



## **M-22/Greilickville Commercial Corridor Traffic Study Elmwood Township, Michigan**

### **Prepared for:**

Charter Township of Elmwood  
10090 E. Lincoln Road  
Traverse City, MI 49684

### **Prepared by:**

Progressive AE  
1811 4 Mile Road NE  
Grand Rapids, MI 49525

July 2016  
Project No. 73200001/002



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The Charter Township of Elmwood and Progressive AE would like to thank the many interested citizens, landowners, business owners, public officials, and agency staff that provided input at the public open house and stakeholder meetings, and in particular MDOT staff for their timely and key feedback throughout the study process.

July 2016  
Project No. 73200001/002

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## Executive Summary

The M-22/Greilickville Commercial Corridor Traffic Study encompasses a little over a mile of M-22 in the southeastern portion of Elmwood Township. Its limits are essentially defined by Cherry Bend Road to the north and the southern township/county line to the south.

M-22 within the study area has long tried to fully serve two key functions; as regional arterial to move through traffic to/from communities to the north and south, and to provide direct access to the many Greilickville commercial and recreational sites along its frontage. As a follow up to the 2013 Greilickville Commercial Corridor Sub-Area Master Plan (2013 Corridor Master Plan) effort, this study was undertaken to further define what type of transportation opportunities and constraints that existing now and what those may be ten years from now in 2026. Of key importance was to try to identify improvements that would provide a more efficient and safer environment for corridor study patrons to access and egress existing and future uses, and for pedestrians to cross M-22 at several points.



The study process included pre-study discussions with the Township and MDOT to refine study goals and criteria. During the study several stakeholder meetings were held including a public presentation to discuss and obtain feedback on preliminary findings and recommendations.

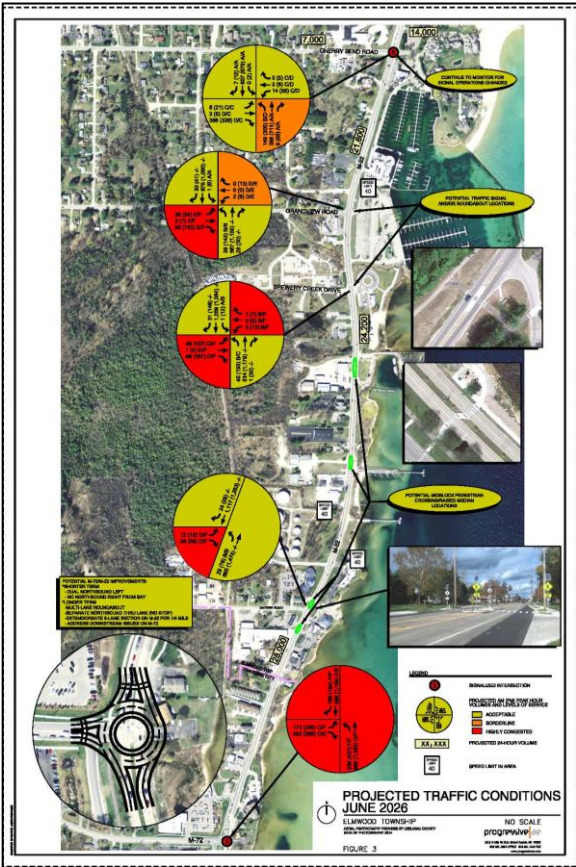
After the introductory Chapter 1 of this report, Chapter 2 focuses on the existing traffic and access management conditions along the study area of M-22. Findings and short term recommendations resulting from the existing (June) conditions analysis include:

- During pre-summer peaks most of the corridor intersections operate acceptably during both the morning and afternoon peak hours;
- As might be expected, the exception is the M-22/M-72 intersection that experiences significant delay on at least two of its movements during both peak hours;
- In the short term a recommended improvement to that intersection would be to add a second northbound left-turn lane and revise the signal operations;
- Regarding current access management conditions, several locations and roadway sections were found to have very poor commercial access spacing or driveway design/depth, fairly typical of older commercial zones on state trunklines within the state; and
- Of particular concern to the Township and several stakeholders is the study area adjacent to the Elmwood Marina where traffic on M-22 creates significant delays for vehicles trying to leave the marina.

Chapter 2 also briefly discusses observed peak hour conditions during a “normal” summer weekday (mid-August) when no nearby festivals were occurring. Those observations indicated just how different that short July-August 2015 period is from even June 2015 conditions.

Chapter 3 analyzes and discusses potential improvements for projected 2026 conditions. Findings and recommendations from that set of analyses, plus input from the stakeholders and public include:

- A trip generation analysis indicated that future projected development within the corridor study area can be expected to generate approximately 300 new morning peak hour trips and close to 800 new afternoon peak hour trips;
- Projected growth of M-22 traffic volumes along the corridor by 2026 from non-corridor study area sources are projected to increase through traffic by approximately 250-300 vehicles during peak hours;
- With that traffic added, most of the study area intersections will have one or more movements that experience significant delays;
- Although a traffic signal or roundabout may be warranted at one or more locations at that time, M-22 would need to be widened to four-five lanes to allow those intersections to operate acceptably;
- Preliminary analyses indicate/suggest that significant reconstruction of the M-22/M-72 intersection will be needed to accommodate even projected 2026 June traffic volumes
- Several access management improvement recommendations were defined on report graphics, most of which are focused on closing or relocating/combining poorly spaced commercial driveways or defining the general location for shared rear service drives; and
- Several potential locations were defined for placing raised mid-block pedestrian island crossings to facilitate safer crossings along the corridor study area.



Chapter 4 provides background on the reasons why so many road agencies, including MDOT, value the application of access management standards, and it summarizes the additional roadway improvements or measures that should be jointly pursued under that umbrella. Those measures include development of service drives, closure and/or relocation of existing driveways, and essentially creating a safer section of roadway by eliminating conflict points where feasible.

Overall, one related improvement idea that came up during the study process, although not covered by the scope of this study or report, was the potential for re-alignment of M-22. As envisioned, the primary goal of such a significant undertaking would be to separate the high through traffic volume from the local business/recreational traffic within the Greilickville study area. The potential start and endpoints of this alternative route could be near Grandview Road at the north end and near Carter Road at the south end. However, it is generally understood that this type of improvement would likely have to be funded solely by the community.

# 1. INTRODUCTION

As a key part of the community’s ongoing short and long term planning process, the Charter Township of Elmwood completed the 2013 Corridor Master Plan that included recommendations for several significant transportation elements. Many of the future recommendations noted in the plan are specifically related to M-22 and how it may be improved to enhance its use for all users. Therefore, as a follow-up to those initial conceptual recommendations, the Township and MDOT recognized that a set of corridor analyses needed to be completed to help define projected future conditions and identify potential transportation opportunities along this largely commercial study area within the township.

Although the primary focus of this study was on M-22 (from Cherry Bend Road down to M-72), the general waterfront corridor area defined by the 2013 Corridor Master Plan was taken into account, especially as it relates to potential side street relocations/re-alignments and projected future development or redevelopment. The primary goal was to determine how best to provide a much improved multi-user environment within this commercial and recreational hub while still recognizing its importance as a key through route for communities further north on the Leelanau Peninsula.

Based upon multiple discussions with Township staff, MDOT staff, and many stakeholders, the primary sets of analyses completed for this corridor study were as follows:

- Identify empirically what the current peak hour traffic conditions are during a relative peak period (June 2015);



- Use projected future land use data and other growth factors to calculate what the peak hour traffic volumes may be by 2026;
- Identify what type of roadway improvements may be necessary to accommodate those 2026 volumes, while recognizing the need to promote/enhance a multi-modal and pedestrian environment; and
- Review current access management conditions and develop a set of preliminary access improvements to make the corridor study area safer and more efficient.

The tasks undertaken to complete the analyses include:

1. **Data Collection.** Applicable information regarding the existing operating conditions of the study area roadways was obtained. Morning and afternoon peak-hour turning movement counts were completed at the study area intersections. Also, 24-hour approach counts were completed at the M-22 intersections with Grandview Road and Carter Road. Information regarding lane configurations, speed limits, traffic controls, and other related data for the study area roadways was also collected. Those on-site recon efforts also included taking field notes regarding existing site access conditions.
2. **Background Growth.** Per discussions with MDOT staff, an annual background traffic growth rate of 1.5 percent was applied to existing volumes to reflect anticipated non-development traffic increases by the 2026 horizon year.
3. **Crash Review.** Recent crash data was collected and reviewed to help define any specific crash patterns that could be address by improvements measures.
4. **Trip Generation/Distribution.** Based upon potential future development data obtained from the Township, the number of trips the potential developments are expected to generate during peak hours was identified. These trips were then assigned to M-22 and the applicable adjacent study area roadways based upon the patterns followed by existing traffic and expected market area.
5. **Levels of Service.** Capacity calculations were completed at the study area key intersections to identify existing and expected future peak-hour operational characteristics.
6. **Stakeholder/Public Meetings.** Several stakeholder meetings and a public presentation were attended to glean additional input and feedback on key concerns and reaction to preliminary findings.
7. **Improvements Recommendations.** Roadway/intersection, access, and pedestrian crossing improvements were identified that will help enable the corridor study area intersections to retain acceptable levels of operation under future conditions upon the addition of background traffic growth and projected development traffic.

## **Why Access Management?**

One of the key elements of this corridor study is development of an access management plan. Successful implementation of the recommendations in the plan will help Elmwood Township and MDOT accommodate planned redevelopment or development along the corridor study area while reducing the negative impact on traffic flow and crash potential. Ongoing national experience continues to show that a proliferation of driveways or an uncontrolled driveway environment increases the number of crashes, severely reduces capacity of the roadway, and may create a need for costly road improvements in the future. Areas where access management plans have been adopted and followed by the communities and road agencies have typically resulted in 25-50 percent reductions in access-related crashes. Further, reductions in the number of access points can provide better or more opportunities for non-motorized system improvements, like the mid-block crossings discussed later in this report.

The following chapters outline the results of the analyses completed during this study.



## 2. EXISTING CONDITIONS

Defining the current access and traffic conditions along the length of the corridor study area is one of the key initial tasks when developing an overall corridor plan. This section of the report outlines the existing traffic and access conditions along M-22. These existing, or base, conditions then provide a comparison to subsequent future conditions analyses. This chapter starts with a discussion focused on traffic conditions, followed up by a discussion largely focused on current access system conditions.

One key element that was much discussed at the outset of this study was the choice of analysis period – June 2015 in this case. There were concerns that analyses based upon June traffic volume data would not reflect actual peaks that are experienced later in the summer. However, it is not uncommon for a roadway agency (MDOT or others) to focus more on relatively peaks, as those are the conditions (or better) that are experienced during the vast majority of the year. Given typical funding constraints, defining conditions and identifying improvements based upon the highest volumes in a year is often not seen as a prudent use of available funds. Therefore, the analyses summarized in this section and subsequent sections are based upon the relatively high volumes that occur during June.

### EXISTING TRAFFIC CONDITIONS

#### Current Roadway Characteristics

**M-22.** M-22 is under the jurisdiction of MDOT and has a three-lane cross section within the corridor study area except within the immediate area of its intersection with M-72. It has a mix of paved shoulders and curb and gutter, and has a 40 mile per hour speed limit. Daily traffic volumes on M-22 vary widely within the corridor as it currently carries approximately 12,000 – 25,000 vehicles on a weekday, with the lower volume just north of Cherry Bend Road and the higher volume near M-72. These volumes can be significantly higher during mid-summer peaks and festival periods. With the exception of the signalized intersections at M-72 and Cherry Bend Road, all public street and larger private drive intersections are stop sign controlled (side street stops).



**Cherry Bend Road.** Cherry Bend Road is a county primary roadway (CR 633) under the jurisdiction of the Leelanau County Road Commission (LCRC). It carries approximately 6,000 vehicles per day on its two-lane cross



section just west of M-22. Cherry Bend Road has a 35 mile per hour speed limit near M-22 and, as noted earlier, is signal controlled at its intersection with M-22.

**Grandview Road.** Grandview Road has a two-lane cross section and is also under the jurisdiction of the LCRC. It carries approximately 2,700 vehicles per day, and has a 35 mile per hour speed limit near M-22. Grandview Road is stop sign controlled at its intersection with M-22.

**Carter Road.** This is another one of LCRC's local paved roadways within the study area that has an uncurbed two-lane cross section. It also has a 35 mile per hour speed limit and carries approximately 1,900 vehicles per day. Carter Road is stop sign controlled at its intersection with M-22.

**M-72.** Under MDOT jurisdiction, M-72 has a varied cross section at the southern end of this study area. It has a four-lane boulevard cross section to the south of the M-22/M-72 intersection, and a standard four-lane cross section to the west of that intersection, both with curb and gutter in the immediate area. MDOT June 2014 data indicates that M-72 carries approximately 28,000 vehicles per day south of the study area and approximately 9,500 vehicles per day west of the signalized M-22 intersection. The speed limit is 35 miles per hour on both of these sections of M-72.

Morning and afternoon peak hour traffic counts were taken in June 2015 from 7:00-9:00 AM and 2:00-6:00 PM on a weekday at the following M-22 intersections:

- Cherry Bend Road
- Grandview Road
- Pico Drive
- Brewery Creek (private)
- Carter Road
- M-72

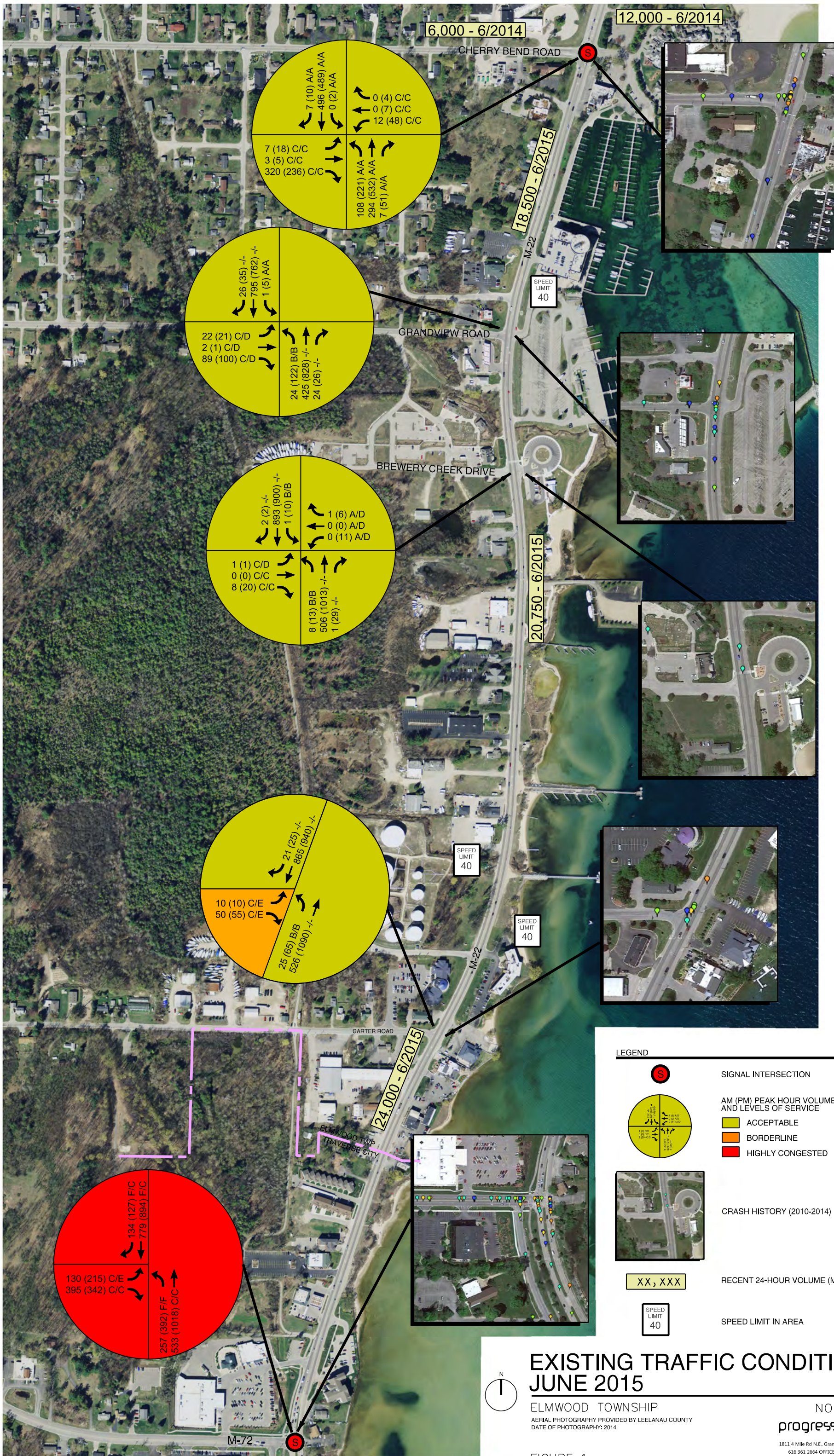
These counts indicated that the weekday peak hours generally occur between 7:30-8:30 AM and the 4:45-5:45 PM. Among other study area traffic characteristics, Figure 1 on the following page illustrates the existing peak-hour volumes at the study area intersections.

