del/Veh (s)	805.0