### **Evaluation of Existing Conditions**

Intersection "level of service" calculations were completed to evaluate the current operational efficiency of the study area intersections. These calculations were completed using techniques outlined in the 2010 Highway Capacity Manual by the Transportation Research Board.

Level of service (LoS) at signalized and unsignalized intersections relates to the delay, traffic volumes, and intersection geometry. LoS are expressed in a range from "A" to "F", with "A" denoting the highest or best operating conditions. Generally, an LoS "D" is considered the





6,000 - 6/2014

12,000 - 6/2014

18,500 - 6/2015

SPEED LIMIT 40

20,750 - 6/2015

SPEED LIMIT 40

SPEED LIMIT 40

24,000 - 6/2015

**LEGEND**



SIGNAL INTERSECTION



AM (PM) PEAK HOUR VOLUMES AND LEVELS OF SERVICE

ACCEPTABLE

BORDERLINE

HIGHLY CONGESTED



CRASH HISTORY (2010-2014)

XX, XXX

RECENT 24-HOUR VOLUME (MO./YR.)

SPEED LIMIT 40

SPEED LIMIT IN AREA

**EXISTING TRAFFIC CONDITIONS  
JUNE 2015**

ELMWOOD TOWNSHIP  
AERIAL PHOTOGRAPHY PROVIDED BY LEEANAU COUNTY  
DATE OF PHOTOGRAPHY: 2014

NO SCALE  
progressive|ae

1811 4 Mile Rd N.E., Grand Rapids, MI 49525  
616 361 2664 OFFICE 616 361 1493 FAX  
www.progressive|ae.com

FIGURE 1



minimum acceptable service level for signalized and unsignalized intersections in suburban or rural areas such as this. The criteria for determining the LoS at signalized and unsignalized intersections are outlined in the technical appendix of this report.

The existing peak hours were analyzed at the study area intersections. The results of the LoS analyses are also shown within the circles in Figure 1. Copies of the computer analyses are included in the technical appendix.

As shown, most of the constrained movements at the study area intersections operate acceptably (LoS A – D) during both peak hours in seasonal periods such as June. Exceptions to that occur within the higher volume intersections on the south portion of the study area. Calculations indicate that drivers on the eastbound approach on Carter Road at M-22 experience some delays during the afternoon peak hour as indicated by the LoS E.

As expected, calculations indicate that even during non-peak summer conditions the signalized M-22/M-72 intersection experiences significant congestion during both morning and afternoon peak hours, with LoS of E or F for several movements.

As noted earlier there was much discussion during team and stakeholder meetings throughout the process regarding the perceived and real significant differences in traffic volumes between summer peaks and June or other times of the year. Even leaving out a couple of festival periods, traffic volumes appeared to increase substantially along the M-22 corridor in July and August. No additional counts were taken during this time period, but on-site observations during a couple of weekday afternoon peak hours substantiate earlier local statements to that effect. The long southbound queues observed on southbound M-22



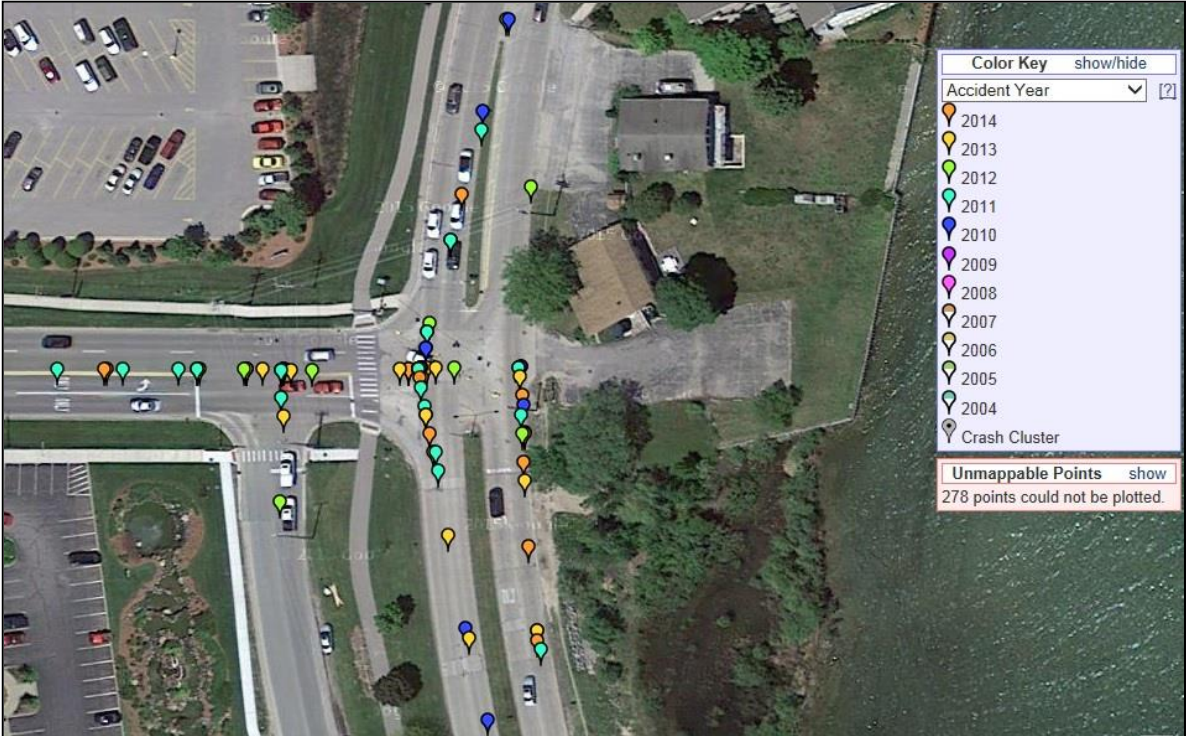
during the afternoon peak-hour were not short term in nature, and at one point extended from M-72 to just north of Cherry Bend Road, a distance of well over a mile. Subsequent investigation confirmed that there was no related crash issue during those observation periods, and additional anecdotal information indicates that such long queues are not uncommon during those two (July and August) summer months.

## Crash History

A brief review of recent crash histories was completed along the corridor study area as part of this existing conditions analyses. Such reviews are typically done to pinpoint any location(s) where the pattern of crashes indicates there is a type of crash that could be

addressed by some type of physical or operational improvement. Figure 1 also includes insets that show a few of the key crash locations along the corridor.

Based upon that review, there are no specific intersections or locations that have a significant crash pattern (3-5 crashes of one type in any given year) along the corridor study area except for the expected M-22/M-72 intersection. The crashes that have occurred at that intersection appear to be tied directly to related congestion issues, and will therefore be addressed in the subsequent future conditions analyses section. The graphic below depicts most of the recent crashes that have occurred there from 2010-2014.



**Discussion – Recommended Roadway/Traffic Improvements**

Given the results of the Existing Conditions analysis and related traffic simulations, near term non-access related traffic improvements should be focused on the M-72/M-22 intersection. Testing iterative improvements at that intersection based upon June 2015 data indicates that adding a second northbound left turn may be the best solution for that level of traffic. This would not only provide better operations for the movement, but would allow a slight shifting of green times to other movements. Calculations show (copies in technical appendix) that improvement would improve the current calculated LoS's from F to D for the northbound left turn movement and the southbound through movement during either/both of the peak hours while still allowing the other movements to operate at LoS C or better. Further discussion regarding this intersection is discussed in the next chapter.

## EXISTING ACCESS SYSTEM CONDITIONS

Although the above traffic analyses included M-22 at M-72, the access management portion of this study is focused on the study area of M-22 just within Greilickville/Elmwood Township, and so does not encompass the area at/near M-72.

There are typically two or three general development characteristics that need to be taken into account for most access management corridors. In general, there are areas that are currently undeveloped (and may stay that way for some time), areas that are relatively undeveloped but experiencing growth pressures, and areas that are already mostly or fully developed and may be subject to redevelopment. For the most part the study area of M-22 from the county line north to Cherry Bend Road fits into the latter category.

Chapter 3 will outline proposed improvements and standards that the Elmwood Township and road agencies can use to improve or retain efficient access. In order to define those proposed improvements, field surveys were completed to identify existing access locations and areas that have poor or substandard access conditions. These are outlined below, along with current roadway characteristics.

Problems created when access is not managed include:

1. **Driveways spaced too close together** – closely spaced driveways, and lack of connections between adjacent businesses, lead to more conflicts between vehicles traveling along M-22 and those slowing down to enter a driveway or exit it. A series of closely spaced driveways can also be more confusing for motorists.
2. **Driveways too close to a signalized intersection** – vehicles attempting to enter or exit driveways near traffic signals create conflicts with vehicles traveling through the intersection, which increases the potential for congestion and crashes.
3. **Driveways with a poor offset from driveways across the street** – the location of driveways and intersections across the street impacts safety and traffic operations. Driveways placed too close to access points on the other side of the street can result in vehicles making opposing left turns both attempting to use the same part of the center turn lane. This can cause congestion or crashes.
4. **Driveways that are not designed for today's conditions** - some of the driveways along the corridors were designed many years ago, when traffic volumes were lower. Those driveways may be too wide, too narrow or have radii that are too small – all of which can increase conflicts between through traffic and those using access points.

### M-22 Access Conditions

The study area is considered a “retrofit” corridor in terms of access management. This means it is fairly well developed, with few undeveloped parcels within the corridor.

However, there are current and planned changes in uses, expansions or redevelopment. This situation is similar to many other mature high volume commercial corridors around the state where access was constructed years before there was awareness of the detrimental effects of poor access management. Two key differences though are that much of the traffic on M-22 is transient and does not originate or end within the study area, and the businesses tend to be fairly small and do not include “big box” development.

To put things in perspective there currently are approximately 53 driveways along the corridor study area, typically deemed to be excessive (and where approximately 30 driveways per mile would be closer to current driveway spacing standards). Although there are a couple of examples of good access decisions, there are many examples of substandard access/driveway spacing, design, and numbers by today’s standards.

Current access management deficiencies on M-22 include:

Δ **Poor driveway spacing and/or unnecessary second drives;** many instances of driveways spaced too close together or sites that have more than one driveway that do not warrant a second (or more) access. The area just south of Carter Road has approximately 15 commercial driveways within a +/- 700 foot section (current standards would allow for about three driveways on each side for a total of six).



Δ **Poor intersection-to-driveway spacing;** there are a couple of examples of poor spacing between an intersection and an adjacent commercial driveway along the corridor. This close spacing can affect both the operations and safety at the intersection, especially those with traffic signals.

Δ **Substandard driveway design/storage;** small driveway radii, too little driveway storage (distance from roadway to first internal parking/circulation) at numerous locations – typical of older small commercial sites.



Δ **Few internal cross access/service drive connections;** the efficiency of this study area can be significantly affected by the lack of internal connections between adjacent uses (either large



or small businesses). Grade differences create constraints at a few locations, particularly in the Grandview Road area.

Δ **Substandard driveway offset;** poor offsets currently exist at many locations (typical of older developed corridors), although it may have been difficult in the past to align or offset driveways properly in some locations given that there are so many.

Δ **Substandard driveway width.** Several locations have older, very wide paved or gravel driveway openings that can lead to driver and cyclist confusion due to multiple points of access/egress.

Discussions regarding specific short and long term access improvements will be covered later in this report.



### 3. PROJECTED FUTURE TRAFFIC CONDITIONS

The purpose of this chapter is to summarize the expected future relative peak traffic conditions within the study area ten years from now with background traffic growth and potential developments traffic in place. These analyses help define the timing and applicability of any potential 2026 roadway improvements.

#### 2026 FUTURE TRAFFIC CONDITIONS

##### Background Traffic

To help assess the future conditions at any intersection, traffic volume growth factors were taken into account. Based upon input from MDOT staff, a 1.5% annual growth factor was incorporated into the future 2026 traffic projections

##### Projected Development

Elmwood Township provided information regarding potential development or redevelopment that can be expected to occur within seven parcels along the corridor study area within the next ten years. The projected types and approximate combined sizes of uses are noted below.

- Retail/service 43,500 s.f.
- Retail/office 93,000 s.f.
- Condominiums 164 units
- Apartments 192 units

Further discussion regarding potential land uses and related impacts are summarized later in this chapter at the bottom of Page 22.

#### DEVELOPMENT TRIP GENERATION

Trip Generation, Ninth Edition, by the Institute of Transportation Engineers (ITE) was used to calculate the projected traffic based on the projected development components. Trips are measured individually for inbound and outbound movements. Therefore, a visit to the site by a patron or employee generates two trips, one inbound and one outbound.

The development sites are expected to generate approximately 331 weekday morning peak-hour vehicle trips at various site driveways and 965 weekday afternoon peak-hour trips at the same site driveways. Of those trips, 299 morning and 791 afternoon trips will be new trips added to the roadway system. Per ITE criteria, the remainder will be pass-by trips from the current M-22 traffic stream.

Table 1 summarizes the projected morning and afternoon peak-hour vehicle trip generation based upon the projected development.



**Table 1**  
**Projected Developments' Peak-Hour Trip Generation**

| Land Use       | ITE Code | Size                                | AM         |            | PM         |            |
|----------------|----------|-------------------------------------|------------|------------|------------|------------|
|                |          |                                     | In         | Out        | In         | Out        |
| Retail/service | 826      | 43,500 sf                           | 26         | 16         | 55         | 71         |
| Retail/office  | 820      | 93,000 sf                           | 55         | 34         | 274        | 297        |
| Condominiums   | 230      | 164 units                           | 15         | 80         | 73         | 36         |
| Apartments     | 220      | 192 units                           | <u>21</u>  | <u>84</u>  | <u>104</u> | <u>55</u>  |
|                |          | Subtotal:                           | 117        | 214        | 506        | 459        |
|                |          | Less pass-by trips <sup>(1)</sup> : | <u>-16</u> | <u>-16</u> | <u>-87</u> | <u>-87</u> |
|                |          | <b>Total new trips:</b>             | <b>101</b> | <b>198</b> | <b>419</b> | <b>372</b> |

Notes:

1. Only applied to retail uses. Conservative pass-by reduction of 25% used.

### PROJECTED TRIP DISTRIBUTION

The directional distribution of the new trips expected to be generated by the developments was roughly based upon existing travel patterns and the potential market area for those uses. In general, the retail/commercial trips are expected to be split roughly 50/50 north and south along M-22, while the residential trips are expected to be largely oriented to the south, with a projected 70/30 split south and north.

The distribution of pass-by trips was based upon current directional distribution of traffic passing by the site. During the morning peak the distribution is roughly 60/40 south/north, while in the afternoon peak it is the somewhat expected opposite, 60/40 north/south.

Based upon the above distribution patterns and the locations of the individual parcels, the projected developments' peak-hour project traffic was assigned to the applicable access points and the adjacent roadway system. Figure 2 on the next page illustrates the expected trip assignment of site-generated traffic upon completion/occupancy of the development sites.

The forecast project trips were added to the expected future 2026 background peak-hour volumes to depict the estimated total 2026 future volumes during the morning and afternoon peak hours. These total 2026 future volumes are illustrated, among other items, in Figure 3.

### EVALUATION OF FUTURE CONDITIONS

Intersection LoS calculations were completed to evaluate the projected 2026 future morning and afternoon peak hour conditions at the study area intersections. The results of the LoS analyses are summarized in Figure 3. Copies of the computer analyses are included in the technical appendix of this report.

The results of the analyses shown in Figure 3 indicate that the addition of background traffic growth and study area development traffic will have, as expected, a significant negative impact at four of the five of the study area intersections. Side street outbound movements at the unsignalized Grandview, Brewery Creek, and Carter Road intersections with M-22 are projected to have an LoS of E or F during one or both of the peak hours.

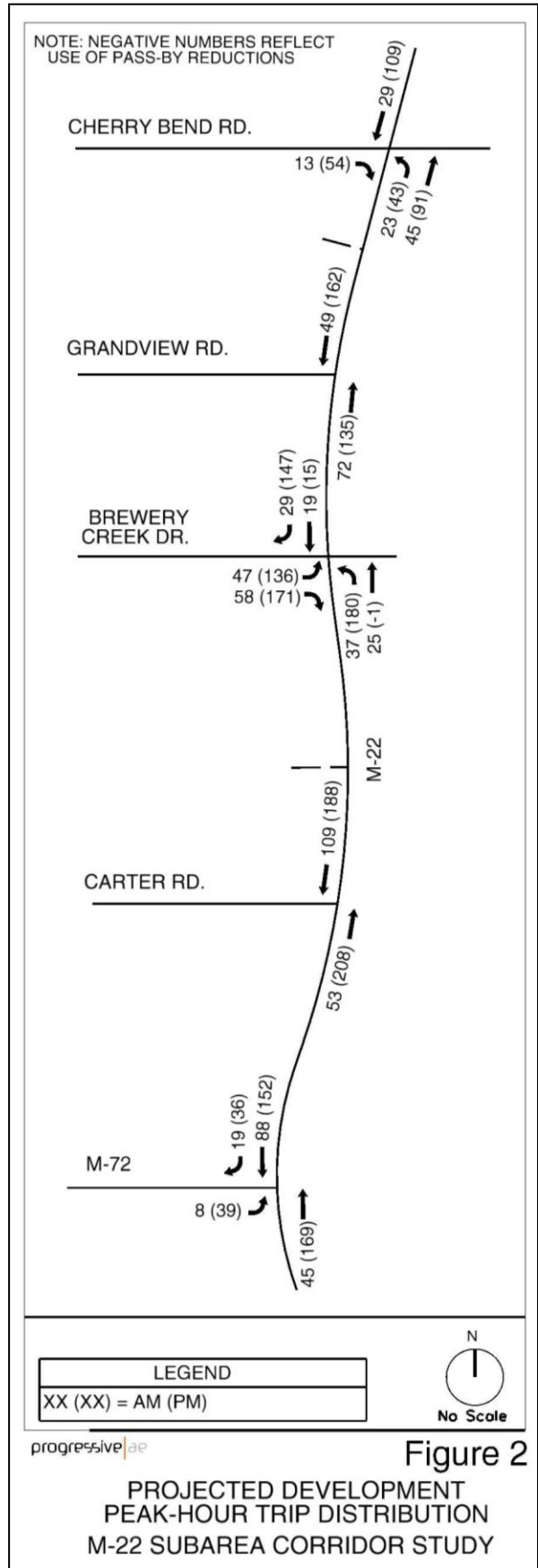
The 2026 projections show that the M-22/M-72 intersection will experience even worse conditions, with an expected LoS of F during one or both peak hours for all of the movements except for the eastbound right turn. Traffic simulations appear to confirm these congested conditions with very lengthy queues occurring during the peak hours.

**DISCUSSION - POTENTIAL 2026 ROADWAY IMPROVEMENTS**

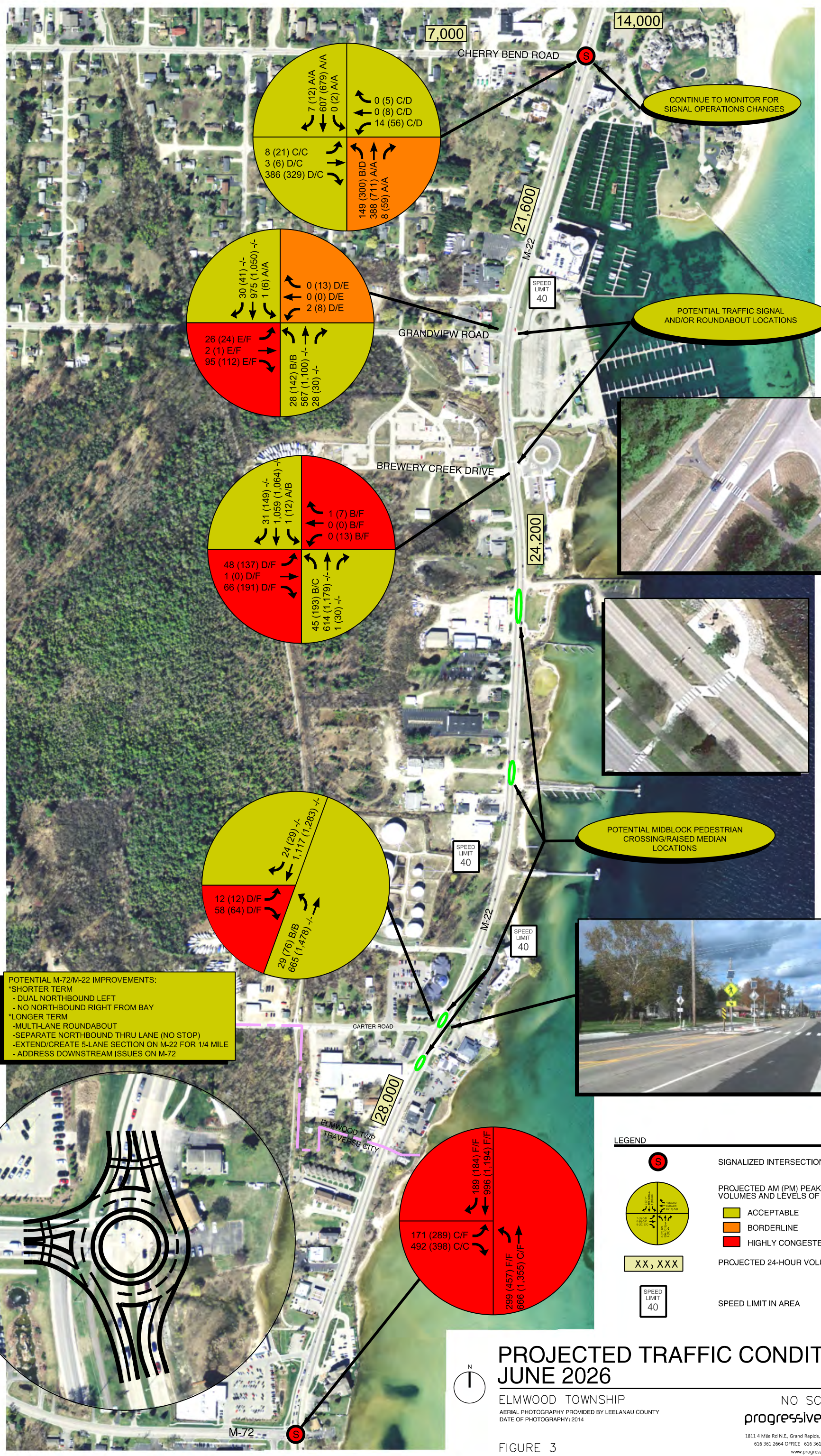
Based upon the above results there are several locations that will need physical and/or operational improvements in order to even accommodate potential June 2026 traffic volumes. Given the relatively low peak hour volumes and projected lack of queuing issues, improvements at the Carter Road intersection with M-22 are not recommended as of yet. Analyses of the other four intersections are summarized below.

**M-22/Cherry Bend Road**

Although no LoS of E or F are projected during either peak hour, it's recommended that the northbound left turn movement continue to be monitored. A northbound left turn phase may be warranted sooner than expected.







**POTENTIAL M-72/M-22 IMPROVEMENTS:**  
 \*SHORTER TERM  
 - DUAL NORTHBOUND LEFT  
 - NO NORTHBOUND RIGHT FROM BAY  
 \*LONGER TERM  
 -MULTI-LANE ROUNDABOUT  
 -SEPARATE NORTHBOUND THRU LANE (NO STOP)  
 -EXTEND/CREATE 5-LANE SECTION ON M-22 FOR 1/4 MILE  
 - ADDRESS DOWNSTREAM ISSUES ON M-72



**LEGEND**

- SIGNALIZED INTERSECTION
- PROJECTED AM (PM) PEAK HOUR VOLUMES AND LEVELS OF SERVICE
  - ACCEPTABLE
  - BORDERLINE
  - HIGHLY CONGESTED
- PROJECTED 24-HOUR VOLUME
- SPEED LIMIT IN AREA

# PROJECTED TRAFFIC CONDITIONS JUNE 2026

ELMWOOD TOWNSHIP  
 AERIAL PHOTOGRAPHY PROVIDED BY LEELANAU COUNTY  
 DATE OF PHOTOGRAPHY: 2014

NO SCALE  
 progressive|ae

1811 4 Mile Rd N.E., Grand Rapids, MI 49525  
 616 361 2664 OFFICE 616 361 1493 FAX  
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FIGURE 3

RENDER DATE/TIME: USERNAME: BEEK



## **M-22/Grandview and M-22/Brewery Creek**

These two intersections have been the focus of much discussion during this corridor study from a development standpoint and a focal point for marina access and pedestrian crossing activity. Those discussions including the potential for reconfiguring one or both roadways to create a single primary intersection that could potentially meet the current eight hour traffic signal warrants that MDOT would require for signal installation. If a signal was installed, it would provide a safer location for pedestrians to cross and provide more efficient left-turn egress operations for those streets and the Elmwood Marina.

### Signal Warrant Analysis – M-22/Brewery Creek

Of the two intersections noted above, this intersection appears to provide the better location for a potential signal as it is already a recognized pedestrian crossing, would provide a slightly better location to focus service drive/commercial traffic (more about that in the subsequent access management section), and would provide gaps for, if not outright connection/alignment, for exiting marina traffic.

This section therefore outlines the outcome of a predictive signal warrant analysis for this location. As such, it compares projected traffic volumes to defined criteria outlined in the current Michigan Manual of Uniform Traffic Control Devices (MMUTCD). As is often the case, a signal may not be allowed to be installed (if deemed warranted herein) until the traffic volumes are actually in place (verified by updated traffic counts). But this type of analysis provides a sound basis for expectations for reviewers and approval agencies.

### Data Collection

As noted earlier in this report, the existing speed limit along this section of M-22 is 40 miles per hour. 24-hour machine counts were completed on the M-22 and Brewery Creek approaches to the intersection. The field reports of the traffic counts are included in the technical appendix of this report. That data was subsequently combined with projected hourly volume increases from background traffic growth and projected additional traffic from the Brewery Creek development.

### Warrant Analysis Parameters

Like all road agencies, MDOT requires that an intersection meet at least one of several traffic signal warrants outlined in the 2011 MMUTCD before a signal can be considered for installation. The most applicable warrants for this location are those related to volumes.

Of those, MDOT typically requires that volume criteria be met for Warrant 1 (Eight-Hour Vehicular Volume) before consideration can be given for installation of a traffic signal. And within that warrant it is preferred that the criteria under Condition A is met. Therefore, the following analyses focus on the criteria defined for Warrant 1 with results further included in the appendix for review.

Warrant 1 requires that, for each of eight or more hours of the day, minimum traffic volume thresholds must be met on the major and minor road approaches to the intersection. The volumes must exceed a certain number of vehicles per hour under one of the two conditions outlined on the next page. The posted speed limit of 40 miles per hour just misses the applicability of using a 30% reduction in required minimum volume thresholds for both the major and minor approaches. Given the higher traffic volumes expected for Brewery Creek Drive (as opposed to the park driveway), the analyses are on that eastbound approach when referring to the minor street approach.

Warrant 1: Condition A (Minimum Vehicular Volume):

- For at least eight hours of a day, the major street (M-22) must have at least 600 vehicles per hour (total of both approaches); and
- For at least eight hours of a day, the higher volume minor street approach must have at least 200 vehicles per hour for the same eight hours as the main street.

Warrant 1: Condition B (Interruption of Continuous Traffic):

- For at least eight hours of a day, the main street (M-22) must have at least 900 vehicles per hour (total of both approaches); and
- For at least eight hours of a day (same eight hours), the higher volume minor street approach (Brewery Creek) must have at least 100 vehicles per hour.

Analysis - Projected 2026 Future Conditions

Using the existing traffic volumes as a base, 2026 traffic volumes were projected over an average weekday to evaluate whether a signal may be warranted upon completion of site developments. For a conservative analyses, a background growth factor was not applied to the existing major street/M-22 traffic volumes over an entire day. The minor street approach volumes were developed using ITE data, including specific information as to how residential and retail/commercial uses traffic is spread out over an average weekday.

The projected total hourly northbound "minor street" approach volumes were then included in MDOT's standard signal warrant analyses spreadsheet, along with the major street (M-22) volumes. Table 2 on the next page illustrates the volume summary from that analysis. Additional output from the spreadsheet is included in the technical appendix.

As shown in Table 2, Warrant 1 Condition A is projected to be met for six hours, thereby missing that warrant by two hours. It is important to note that no relocation/redistribution of Grandview traffic was assumed for this base analysis. *Subsequent review/analysis indicate that if such a shift in approach traffic were to occur, criteria for Condition A would be met for 9 hours, or one more than the minimum for meeting that condition.*

**Table 2 Signal Warrant Volume Summary**

| Michigan Manual of Uniform Traffic Control Devices  |                      |               |               |               |  |  |  |
|---|----------------------|---------------|---------------|---------------|--|--|--|
| Volume Summary                                      |                      |               |               |               |  |  |  |
| Prepared by MDOT for the 2011 Edition of the MMUTCD |                      |               |               |               |  |  |  |
| Spot Number:  | na                   |               |               |               |  |  |  |
| Major Street:                                       | M-22                 |               | Minor Street: | Brewery Creek |  |  |  |
| Intersection:                                       | M-22 @ Brewery Creek |               |               |               |  |  |  |
| City/Twp:   | Elmwood Twp          |               |               |               |  |  |  |
| Date Performed:                                     |                      | Performed By: | PAE           |               |  |  |  |
| Date Volumes Collected:                             | 2026 Projected       |               |               |               |  |  |  |

|               | Major<br>NB  | Major<br>SB  | Minor<br>EB | Minor<br>WB | Total<br>Major | Highest<br>Minor | Total        |
|---------------|--------------|--------------|-------------|-------------|----------------|------------------|--------------|
| 00:01 - 01:00 | 76           | 24           | 0           | 0           | 100            | 0                | 100          |
| 01:00 - 02:00 | 48           | 17           | 0           | 0           | 65             | 0                | 65           |
| 02:00 - 03:00 | 20           | 18           | 0           | 0           | 38             | 0                | 38           |
| 03:00 - 04:00 | 24           | 14           | 0           | 0           | 38             | 0                | 38           |
| 04:00 - 05:00 | 22           | 52           | 0           | 0           | 74             | 0                | 74           |
| 05:00 - 06:00 | 64           | 123          | 0           | 0           | 187            | 0                | 187          |
| 06:00 - 07:00 | 159          | 326          | 34          | 0           | 485            | 34               | 519          |
| 07:00 - 08:00 | 405          | 798          | 114         | 0           | 1203           | 114              | 1317         |
| 08:00 - 09:00 | 551          | 787          | 100         | 0           | 1338           | 100              | 1438         |
| 09:00 - 10:00 | 580          | 684          | 68          | 0           | 1264           | 68               | 1332         |
| 10:00 - 11:00 | 588          | 683          | 115         | 0           | 1271           | 115              | 1386         |
| 11:00 - 12:00 | 695          | 651          | 170         | 0           | 1346           | 170              | 1516         |
| 12:00 - 13:00 | 728          | 658          | 214         | 0           | 1386           | 214              | 1600         |
| 13:00 - 14:00 | 793          | 635          | 208         | 0           | 1428           | 208              | 1636         |
| 14:00 - 15:00 | 752          | 672          | 211         | 0           | 1424           | 211              | 1635         |
| 15:00 - 16:00 | 829          | 730          | 220         | 0           | 1559           | 220              | 1779         |
| 16:00 - 17:00 | 917          | 873          | 221         | 0           | 1790           | 221              | 2011         |
| 17:00 - 18:00 | 1050         | 864          | 238         | 0           | 1914           | 238              | 2152         |
| 18:00 - 19:00 | 788          | 584          | 179         | 0           | 1372           | 179              | 1551         |
| 19:00 - 20:00 | 576          | 436          | 165         | 0           | 1012           | 165              | 1177         |
| 20:00 - 21:00 | 509          | 352          | 181         | 0           | 861            | 181              | 1042         |
| 21:00 - 22:00 | 422          | 228          | 169         | 0           | 650            | 169              | 819          |
| 22:00 - 23:00 | 248          | 136          | 0           | 0           | 384            | 0                | 384          |
| 23:00 - 00:00 | 140          | 57           | 0           | 0           | 197            | 0                | 197          |
| <b>Total</b>  | <b>10984</b> | <b>10402</b> | <b>2607</b> | <b>0</b>    | <b>21386</b>   | <b>2607</b>      | <b>23993</b> |

Also shown by the volumes in Table 2, Warrant 1 Condition B criteria would be met for at least 14 hours, thus meeting that warrant.

Evaluation - Capacity Analysis

*Meeting a key signal warrant or warrants through a predicted set of traffic volumes is one step in the process of defining recommended roadway improvements. Identifying if the intersection in question can accommodate predicted peak hour traffic under signalized control is the needed follow-up check.* The projected 2026 afternoon peak hour volumes at the M-22/Brewery Creek intersection were analyzed under signal control assuming the current three-lane cross section on M-22 and a two-lane approach on Brewery Creek.

Several iterations of signal timing and operations were checked that included a pedestrian crossing on one leg of M-22. Unfortunately those calculations show at best that at least two movements are expected to operate at LoS's of E or F during the peak hour under signal control. This is largely due to the heavy northbound and southbound through volumes (both over 1,000 vehicles) that require use of a vast majority of the green time in order to operate at even borderline acceptable conditions. As such, it does not appear that a traffic signal at M-22/Brewery Creek (or M-22/Grandview) will be an acceptable/recommended improvement even though it may meet one or more key signal warrants.

***"As such, it does not appear that a traffic signal at M-22/Brewery Creek (or M-22/Grandview) will be an acceptable/recommended improvement even though it may meet one or more key signal warrants"***

It should be noted that widening of M-22 to a five-lane cross section at this intersection would allow it to operate acceptably under signal control during 2026 peak (June) hours. However, such a widening would need to extend further than just this intersection, and therefore not meet the underlying Township/master plan goal of creating a more pedestrian/non-motorized friendly environment within the subarea. The actual length of the widening would need to be determined through additional discussions with MDOT, as the distance needed to reduce the cross section back down to a single through lane (in each direction) while still accommodating existing and projected peak hour volumes is not easily determined. And, such transition sections have been shown to engender unsafe passing movements, and road agencies are typically against creating "hourglass" sections of roadways versus a consistent cross section. In short, it is likely that MDOT would require a fairly extensive five-lane section of highway that may entail most of this study area.

Further, the projected 2026 peak hour volumes were also run through roundabout capacity software as an additional check in case that intersection control alternative was desired. Those calculations also indicated that the through volumes on M-22 are/will be just too high to retain the current three-lane cross section on M-22.

In summary, whereas near-term the highest and best use of several of the seven undeveloped parcels is retail/service or retail/office, ultimately the very strong potential exists that these near-term uses will be converted to residential because of the corridor's close proximity to the City of Traverse City. That being said, if commercial retail/service or retail/office were to remain the predominant future land uses, the negative impact at all five study area intersections will be even worse than indicated in this report because as shown, retail/service and retail/office peak-hour trip generation characteristics are easily greater than those for condominiums or apartments. Thus, such an occurrence would not change the outcome of the report's findings because the calculated fact remains that whereas a signal could be warranted at least at one location, the volumes are too high on M-22 itself (in 10 years) that the corridor won't function for the north/south through movements without widening portions of M-22 to five lanes.

## M-22/M-72

This intersection is outside of the actual M-22/Greilickville study area so extensive analyses were not completed to define long term improvement measures. In addition, mid-study stakeholder discussions including MDOT staff indicated that MDOT is planning to do a congestion management analysis of this intersection.

In general, the operation of the M-22/M-72 intersection (and intersections further south on M-72) defines in many ways how well M-22 functions to the north. As noted in earlier sections, peak summer traffic volumes create extensive queuing issues through this study's corridor, in addition to the M-72 approaches. The substandard spacing of the Bay Street/M-72 intersection also exacerbates the conditions at this key junction, particularly during the afternoon peak hour.



As part of this analysis, several potential improvements were identified, with capacity analyses completed on at least one of those potential M-22/M-72 intersection improvement alternatives to help define just what it may take to really address relative peak conditions. Those potential improvements, also noted on Figure 3, include the following.

- In addition to the second northbound left turn lane noted in the Existing Conditions chapter, consider adding a second northbound through lane, limit the movements to/from Bay Street, and revise the signal operations. This would also require extending a second northbound lane on M-22 for a certain distance north of M-72 before tapering down to a single northbound lane.
- Consider construction of a multi-lane roundabout. Although this alternative could provide significant safety and capacity benefits, it would require elimination or re-alignment of the Bay Street connection. And to accommodate Tart Trail users this type of improvement would need to include a HAWK type signal or relocation (or grade separation/tunnel) of that trail crossing.
- Consider separating the northbound through movement so it is not stopped/controlled by the signal. This would also require that a second northbound through lane be installed on M-22 for a section just north of M-72 to allow eastbound left turn traffic to merge into the northbound through traffic. Such an improvement would provide



additional signal capacity for the other deficient movements, but would result in essentially eliminating any ability for pedestrians to cross to/from the east side of the intersection at grade.

### **Pedestrian/Non-Motorized Improvements**

One of the key goals of the 2013 Corridor Master Plan and of this corridor study was to identify roadway improvements that would enhance the ability of visitors/patrons/employees/etc to more easily access multiple sites on either side of M-22 without resorting to driving to each. The expanding business and marina uses in the Brewery Creek/Grandview area (plus potential upcoming condominium/apartment uses) is an example of where better connectivity is needed than the existing marked crosswalk. The current three-lane cross section throughout the corridor isn't too wide, but the consistently higher traffic volumes, especially in the summer months when pedestrian demands are higher, makes it difficult to cross safely during many portions of the day.



Based upon the findings in the last section, it unfortunately doesn't appear that one or more signalized intersections or roundabouts will be a feasible way to provide more controlled, safer pedestrian crossing locations along M-22 within the corridor study area unless M-22 itself is widened, a somewhat self-defeating "improvement" in the quest to develop a more pedestrian friendly environment.

Therefore locations were examined along the corridor study area that either already have significant pedestrian demands and/or are expected to have higher demands in the coming years. At those locations it is recommended to work with MDOT to develop raised mid-block median islands, either within the existing center left turn lane width or with slight widening of that center lane to provide more pedestrian/cyclist storage. These types of refuge islands provide more opportunities for crossing as it breaks down the crossing movement into two distinct crossings where only one direction of vehicle traffic has to be observed and crossed at one time. If/when pedestrian volumes become high



enough, some type of pedestrian signal may be warranted, although increased vehicular congestion will need to be taken into account as part of that effort.

Identifying the most feasible locations for such raised median crossings is not just a matter of finding where the demand is/will be. Such refuge islands can't be placed where it will be in conflict with left turn traffic demands at site driveways or public street intersections. Even with access revisions/reductions outlined in the next chapter, there appear to be only a few good candidate locations along the corridor. Figure 3 illustrates several potential locations. In coordination with access reduction recommendations, those include two locations near the M-22/Carter Road intersection, one just north of the Bluewater Hall Event Center, and another one adjacent to the Discovery Center/Children's Museum site. One other potential location (not shown) would be immediately south/adjacent to the current Elmwood Marina exit driveway, about 150 feet north of the current designated pedestrian crossing. However, access revisions related to the marina are yet to be fully defined so that location may need to shift.



In any case, there are multiple examples of such midblock crossings northern Michigan, including one just down the road on M-72 (shown above).

This chapter has summarized the analyses and findings regarding several standard roadway improvements. However, one additional set of improvements that can provide significant safety and efficiency benefits along the corridor is related to access management. The background for such improvements and specific access management recommendations are covered in the following chapter.

## 4. ACCESS MANAGEMENT STANDARDS & RECOMMENDATIONS

Based upon the analysis of existing conditions and constraints and use/review of standards outlined in the MDOT-sponsored Access Management Guidebook, the access management portion for the M-22 study area was developed. This chapter summarizes the basic design standards that should be used by Elmwood Township for future access considerations along this corridor.

### ACCESS MANAGEMENT STANDARDS

Since this section of M-22 is largely developed and there is a significant difference in the current and potential future development along the corridor, it is impractical to impose driveway standards uniformly throughout the overall study area. The recommendations outlined in this chapter were developed to provide sufficient flexibility to be effective and equitable, while also consistent with requirements set by MDOT where practical. In short, for "retrofit" corridor study areas like this it is impractical to try to meet exact spacing standards, but the goal is to at least get closer to those standards by eliminating or relocating unnecessary commercial driveways or redesign them for safer use.

The introduction of this report mentioned several benefits that typically result from consistent use of an access management plan. To achieve those benefits, access standards must adhere to the following principles:

- **Design for efficient and safe access.** Identify driveway design criteria that promote safe and efficient ingress and egress at driveways.
- **Separate the conflict areas.** Reduce the number of driveways, increase the spacing between driveways and between driveways and intersections, and reduce the number of poorly aligned driveways.
- **Remove turning vehicles or queues from the through lanes.** Reduce both the frequency and severity of conflicts by providing separate lanes and storage areas for turning vehicles and queues.
- **Limit the types of conflicts.** Reduce the frequency of conflicts or reduce the area of conflict at driveways by limiting or preventing certain kinds of movements.
- **Preserve public investment and the integrity of the roadway.** Recognize that

substantial public funds have been, and will need to be, invested to develop the corridors to move traffic safely and efficiently.

- **Provide reasonable access.** Recognize that the public desires convenient access and property owners have the inherent right to reasonable access to public roadways. In some cases that reasonable access may be fewer access points than a property owner desires or it may be indirect or shared access in some instances.

Improved driveway spacing simplifies driving by reducing the amount of information that a driver must process and react to. Locating a driveway away from the operational area of a signalized intersection decreases the potential for congestion and crashes, for both through

***“Improved driveway spacing simplifies driving by reducing the amount of information to which a driver must process and react.”***

traffic and vehicles using the driveway. Proper spacing between driveways and unsignalized roadways (or other driveways) can reduce confusion that require drivers to watch for ingress and egress traffic at several points at the same time, while also controlling their vehicle and monitoring other traffic ahead of and behind them. As noted earlier, the primary, overriding theme of any access management plan is to increase the safety of the study area corridor(s).

The following sections discuss a few of the basic access design criteria that were used during the analysis of the M-22 study area. The specific ways in which these criteria or standards are applied to the corridor is outlined later in the chapter.

### **Access Design Parameters**

Access management involves a series of tools to limit and separate traffic conflict points, separate turning vehicles from through movements, locate traffic signals (if applicable) to facilitate traffic flow, and limit direct access on higher speed roads to preserve capacity and improve safety. The following is a summary of what access management standards typically include.

- **Number of Access Points:** The number of access points to a development should be limited to one where possible. The number of driveways allowed along M-22 will affect traffic flow, ease of driving, pedestrian elements, and crash potential. Every effort should be made to limit the number of driveways and encourage access off side streets, service drives, frontage roads, and shared driveways. Driveways should be properly spaced from one another and from intersections with other major streets.

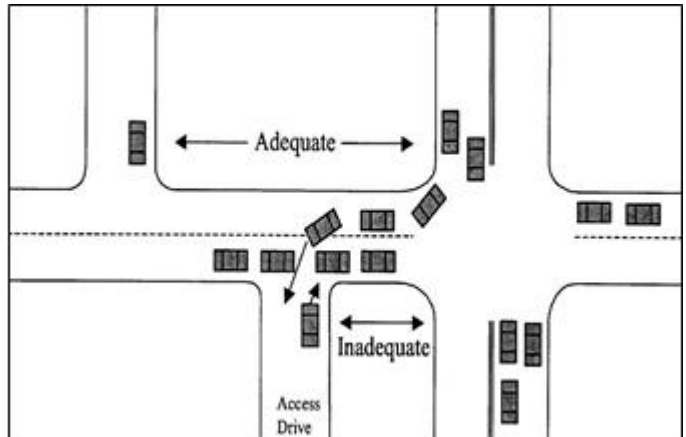
Access to a parcel should generally consist of a single driveway, and be shared with adjacent parcels wherever possible. Certain developments generate enough traffic to consider allowing more than one driveway. Although not generally applicable to this M-22 study area, larger parcels with frontages of at least 660 feet may also warrant an additional driveway. An additional driveway should only be considered following a

traffic impact study that demonstrates the need for additional access. Where possible, the second access point should be located on a side street or be shared with adjacent land uses.

- **Driveway Spacing from Intersections:** Driveways need to be placed such that there is proper spacing from an intersecting street, to ensure that traffic entering or exiting a driveway does not conflict with intersection traffic. Spacing between a proposed driveway and an existing public street intersection is an important design element that must be identified. Typical standards take into account the type of roadways involved (trunkline, arterial, etc.), type of intersection control and type of access requested. In most cases, a driveway should not be developed within the functional boundary of a given intersection, unless the size of the parcel and other constraints do not provide a good alternative.

Generally, for roadways such as M-22 that have a 40 mph posted speed limit, full movement driveways should be a minimum of 460 feet away from any

signalized intersection and 230 feet away from an unsignalized intersection. Such distances are typically not attainable in lower speed zones (25 – 35 mph) but a minimum of 150-200 feet should still be pursued. This speed zone is not currently applicable to M-22 itself, but it is to the side roads such as Cherry Bend, Grandview, etc.



In this case it is recognized that attaining such driveway spacing on corridors like M-22 that are highly developed isn't practical. In retrofit or older developed areas where existing parcel constraints prohibit proper spacing, driveways should be placed as far as possible away from the intersection. In most areas of the corridors, spacing of driveways on the side roads should be at least 150 feet from the nearest edge of the M-22 pavement. Driveways to side roads that are under the jurisdiction of the LCRC must meet their current standards.

- **Driveway Spacing from Other Driveways:** Driveways also need to provide proper spacing from other driveways, to ensure that turning movement conflicts are minimized. Generally, the greater the speed along the roadway the greater the driveway spacing should be.

Spacing standards recommended for this corridor study area are based upon MDOT guidelines adopted several years ago (supported by numerous national references). Guidelines require the following minimum distances between driveways (centerline to centerline) based on a measured average speed. For M-22, with a consistent speed limit of 40 mph, a 300-foot minimum spacing is desired as noted in Table 3.

**Table 3. Minimum Driveway Spacing**

| <u>Posted Speed (MPH)</u> | <u>Minimum Driveway Spacing</u> |
|---------------------------|---------------------------------|
| 25                        | 130 feet                        |
| 30                        | 185 feet                        |
| 35                        | 245 feet                        |
| 40                        | 300 feet                        |
| 45                        | 350 feet                        |
| 50+                       | 455 feet                        |

As with the driveway-to-intersection criteria, it will be difficult to attain this level of spacing in the retrofit areas of the corridor. So the primary goal is to close/combine driveways that maximize driveway spacing to the extent practical whenever opportunities arise.

- Driveway Alignment or Offset:** In order to prevent left turn conflicts, driveways should be aligned with those across the street or offset a sufficient distance to prevent turning movement conflicts. Proper offsets of 250 – 325 feet are difficult to achieve in retrofit corridors, so the goal again is to realign driveways as much as possible or close those that create very poor offset situations. Addressing left-turn offset issues are important as the majority of crashes at access points are related to left turns.
- Shared Driveways:** Sharing or joint use of a driveway by two or more property owners should be encouraged. This will require a written easement from all affected property owners (during the site plan approval process). Where a future shared access is desired, the developer or landowner should deed an easement that will be provided to future adjacent land owners.
- Alternative Access:** Alternative access should be encouraged, such as rear service drives or frontage roads. Where parcels have frontage on M-22 and a side street, access should be provided off of the side street. Certain turning movements should be limited, especially left turns, where safety hazards may be created or traffic flow may be affected.
- Service Drives:** Frontage roads, rear service drives, shared driveways, and connected parking lots should all be used to minimize the number of driveways, while preserving the property owner's right to reasonable access. Such facilities provide customers with access to multiple shopping/commercial sites without re-entering M-22 and experiencing conflicts and higher speeds. In areas within one-quarter mile of existing or





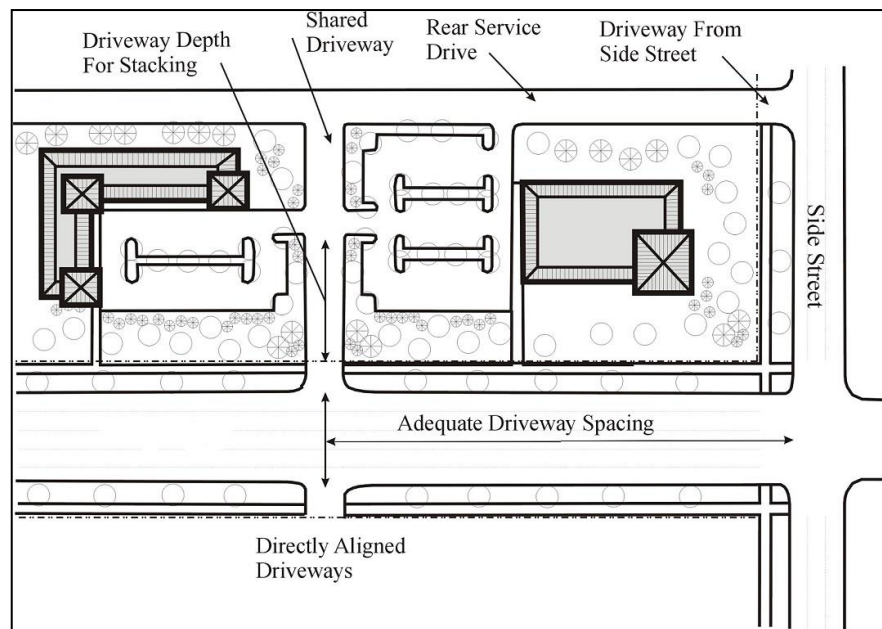
potential future signal locations, access to individual properties should be provided by these alternative access methods, rather than by direct connection to a major roadway.

*In areas where service drives or additional internal connections are proposed or recommended, but adjacent properties have not yet developed, the site should be designed to accommodate a future service drive, with access easements provided. MDOT or the LCRC (if applicable) may temporarily grant individual properties a direct connection to a major road until the frontage road or service drive is constructed. This access point should be closed by the property owner when the frontage road or service drive is constructed by the property owner.*

The safety and efficiency of all of these types of facilities is only as good as their design allows. An important, but often overlooked, aspect of that design is the "storage" (or depth for stacking) provided at driveways. This is the distance between the main road and the service drive or the first internal crossing access. This storage needs to be deep enough to accommodate the expected vehicle queues and to reduce the chance of blocking internal circulation on the service drive. The correct depth is also needed to reduce the possibility of entering vehicles backing up into M-22 due to internal congestion. Correct location and maintenance of traffic control signs and pavement markings are essential to a smooth operation of these shared driveways.

***"Shared access drives, service drives or frontage roads all serve to minimize the number of conflict points along a corridor while still providing reasonable access to the adjacent land uses."***

There are several factors that affect the determination of the best alignment and depth of a service drive. Those factors include the existing right-of-way at that location on M-22, the depth of the adjacent parcels and the location of existing buildings in partially



developed sections of the corridor. The storage should be at least 40 feet for drives providing access to two small commercial uses. The storage should be at least 60 to 100 feet and potentially much more than that (150 - 300 feet) for drives providing

access to more than two small commercial uses. The storage depth depends upon the trip generation characteristics of the existing and proposed long term land use to be served.

Rear service drives are often preferred because they do not create issues with driveway depth. They also facilitate placing parking to the rear of buildings and moving the buildings closer to the road. Rear service drives also have the added benefit of facilitating integrated access and circulation with development further to the rear. On larger sites, these rear service drives can be designed to function similar to roads by interconnecting multiple sites.

Service drives are usually constructed and maintained by the property owner or an association of adjacent owners. The service drive itself should be constructed to public roadway standards, in regard to cross section (ie. 22-30 feet wide), materials, design and alignment, as well as turning lanes where needed. The design is often based upon the type and size of vehicles it will need to accommodate, including large delivery trucks. However, an easement that defines a service drive does not need to be nearly as wide as a public street right-of-way. Since, by definition, these internal service drives will be serving several uses, with numerous driveways, additional uses such as on-street parking (temporary or otherwise) should be allowed only under special circumstances.

- **Sight Distance:** There are very few existing sight distance limitations in the study area. The minimum sight distance required for a vehicle to safely enter the M-22 traffic stream or one of the side streets is determined by MDOT and/or the LCRC at the time of an application for a driveway permit. The township should continue to coordinate with MDOT on M-22 at the time of site plan review to ensure that sight distance requirements can be met. If this distance cannot be met on the site, indirect access through another property should be sought.

Implementation of the above access criteria and elements will help to preserve the capacity, safety, and useful life of this M-22 corridor in its present state. Travel time and congestion will be decreased and the potential for crashes will be reduced. While initially individual land owners may see the plan as restricting access to their property, over the long term a well-managed plan will improve access to properties, maintain travel efficiency, and enhance the economic prosperity of local businesses. A strong access management program also has the benefit of closely coordinating land use and transportation decisions to improve the overall quality of life in this Greilickville corridor study area of Elmwood Township.

## **ACCESS MANAGEMENT RECOMMENDATIONS**

The access management plan/recommendations developed for the M-22 corridor study were based upon the analysis of existing access conditions and constraints, input from stakeholders, local officials and property owners, and review of MDOT, national, local, and other states access guidelines. However, developing standards to be used for future access



management considerations are only part of the picture. The other key element for any access management plan is to identify improvements to existing access systems that will reduce crash potential and provide better efficiency within the corridor study area. These corrections are typically referred to as retrofit access improvements.

As noted during the meetings with the stakeholders, in most areas of the corridor it may be difficult to retrofit it to meet current spacing guidelines for new driveways. In those cases, however, the goal is still to minimize the number of driveways and comply with MDOT

***It should be recognized that many of the retrofit improvements recommended in the plan can likely only be implemented when an owner or developer approaches the Township or MDOT/LCRC during the next site plan approval process.***

standards to the extent practical. It should be recognized that many of the retrofit improvements recommended in the plan can likely only be implemented when an owner or developer approaches the Township or MDOT/LCRC during the next site plan approval process. Alternatively, in the event of a change or expansion of an existing land use, implementation may occur with the landowner’s consent during a future roadway improvement or underground utility project.

This plan should be viewed as a flexible document that is subject to adjustments and improvements as the study area develops/redevelops. Although the basic design concepts should remain in place, exact locations and configurations of driveways, service drives, and frontage roads may shift as future development plans come into focus.

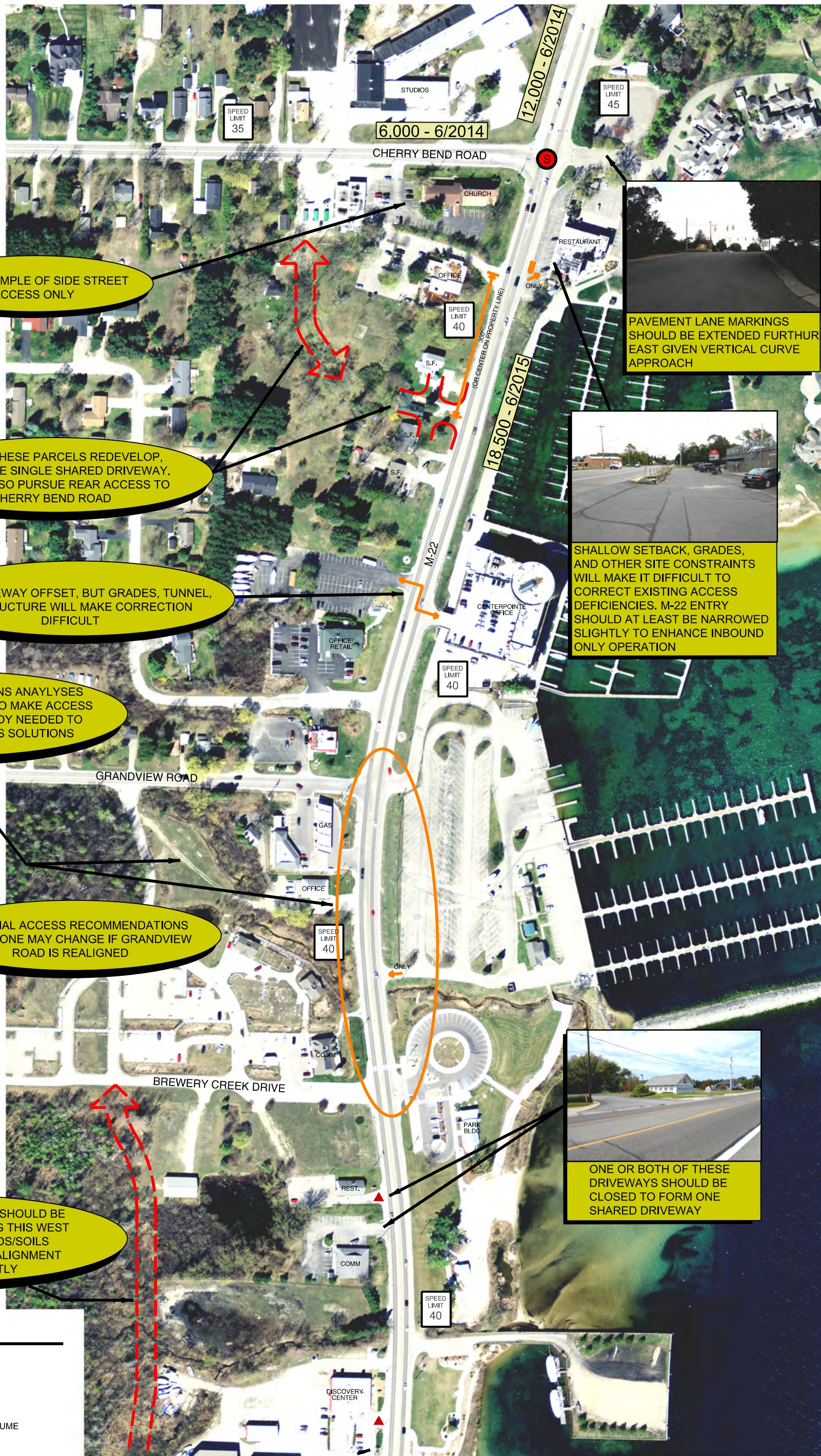
The recommendations of the Access Management Plan are largely based on parcel configurations and future land use plans in place at the time that this plan was prepared. *Property combinations and unified development of small parcels is strongly encouraged.* In addition, existing parcels should only be divided if a coordinated access system is retained through signed agreements and illustrated on an approved site plan.

The following discussions regarding access management plan recommendations are general in nature and do not discuss each site on an individual basis, although some sites are noted of special significance. The discussion and graphics start with the north half of the corridor study area on Figure 4 and then the south half on Figure 5.

**M-22 North – Cherry Bend Road to the Discovery Center**

Figure 4 illustrates the access management recommendations developed for this northern portion of the study area. This part of M-22 is largely developed but with fewer commercial driveways that it’s southern counterpart. Even so, there are several recommendations to close or combine poorly spaced driveways or revise a substandard driveway design when the opportunity arises. Given the potential for development/redevelopment on the west side of M-22 just south of Cherry Bend Road and within the Brewery Creek site and to the





GOOD EXAMPLE OF SIDE STREET ACCESS ONLY

IF/WHEN THESE PARCELS REDEVELOP, SHOULD USE SINGLE SHARED DRIVEWAY. SHOULD ALSO PURSUE REAR ACCESS TO CHERRY BEND ROAD

POOR DRIVEWAY OFFSET, BUT GRADES, TUNNEL, AND STRUCTURE WILL MAKE CORRECTION DIFFICULT

RESULTS OF FUTURE CONDITIONS ANALYSES DO NOT ALLOW FOR CONTROLS TO MAKE ACCESS MORE FOCUSED. FURTHER STUDY NEEDED TO PIN DOWN LONG TERM ACCESS SOLUTIONS FOR MARINA

POTENTIAL ACCESS RECOMMENDATIONS IN THIS ZONE MAY CHANGE IF GRANDVIEW ROAD IS REALIGNED

REAR SERVICE DRIVE SYSTEM SHOULD BE STRONGLY CONSIDERED ALONG THIS WEST SIDE IF POTENTIAL WETLANDS/SOILS ISSUES CAN BE ADDRESSED. ALIGNMENT CAN VARY SIGNIFICANTLY

PAVEMENT LANE MARKINGS SHOULD BE EXTENDED FURTHER EAST GIVEN VERTICAL CURVE APPROACH

SHALLOW SETBACK, GRADES, AND OTHER SITE CONSTRAINTS WILL MAKE IT DIFFICULT TO CORRECT EXISTING ACCESS DEFICIENCIES. M-22 ENTRY SHOULD AT LEAST BE NARROWED SLIGHTLY TO ENHANCE INBOUND ONLY OPERATION

ONE OR BOTH OF THESE DRIVEWAYS SHOULD BE CLOSED TO FORM ONE SHARED DRIVEWAY

- LEGEND**
- SPEED LIMIT IN AREA
  - AVERAGE DAILY TRAFFIC VOLUME
  - SIGNAL OR FLASHING BEACON
  - RECOMMENDED DRIVEWAY CLOSURE
  - RECOMMENDED NEW/RELOCATED DRIVEWAY
  - RECOMMENDED CROSS ACCESS
  - RECOMMENDED SERVICE DRIVE (ALIGNMENT CAN VARY)

# M-22 CORRIDOR STUDY ACCESS MANAGEMENT RECOMMENDATIONS (NORTH HALF)



ELMWOOD TOWNSHIP  
AERIAL PHOTOGRAPHY PROVIDED BY LEEANAU COUNTY  
DATE OF PHOTOGRAPHY: 2014

NO SCALE  
progressive|ae

1811 4 Mile Rd N.E., Grand Rapids, MI 49525  
616 361 2664 OFFICE 616 361 1493 FAX  
www.progressiveae.com

FIGURE 4



south, the Township should consider long term development of coordinated service drive systems. The alignment of those rear service drives can take many forms and will be defined in part by wetland and other constraints. But such service drives can pay big dividends by allowing access to side streets and/or providing additional access/egress options for individual site patrons, and generally leading to fewer access points along M-22 in the long term.

The one segment of the corridor study area where this plan was not able to fully pin down any specific access management improvements is adjacent to the Elmwood Marina. Many potential improvements were identified and discussed, but constraints related to marina operations, park circulation, creek location, existing building locations, and grades have made it difficult to make definitive short or long term recommendations. It is hoped that this matter will be taken up as part of future study efforts.

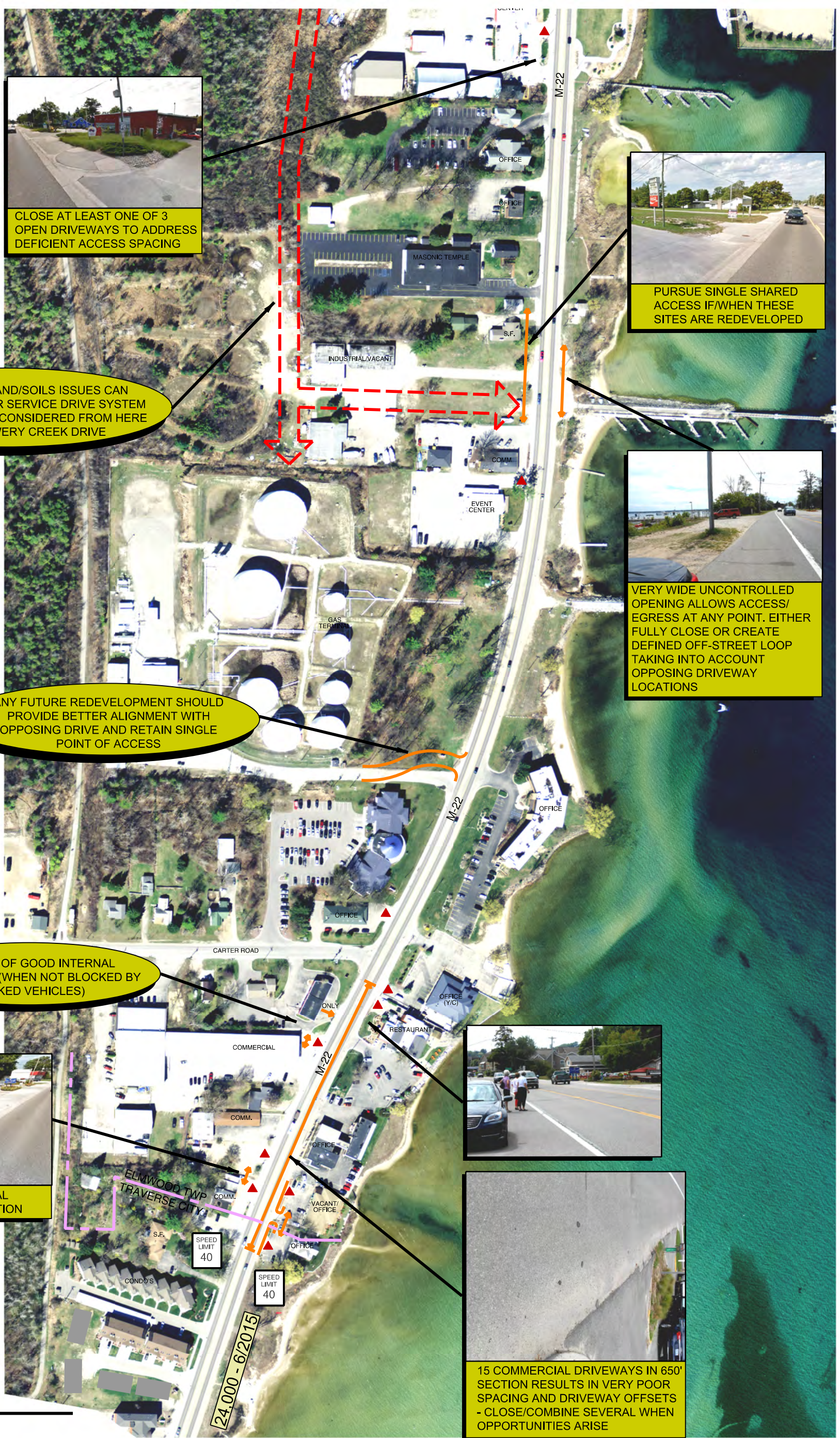
### **M-22 South – Discovery Center to South County/Township Line**

Figure 5 illustrates the access management recommendations developed for this southern portion of the study area. Like much of the overall corridor, this section is highly developed/redeveloped so the efforts here will be almost exclusively of the retrofit nature. Therefore, most of the recommendations are related to adjusting existing driveways/access points.

Driveway closures are easily the most consistent recommendation, particularly on the extreme southern portion of this section. As noted earlier in this report, this segment has many small sites with multiple driveways. The sites were largely developed/ approved many years ago within small parcels and prior to current knowledge of the negative safety impacts of poor spacing. There is a subsection just south of Carter Road where excessive and/or poorly spaced commercial drives are especially prevalent. The plan calls for the closure or relocation of approximately eight of the fifteen commercial driveways on M-22 in this 700-foot subsection.







CLOSE AT LEAST ONE OF 3 OPEN DRIVEWAYS TO ADDRESS DEFICIENT ACCESS SPACING

PURSUe SINGLE SHARED ACCESS IF/WHEN THESE SITES ARE REDEVELOPED

IF POTENTIAL WETLAND/SOILS ISSUES CAN BE ADDRESSED, A REAR SERVICE DRIVE SYSTEM SHOULD BE STRONGLY CONSIDERED FROM HERE NORTH TO BREWERY CREEK DRIVE

VERY WIDE UNCONTROLLED OPENING ALLOWS ACCESS/EGRESS AT ANY POINT. EITHER FULLY CLOSE OR CREATE DEFINED OFF-STREET LOOP TAKING INTO ACCOUNT OPPOSING DRIVEWAY LOCATIONS

ANY FUTURE REDEVELOPMENT SHOULD PROVIDE BETTER ALIGNMENT WITH OPPOSING DRIVE AND RETAIN SINGLE POINT OF ACCESS

EXAMPLE OF GOOD INTERNAL CONNECTION (WHEN NOT BLOCKED BY PARKED VEHICLES)

IMPROVE INTERNAL GRAVEL CONNECTION

15 COMMERCIAL DRIVEWAYS IN 650' SECTION RESULTS IN VERY POOR SPACING AND DRIVEWAY OFFSETS - CLOSE/COMBINE SEVERAL WHEN OPPORTUNITIES ARISe

- LEGEND
- SPEED LIMIT IN AREA
  - AVERAGE DAILY TRAFFIC VOLUME
  - SIGNAL OR FLASHING BEACON
  - RECOMMENDED DRIVEWAY CLOSURE
  - RECOMMENDED NEW/RELOCATED DRIVEWAY
  - RECOMMENDED CROSS ACCESS
  - RECOMMENDED SERVICE DRIVE (ALIGNMENT CAN VARY)

## M-22 CORRIDOR STUDY ACCESS MANAGEMENT RECOMMENDATIONS (SOUTH HALF)

ELMWOOD TOWNSHIP  
AERIAL PHOTOGRAPHY PROVIDED BY LEELANAU COUNTY  
DATE OF PHOTOGRAPHY: 2014

NO SCALE  
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FIGURE 5



Another important recommendation includes an extended rear service drive along the west side of M-22 as noted earlier. It appears the best location to bring a consolidated access point for a connection to M-22 would be in/adjacent to the currently vacant business site located just north of the Bluewater Hall Event Center. If/when the former Marathon gas terminal site redevelops, the additional extension of the service drive could be made to the south. In any case, this rear service drive could provide additional (or only) access/egress points for businesses along the M-22 frontage, and potentially allow patrons to access multiple sites between here and Grandview Road without having to use M-22.

## 5. CONCLUSIONS

The chapters of this report have summarized the current traffic and access management conditions along the M-22 Commercial Corridor study area, along with analyses and recommendations for applicable future improvements that will help provide an improved environment for all corridor study area users. Keeping in mind that this study is based upon annual near-peak conditions (June), the key conclusions that were drawn by the review and analyses efforts are as follows.

- Analyses indicate that potential development around the Brewery Creek Drive/ Grandview Road area could generate enough side street traffic within ten years (or sooner) to warrant a signal (or roundabout) on M-22 in that area, assuming a re-alignment of Grandview Road and/or more dense development than is currently expected. However, intersection capacity calculations show that M-22 would need to be widened to a 5-lane cross section at that intersection and for a considerable length in each direction in order to allow it to safely function within acceptable levels. In short, meeting a signal warrant isn't the key/only issue, it's also a matter of addressing the very heavy through traffic volumes on M-22.
- There are numerous deficiencies in the existing driveway access system that can be largely addressed in the long term by a combination of closed or relocated driveways, development of shared access points, and development of front or rear service drives.
- Although not part of this study, discussions among stakeholders included the long term potential for developing/constructing an adjacent alternative parallel route for M-22, thereby removing most of the existing through traffic in this subarea that could result in a much more local user friendly environment.
- The M-72/M-22 intersection already experiences significant congestion during peak hours that, at times, leads to queuing and other issues well into the primary study area to the north on M-22. As regional development and related traffic continues to grow, the congestion will worsen. To that end, MDOT is planning to do a congestion management analysis of this intersection.



# **Technical Appendix**

## **M-22 Greilickville Subarea Corridor Study**

- **Level of Service Definitions**
- **Glossary**
- **Count/Data Summaries**
- **LoS Analyses Results**
- **Signal Warrant Output**
- **Meeting/presentation materials**
- **Other background information**





## **Level of Service Definitions**

### **Signalized Intersections**

- Level of Service A:** Describes operations with very low average stopped delay, i.e., less than 10.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
- Level of Service B:** Describes operations with an average stopped delay in the range of 10.0 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
- Level of Service C:** Describes operations with an average stopped delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- Level of Service D:** Describes operations with an average stopped delay in the range of 35.1 to 55.0 seconds per vehicle. At Level of Service D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c (volume/capacity) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
- Level of Service E:** Describes operations with an average stopped delay in the range of 55.1 to 80.0 seconds per vehicle. This is considered to be the limit of acceptable delay in many cases. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are a frequent occurrence.
- Level of Service F:** Describes operations with an average stopped delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

## **Level of Service Definitions**

### **Unsignalized Intersections**

|                            |   |
|----------------------------|---|
| <b>Level of Service A:</b> | Average delay per vehicles for impeded movements is less than 10 seconds. There is little or no delay with typically low side street and/or main street traffic.          |
| <b>Level of Service B:</b> | Average stopped delays from 10.1 seconds to 15.0 seconds. Short delays, many acceptable gaps in main street traffic stream.   |
| <b>Level of Service C:</b> | Average delay per vehicle ranges from 15.1 to 25.0 seconds. Average traffic delays with frequent gaps in main street traffic.   |
| <b>Level of Service D:</b> | Average delays from 25.1 to 35.0 seconds for impeded movements. Long traffic delays for impeded movements due in part to a limited number of acceptable gaps.             |
| <b>Level of Service E:</b> | Average delays in the 35.1 to 50.0 second range. May experience very long delays for impeded movements with a very small number of acceptable gaps in the traffic stream. |
| <b>Level of Service F:</b> | Average vehicle delays of over 50.0 seconds. Extreme traffic delays with virtually no acceptable gaps in main street traffic.   |

## Glossary

**Approach:** A set of lanes accommodating all left-turn, through, and right-turn movements arriving at an intersection from a given direction.

**Arterial:** Signalized streets that serve primarily through traffic and provide access to abutting properties as a secondary function.

**Average Stopped Delay:** The total time vehicles are stopped in an intersection approach or lane group during a specified time interval divided by the volume departing from the approach or lane group during the same time period, in seconds per vehicle.

**Background Traffic:** Traffic volumes that will be on the roadway network without the presence of the proposed development.

**Bypass Lane:** A one-lane widening on a two-lane roadway that allows through traffic to pass by waiting left-turn traffic.

**Capacity:** The maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions; usually expressed as vehicles per hour or persons per hour.

**Conflicting Traffic Volume:** The volume of traffic which conflicts with a specific movement at an intersection.

**Corridor:** A lineal study area aligned with a roadway facility in which traffic, land use, right-of-way, environmental, and other factors are evaluated to determine future transportation facility needs.

**Cycle:** Any complete sequence of traffic signal indications.

**Cycle Length:** The total time for a traffic signal to complete one cycle.

**Design Hour Volume:** The traffic volume for the design hour, usually a forecast of the relevant peak hour volume, in vehicles per hour.

**Diverted Linked Trips:** Trips from the traffic volume on roadways within the vicinity of the generator but which requires a diversion from that roadway to another roadway to gain access to the site.

**Driveway Offset:** Distance between driveways on opposite sides of a roadway, measured parallel to roadway.

**Freeway:** A multi-lane divided highway having a minimum of two lanes for exclusive use of traffic in each direction and full control of access and egress.

**Gaps (Critical Gap):** The median time headway between vehicles in a major traffic stream which will permit side-street vehicles to cross through or merge with the major traffic stream.

**Green Time:** The actual length of the "green" indication for a given movement at a signalized intersection.

**Level of Service:** A qualitative measure describing operational conditions within a traffic stream; generally described in terms of such factors as speed and travel time, delay, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

**Operational Analysis:** A use of capacity analysis to determine the prevailing level of service on an existing or projected facility, with known or projected traffic, roadway, and control conditions. This analysis can involve a particular location, such as an intersection or a corridor.

**Pass-by Trips:** Trips made as intermediate stops on the way from an origin to a primary trip destination.

**Peak Hour (AM):** The one hour period in the morning representing the highest hourly volume of traffic flow on the adjacent public street system.

**Peak Hour (PM):** The one hour period in the afternoon or evening representing the highest hourly volume of traffic flow on the adjacent public street system.

**Peak Hour Factor:** The hourly volume during the maximum volume hour of the day divided by four times the peak 15-minute flow within the peak hour; a measure of traffic demand fluctuation within the peak hour.

**Phase:** The part of the signal cycle allocated to any combination of traffic movements receiving the right-of-way simultaneously during one or more intervals.

**Roadway Conditions:** Geometric characteristics of a street or highway, including the type of facility, number and width of lanes (by direction), shoulder widths and lateral clearances, design speed, etc.

**Service Drive:** A roadway (usually private) that provides internal access to two or more uses.

**Site Traffic:** Existing or projected vehicular traffic generated by the development.

**Study Area:** The geographic area containing site access points and critical intersections (and connecting highway segments) which are impacted by the site-traffic generated by the development, and should be evaluated.

**System Improvements:** Added lanes, signal improvements, and other roadway improvements not considered site-related improvements.

**Traffic Impact:** The adverse impact on intersection Level of Service and/or street and highway safety and operations as determined by the criteria and procedures set forth in this handbook.

**Trip (Directional Trip):** A single or one-direction vehicle movement with either the origin or the destination (exiting or entering) inside a study site.

**Trip Distribution:** The distribution or assignment of site traffic into site driveways and study area roadways/intersections based upon expected direction of approach and departure.

**Unsignalized Intersection:** Any intersection not controlled by traffic signals.

**Volume:** The number of persons or vehicles passing a point on a lane or roadway during some time interval, such as one hour or during an average day.

**Volume-to-Capacity Ratio (V/C):** The ratio of demand flow rate to capacity for a traffic facility.

## **COUNT/DATA SUMMARIES**





# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Cherry Bend**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovision Video SCU 24L**

**File Name : TMC1\_M-22&CherryBend\_6-24-15**  
**Site Code : TMC\_1**  
**Start Date : 6/24/2015**  
**Page No : 1**

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

| Start Time      | Bay Shore Drive (M-22) Southbound |      |      |      |            | Marina Village Drive Westbound |      |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |      |            | Cherry Bend Road Eastbound |      |      |      |            | Int. Total |
|-----------------|-----------------------------------|------|------|------|------------|--------------------------------|------|------|------|------------|-----------------------------------|------|------|------|------------|----------------------------|------|------|------|------------|------------|
|                 | Rgt                               | Thru | Left | Peds | App. Total | Rgt                            | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total | Rgt                        | Thru | Left | Peds | App. Total |            |
| 07:00 AM        | 3                                 | 71   | 0    | 0    | 74         | 0                              | 0    | 1    | 0    | 1          | 1                                 | 43   | 17   | 0    | 61         | 53                         | 0    | 1    | 0    | 54         | 190        |
| 07:15 AM        | 2                                 | 86   | 1    | 0    | 89         | 0                              | 0    | 0    | 0    | 0          | 1                                 | 60   | 21   | 0    | 82         | 70                         | 0    | 0    | 0    | 70         | 241        |
| 07:30 AM        | 2                                 | 131  | 0    | 0    | 133        | 0                              | 0    | 5    | 0    | 5          | 2                                 | 73   | 20   | 0    | 95         | 90                         | 0    | 3    | 0    | 93         | 326        |
| 07:45 AM        | 3                                 | 137  | 0    | 0    | 140        | 0                              | 0    | 3    | 0    | 3          | 3                                 | 64   | 27   | 0    | 94         | 88                         | 2    | 2    | 0    | 92         | 329        |
| Total           | 10                                | 425  | 1    | 0    | 436        | 0                              | 0    | 9    | 0    | 9          | 7                                 | 240  | 85   | 0    | 332        | 301                        | 2    | 6    | 0    | 309        | 1086       |
| 08:00 AM        | 1                                 | 119  | 0    | 0    | 120        | 0                              | 0    | 3    | 0    | 3          | 1                                 | 79   | 38   | 0    | 118        | 76                         | 1    | 2    | 0    | 79         | 320        |
| 08:15 AM        | 1                                 | 109  | 0    | 0    | 110        | 0                              | 0    | 1    | 0    | 1          | 1                                 | 78   | 23   | 0    | 102        | 66                         | 0    | 0    | 0    | 66         | 279        |
| 08:30 AM        | 6                                 | 105  | 0    | 0    | 111        | 0                              | 0    | 1    | 0    | 1          | 2                                 | 71   | 35   | 0    | 108        | 64                         | 0    | 5    | 0    | 69         | 289        |
| 08:45 AM        | 3                                 | 99   | 0    | 0    | 102        | 0                              | 0    | 1    | 0    | 1          | 3                                 | 78   | 37   | 0    | 118        | 63                         | 0    | 4    | 0    | 67         | 288        |
| Total           | 11                                | 432  | 0    | 0    | 443        | 0                              | 0    | 6    | 0    | 6          | 7                                 | 306  | 133  | 0    | 446        | 269                        | 1    | 11   | 0    | 281        | 1176       |
| **** BREAK **** |                                   |      |      |      |            |                                |      |      |      |            |                                   |      |      |      |            |                            |      |      |      |            |            |
| 04:00 PM        | 6                                 | 107  | 2    | 0    | 115        | 0                              | 2    | 12   | 0    | 14         | 5                                 | 104  | 37   | 0    | 146        | 61                         | 1    | 5    | 0    | 67         | 342        |
| 04:15 PM        | 4                                 | 128  | 0    | 0    | 132        | 1                              | 1    | 6    | 0    | 8          | 8                                 | 99   | 55   | 0    | 162        | 59                         | 1    | 6    | 0    | 66         | 368        |
| 04:30 PM        | 0                                 | 118  | 1    | 0    | 119        | 1                              | 5    | 7    | 0    | 13         | 18                                | 116  | 50   | 0    | 184        | 69                         | 0    | 5    | 0    | 74         | 390        |
| 04:45 PM        | 2                                 | 124  | 0    | 0    | 126        | 2                              | 1    | 12   | 0    | 15         | 10                                | 140  | 35   | 0    | 185        | 66                         | 2    | 5    | 0    | 73         | 399        |
| Total           | 12                                | 477  | 3    | 0    | 492        | 4                              | 9    | 37   | 0    | 50         | 41                                | 459  | 177  | 0    | 677        | 255                        | 4    | 21   | 0    | 280        | 1499       |
| 05:00 PM        | 3                                 | 117  | 0    | 0    | 120        | 0                              | 3    | 8    | 2    | 13         | 21                                | 136  | 66   | 0    | 223        | 51                         | 0    | 4    | 0    | 55         | 411        |
| 05:15 PM        | 4                                 | 126  | 2    | 0    | 132        | 1                              | 2    | 15   | 0    | 18         | 12                                | 117  | 68   | 0    | 197        | 60                         | 2    | 7    | 0    | 69         | 416        |
| 05:30 PM        | 1                                 | 122  | 0    | 0    | 123        | 1                              | 1    | 13   | 0    | 15         | 8                                 | 139  | 52   | 0    | 199        | 59                         | 1    | 2    | 1    | 63         | 400        |
| 05:45 PM        | 4                                 | 112  | 2    | 0    | 118        | 0                              | 2    | 9    | 0    | 11         | 5                                 | 122  | 58   | 0    | 185        | 50                         | 1    | 4    | 0    | 55         | 369        |
| Total           | 12                                | 477  | 4    | 0    | 493        | 2                              | 8    | 45   | 2    | 57         | 46                                | 514  | 244  | 0    | 804        | 220                        | 4    | 17   | 1    | 242        | 1596       |
| Grand Total     | 45                                | 1811 | 8    | 0    | 1864       | 6                              | 17   | 97   | 2    | 122        | 101                               | 1519 | 639  | 0    | 2259       | 1045                       | 11   | 55   | 1    | 1112       | 5357       |
| Apprch %        | 2.4                               | 97.2 | 0.4  | 0    |            | 4.9                            | 13.9 | 79.5 | 1.6  |            | 4.5                               | 67.2 | 28.3 | 0    |            | 94                         | 1    | 4.9  | 0.1  |            |            |
| Total %         | 0.8                               | 33.8 | 0.1  | 0    | 34.8       | 0.1                            | 0.3  | 1.8  | 0    | 2.3        | 1.9                               | 28.4 | 11.9 | 0    | 42.2       | 19.5                       | 0.2  | 1    | 0    | 20.8       |            |
| Pass Cars       | 44                                | 1768 | 8    | 0    | 1820       | 6                              | 17   | 95   | 0    | 118        | 101                               | 1474 | 626  | 0    | 2201       | 1030                       | 10   | 51   | 0    | 1091       | 5230       |
| % Pass Cars     | 97.8                              | 97.6 | 100  | 0    | 97.6       | 100                            | 100  | 97.9 | 0    | 96.7       | 100                               | 97   | 98   | 0    | 97.4       | 98.6                       | 90.9 | 92.7 | 0    | 98.1       | 97.6       |
| Single Units    | 1                                 | 39   | 0    | 0    | 40         | 0                              | 0    | 2    | 0    | 2          | 0                                 | 37   | 11   | 0    | 48         | 11                         | 1    | 3    | 0    | 15         | 105        |
| % Single Units  | 2.2                               | 2.2  | 0    | 0    | 2.1        | 0                              | 0    | 2.1  | 0    | 1.6        | 0                                 | 2.4  | 1.7  | 0    | 2.1        | 1.1                        | 9.1  | 5.5  | 0    | 1.3        | 2          |
| Heavy Trucks    | 0                                 | 4    | 0    | 0    | 4          | 0                              | 0    | 0    | 0    | 0          | 0                                 | 8    | 2    | 0    | 10         | 4                          | 0    | 1    | 0    | 5          | 19         |
| % Heavy Trucks  | 0                                 | 0.2  | 0    | 0    | 0.2        | 0                              | 0    | 0    | 0    | 0          | 0                                 | 0.5  | 0.3  | 0    | 0.4        | 0.4                        | 0    | 1.8  | 0    | 0.4        | 0.4        |
| Ped             | 0                                 | 0    | 0    | 0    | 0          | 0                              | 0    | 0    | 2    | 2          | 0                                 | 0    | 0    | 0    | 0          | 0                          | 0    | 0    | 1    | 1          | 3          |
| % Ped           | 0                                 | 0    | 0    | 0    | 0          | 0                              | 0    | 0    | 100  | 1.6        | 0                                 | 0    | 0    | 0    | 0          | 0                          | 0    | 0    | 100  | 0.1        | 0.1        |

Comments: 4 hour traffic study conducted during typical weekday (Wednesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours. Signalized intersection, no ped. signals. Miovision SCU video camera located within NE intersection quadrant.



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

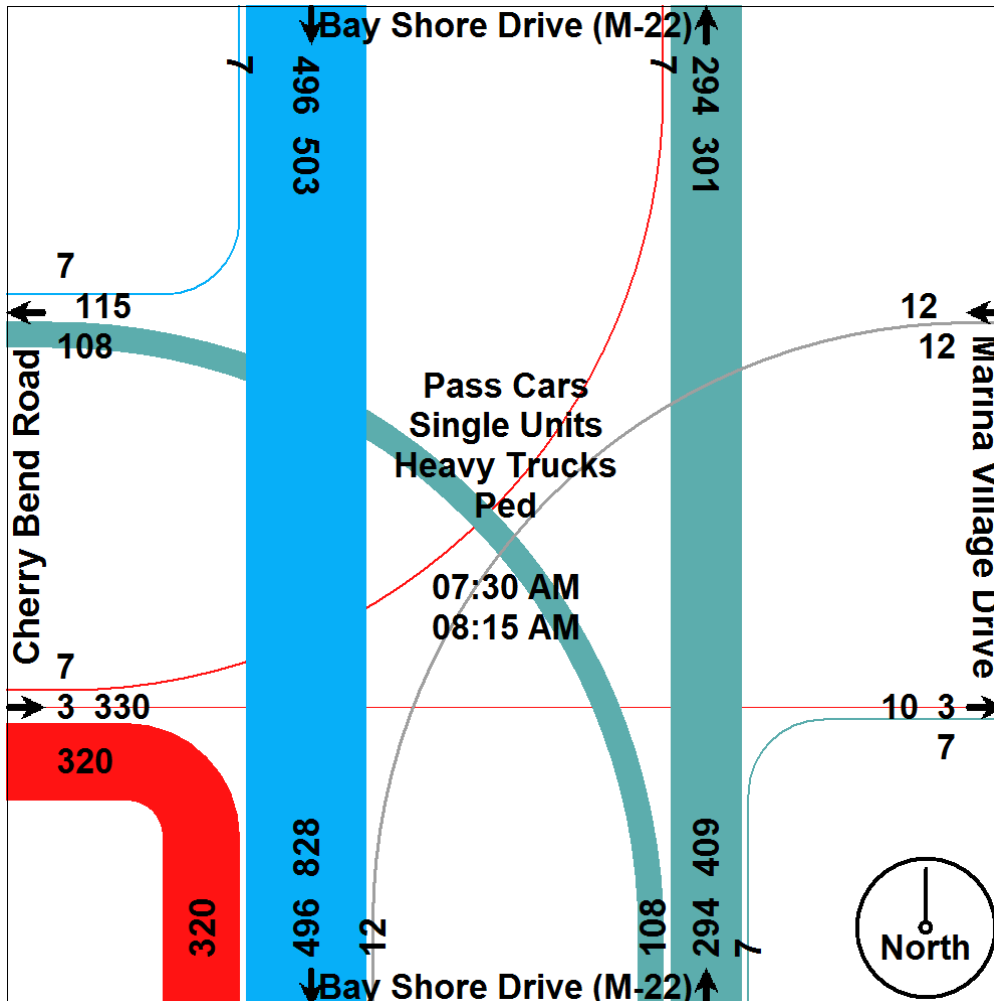
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Cherry Bend**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 24L**

**File Name : TMC1\_M-22&CherryBend\_6-24-15**  
**Site Code : TMC\_1**  
**Start Date : 6/24/2015**  
**Page No : 3**

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Marina Village Drive Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Cherry Bend Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|--------------------------------|------|------|------------|-----------------------------------|------|------|------------|----------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                            | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                        | Thru | Left | App. Total |            |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 |                                   |      |      |            |                                |      |      |            |                                   |      |      |            |                            |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                                   |      |      |            |                                |      |      |            |                                   |      |      |            |                            |      |      |            |            |
| 07:30 AM   | 2                                 | 131  | 0    | 133        | 0                              | 0    | 5    | 5          | 2                                 | 73   | 20   | 95         | 90                         | 0    | 3    | 93         | 326        |
| 07:45 AM   | 3                                 | 137  | 0    | 140        | 0                              | 0    | 3    | 3          | 3                                 | 64   | 27   | 94         | 88                         | 2    | 2    | 92         | 329        |
| 08:00 AM   | 1                                 | 119  | 0    | 120        | 0                              | 0    | 3    | 3          | 1                                 | 79   | 38   | 118        | 76                         | 1    | 2    | 79         | 320        |
| 08:15 AM   | 1                                 | 109  | 0    | 110        | 0                              | 0    | 1    | 1          | 1                                 | 78   | 23   | 102        | 66                         | 0    | 0    | 66         | 279        |
| Total Volume   | 7                                 | 496  | 0    | 503        | 0                              | 0    | 12   | 12         | 7                                 | 294  | 108  | 409        | 320                        | 3    | 7    | 330        | 1254       |
| % App. Total   | 1.4                               | 98.6 | 0    |            | 0                              | 0    | 100  |            | 1.7                               | 71.9 | 26.4 |            | 97                         | 0.9  | 2.1  |            |            |
| PHF  | .583                              | .905 | .000 | .898       | .000                           | .000 | .600 | .600       | .583                              | .930 | .711 | .867       | .889                       | .375 | .583 | .887       | .953       |
| Pass Cars  | 7                                 | 492  | 0    | 499        | 0                              | 0    | 12   | 12         | 7                                 | 273  | 105  | 385        | 316                        | 3    | 6    | 325        | 1221       |
| % Pass Cars  | 100                               | 99.2 | 0    | 99.2       | 0                              | 0    | 100  | 100        | 100                               | 92.9 | 97.2 | 94.1       | 98.8                       | 100  | 85.7 | 98.5       | 97.4       |
| Single Units   | 0                                 | 4    | 0    | 4          | 0                              | 0    | 0    | 0          | 0                                 | 16   | 2    | 18         | 2                          | 0    | 1    | 3          | 25         |
| % Single Units   | 0                                 | 0.8  | 0    | 0.8        | 0                              | 0    | 0    | 0          | 0                                 | 5.4  | 1.9  | 4.4        | 0.6                        | 0    | 14.3 | 0.9        | 2.0        |
| Heavy Trucks   | 0                                 | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                                 | 5    | 1    | 6          | 2                          | 0    | 0    | 2          | 8          |
| % Heavy Trucks   | 0                                 | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                                 | 1.7  | 0.9  | 1.5        | 0.6                        | 0    | 0    | 0.6        | 0.6        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                          | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                          | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

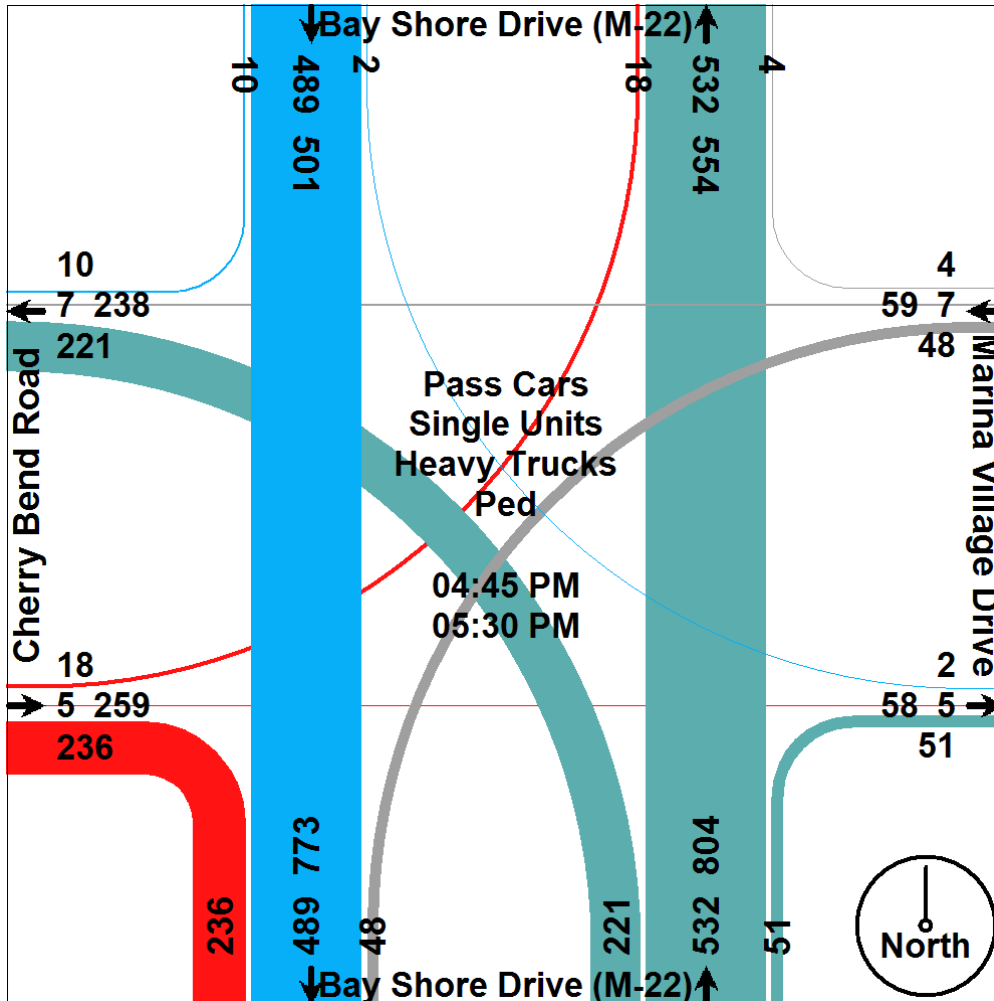
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Cherry Bend**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 24L**

**File Name : TMC1\_M-22&CherryBend\_6-24-15**  
**Site Code : TMC\_1**  
**Start Date : 6/24/2015**  
**Page No : 4**

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Marina Village Drive Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Cherry Bend Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|--------------------------------|------|------|------------|-----------------------------------|------|------|------------|----------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                            | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                        | Thru | Left | App. Total |            |
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 |                                   |      |      |            |                                |      |      |            |                                   |      |      |            |                            |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                                   |      |      |            |                                |      |      |            |                                   |      |      |            |                            |      |      |            |            |
| 04:45 PM   | 2                                 | 124  | 0    | 126        | 2                              | 1    | 12   | 15         | 10                                | 140  | 35   | 185        | 66                         | 2    | 5    | 73         | 399        |
| 05:00 PM   | 3                                 | 117  | 0    | 120        | 0                              | 3    | 8    | 11         | 21                                | 136  | 66   | 223        | 51                         | 0    | 4    | 55         | 409        |
| 05:15 PM   | 4                                 | 126  | 2    | 132        | 1                              | 2    | 15   | 18         | 12                                | 117  | 68   | 197        | 60                         | 2    | 7    | 69         | 416        |
| 05:30 PM   | 1                                 | 122  | 0    | 123        | 1                              | 1    | 13   | 15         | 8                                 | 139  | 52   | 199        | 59                         | 1    | 2    | 62         | 399        |
| Total Volume   | 10                                | 489  | 2    | 501        | 4                              | 7    | 48   | 59         | 51                                | 532  | 221  | 804        | 236                        | 5    | 18   | 259        | 1623       |
| % App. Total   | 2                                 | 97.6 | 0.4  |            | 6.8                            | 11.9 | 81.4 |            | 6.3                               | 66.2 | 27.5 |            | 91.1                       | 1.9  | 6.9  |            |            |
| PHF  | .625                              | .970 | .250 | .949       | .500                           | .583 | .800 | .819       | .607                              | .950 | .813 | .901       | .894                       | .625 | .643 | .887       | .975       |
| Pass Cars  | 9                                 | 474  | 2    | 485        | 4                              | 7    | 47   | 58         | 51                                | 525  | 219  | 795        | 230                        | 4    | 17   | 251        | 1589       |
| % Pass Cars  | 90.0                              | 96.9 | 100  | 96.8       | 100                            | 100  | 97.9 | 98.3       | 100                               | 98.7 | 99.1 | 98.9       | 97.5                       | 80.0 | 94.4 | 96.9       | 97.9       |
| Single Units   | 1                                 | 14   | 0    | 15         | 0                              | 0    | 1    | 1          | 0                                 | 5    | 2    | 7          | 5                          | 1    | 1    | 7          | 30         |
| % Single Units   | 10.0                              | 2.9  | 0    | 3.0        | 0                              | 0    | 2.1  | 1.7        | 0                                 | 0.9  | 0.9  | 0.9        | 2.1                        | 20.0 | 5.6  | 2.7        | 1.8        |
| Heavy Trucks   | 0                                 | 1    | 0    | 1          | 0                              | 0    | 0    | 0          | 0                                 | 2    | 0    | 2          | 1                          | 0    | 0    | 1          | 4          |
| % Heavy Trucks   | 0                                 | 0.2  | 0    | 0.2        | 0                              | 0    | 0    | 0          | 0                                 | 0.4  | 0    | 0.2        | 0.4                        | 0    | 0    | 0.4        | 0.2        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                          | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                          | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

[tdccounts.com](http://tdccounts.com)

Phone: (586) 786-5407

Traffic Study Performed For:

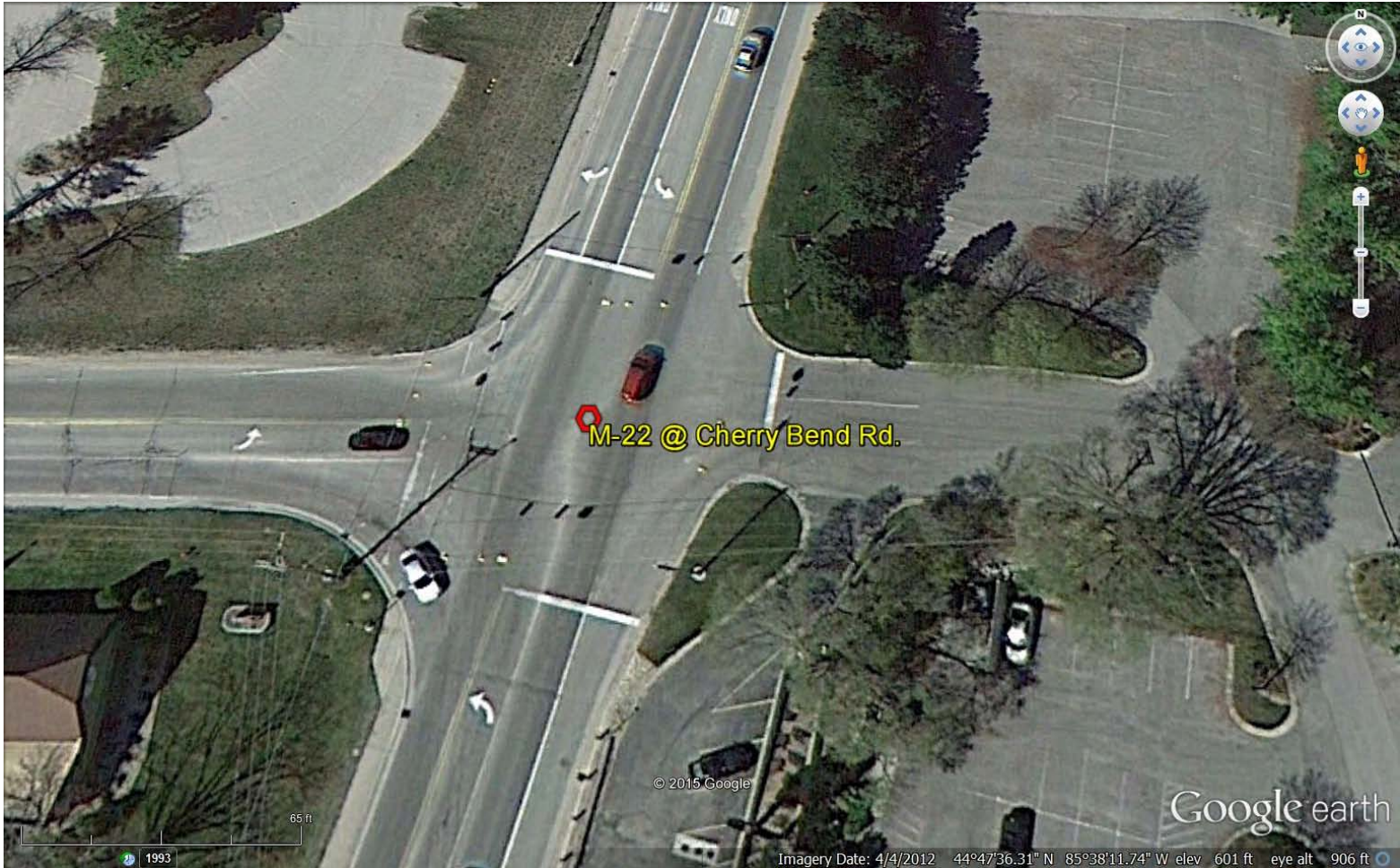
**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & Cherry Bend  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 24L

File Name : TMC1\_M-22&CherryBend\_6-24-15  
Site Code : TMC\_1  
Start Date : 6/24/2015  
Page No : 5

Aerial Photo





# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Grandview**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 4BT**

**File Name : TMC3\_M-22&Grandview\_6-24-15**  
**Site Code : TMC\_3**  
**Start Date : 6/24/2015**  
**Page No : 1**

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

| Start Time | Bay Shore Drive (M-22) Southbound |      |      |      |            | Elmwood Marina Westbound |      |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |      |            | Grandview Road Eastbound |      |      |      |            | Int. Total |
|------------|-----------------------------------|------|------|------|------------|--------------------------|------|------|------|------------|-----------------------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------|
|            | Rgt                               | Thru | Left | Peds | App. Total | Rgt                      | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total | Rgt                      | Thru | Left | Peds | App. Total |            |
| 07:00 AM   | 5                                 | 121  | 1    | 0    | 127        | 0                        | 0    | 0    | 0    | 0          | 0                                 | 56   | 0    | 0    | 56         | 13                       | 0    | 4    | 0    | 17         | 200        |
| 07:15 AM   | 2                                 | 156  | 1    | 0    | 159        | 0                        | 0    | 0    | 0    | 0          | 4                                 | 86   | 0    | 0    | 90         | 17                       | 0    | 4    | 0    | 21         | 270        |
| 07:30 AM   | 3                                 | 219  | 1    | 0    | 223        | 0                        | 0    | 0    | 0    | 0          | 2                                 | 104  | 3    | 0    | 109        | 18                       | 0    | 4    | 0    | 22         | 354        |
| 07:45 AM   | 10                                | 218  | 0    | 0    | 228        | 0                        | 0    | 0    | 0    | 0          | 5                                 | 96   | 9    | 0    | 110        | 20                       | 1    | 7    | 0    | 28         | 366        |
| Total      | 20                                | 714  | 3    | 0    | 737        | 0                        | 0    | 0    | 0    | 0          | 11                                | 342  | 12   | 0    | 365        | 68                       | 1    | 19   | 0    | 88         | 1190       |
| 08:00 AM   | 6                                 | 189  | 0    | 0    | 195        | 0                        | 0    | 0    | 0    | 0          | 9                                 | 118  | 7    | 0    | 134        | 28                       | 1    | 7    | 0    | 36         | 365        |
| 08:15 AM   | 7                                 | 169  | 0    | 0    | 176        | 0                        | 0    | 2    | 0    | 2          | 8                                 | 107  | 5    | 0    | 120        | 23                       | 0    | 4    | 0    | 27         | 325        |
| 08:30 AM   | 4                                 | 167  | 1    | 0    | 172        | 0                        | 0    | 0    | 0    | 0          | 4                                 | 105  | 5    | 0    | 114        | 14                       | 0    | 5    | 1    | 20         | 306        |
| 08:45 AM   | 6                                 | 157  | 1    | 0    | 164        | 0                        | 0    | 0    | 0    | 0          | 2                                 | 121  | 9    | 0    | 132        | 14                       | 0    | 8    | 0    | 22         | 318        |
| Total      | 23                                | 682  | 2    | 0    | 707        | 0                        | 0    | 2    | 0    | 2          | 23                                | 451  | 26   | 0    | 500        | 79                       | 1    | 24   | 1    | 105        | 1314       |
| 09:00 AM   | 9                                 | 169  | 0    | 0    | 178        | 0                        | 0    | 0    | 0    | 0          | 2                                 | 134  | 6    | 0    | 142        | 11                       | 0    | 7    | 0    | 18         | 338        |
| 09:15 AM   | 3                                 | 132  | 1    | 0    | 136        | 0                        | 0    | 3    | 0    | 3          | 5                                 | 122  | 7    | 0    | 134        | 12                       | 0    | 7    | 0    | 19         | 292        |
| 09:30 AM   | 3                                 | 144  | 2    | 0    | 149        | 0                        | 0    | 1    | 0    | 1          | 4                                 | 131  | 5    | 0    | 140        | 10                       | 0    | 5    | 0    | 15         | 305        |
| 09:45 AM   | 8                                 | 171  | 1    | 0    | 180        | 0                        | 0    | 1    | 0    | 1          | 3                                 | 128  | 4    | 0    | 135        | 12                       | 0    | 11   | 0    | 23         | 339        |
| Total      | 23                                | 616  | 4    | 0    | 643        | 0                        | 0    | 5    | 0    | 5          | 14                                | 515  | 22   | 0    | 551        | 45                       | 0    | 30   | 0    | 75         | 1274       |
| 10:00 AM   | 5                                 | 157  | 0    | 0    | 162        | 0                        | 0    | 2    | 0    | 2          | 3                                 | 107  | 13   | 0    | 123        | 10                       | 1    | 4    | 0    | 15         | 302        |
| 10:15 AM   | 6                                 | 145  | 0    | 0    | 151        | 0                        | 0    | 1    | 0    | 1          | 5                                 | 122  | 4    | 0    | 131        | 12                       | 0    | 3    | 0    | 15         | 298        |
| 10:30 AM   | 5                                 | 153  | 0    | 0    | 158        | 0                        | 0    | 1    | 0    | 1          | 5                                 | 147  | 6    | 0    | 158        | 9                        | 0    | 5    | 0    | 14         | 331        |
| 10:45 AM   | 6                                 | 151  | 0    | 0    | 157        | 1                        | 0    | 1    | 0    | 2          | 6                                 | 137  | 11   | 0    | 154        | 13                       | 0    | 6    | 0    | 19         | 332        |
| Total      | 22                                | 606  | 0    | 0    | 628        | 1                        | 0    | 5    | 0    | 6          | 19                                | 513  | 34   | 0    | 566        | 44                       | 1    | 18   | 0    | 63         | 1263       |
| 11:00 AM   | 6                                 | 165  | 1    | 0    | 172        | 1                        | 1    | 2    | 0    | 4          | 10                                | 144  | 12   | 0    | 166        | 10                       | 0    | 4    | 0    | 14         | 356        |
| 11:15 AM   | 7                                 | 162  | 1    | 0    | 170        | 0                        | 0    | 2    | 0    | 2          | 5                                 | 141  | 10   | 0    | 156        | 28                       | 0    | 5    | 0    | 33         | 361        |
| 11:30 AM   | 4                                 | 144  | 2    | 0    | 150        | 0                        | 0    | 0    | 0    | 0          | 0                                 | 119  | 12   | 0    | 131        | 16                       | 0    | 5    | 0    | 21         | 302        |
| 11:45 AM   | 5                                 | 137  | 1    | 2    | 145        | 1                        | 0    | 0    | 0    | 1          | 9                                 | 146  | 24   | 0    | 179        | 20                       | 0    | 5    | 0    | 25         | 350        |
| Total      | 22                                | 608  | 5    | 2    | 637        | 2                        | 1    | 4    | 0    | 7          | 24                                | 550  | 58   | 0    | 632        | 74                       | 0    | 19   | 0    | 93         | 1369       |
| 12:00 PM   | 5                                 | 141  | 1    | 0    | 147        | 1                        | 1    | 4    | 0    | 6          | 4                                 | 145  | 26   | 0    | 175        | 13                       | 1    | 4    | 2    | 20         | 348        |
| 12:15 PM   | 11                                | 146  | 2    | 2    | 161        | 0                        | 0    | 4    | 0    | 4          | 4                                 | 139  | 13   | 0    | 156        | 16                       | 0    | 1    | 0    | 17         | 338        |
| 12:30 PM   | 4                                 | 149  | 2    | 0    | 155        | 0                        | 0    | 1    | 0    | 1          | 2                                 | 147  | 27   | 0    | 176        | 15                       | 1    | 6    | 0    | 22         | 354        |
| 12:45 PM   | 2                                 | 177  | 1    | 0    | 180        | 1                        | 0    | 1    | 0    | 2          | 6                                 | 153  | 17   | 0    | 176        | 29                       | 3    | 4    | 0    | 36         | 394        |
| Total      | 22                                | 613  | 6    | 2    | 643        | 2                        | 1    | 10   | 0    | 13         | 16                                | 584  | 83   | 0    | 683        | 73                       | 5    | 15   | 2    | 95         | 1434       |
| 01:00 PM   | 12                                | 138  | 0    | 0    | 150        | 1                        | 1    | 1    | 0    | 3          | 7                                 | 171  | 14   | 0    | 192        | 14                       | 0    | 4    | 0    | 18         | 363        |
| 01:15 PM   | 6                                 | 130  | 1    | 0    | 137        | 1                        | 0    | 1    | 0    | 2          | 9                                 | 157  | 14   | 0    | 180        | 14                       | 0    | 12   | 0    | 26         | 345        |
| 01:30 PM   | 4                                 | 131  | 1    | 0    | 136        | 1                        | 0    | 2    | 0    | 3          | 10                                | 158  | 16   | 0    | 184        | 13                       | 0    | 4    | 0    | 17         | 340        |
| 01:45 PM   | 10                                | 156  | 2    | 0    | 168        | 0                        | 0    | 0    | 0    | 0          | 10                                | 148  | 21   | 0    | 179        | 13                       | 0    | 8    | 0    | 21         | 368        |
| Total      | 32                                | 555  | 4    | 0    | 591        | 3                        | 1    | 4    | 0    | 8          | 36                                | 634  | 65   | 0    | 735        | 54                       | 0    | 28   | 0    | 82         | 1416       |
| 02:00 PM   | 9                                 | 152  | 1    | 0    | 162        | 1                        | 1    | 0    | 0    | 2          | 7                                 | 146  | 19   | 0    | 172        | 19                       | 0    | 9    | 2    | 30         | 366        |
| 02:15 PM   | 6                                 | 149  | 1    | 0    | 156        | 0                        | 0    | 1    | 0    | 1          | 4                                 | 166  | 17   | 0    | 187        | 16                       | 0    | 1    | 0    | 17         | 361        |
| 02:30 PM   | 4                                 | 153  | 3    | 0    | 160        | 1                        | 0    | 3    | 0    | 4          | 4                                 | 167  | 22   | 0    | 193        | 17                       | 0    | 2    | 0    | 19         | 376        |
| 02:45 PM   | 4                                 | 155  | 4    | 0    | 163        | 2                        | 0    | 1    | 0    | 3          | 8                                 | 154  | 20   | 0    | 182        | 19                       | 0    | 7    | 0    | 26         | 374        |
| Total      | 23                                | 609  | 9    | 0    | 641        | 4                        | 1    | 5    | 0    | 10         | 23                                | 633  | 78   | 0    | 734        | 71                       | 0    | 19   | 2    | 92         | 1477       |
| 03:00 PM   | 7                                 | 149  | 2    | 0    | 158        | 1                        | 0    | 4    | 0    | 5          | 7                                 | 137  | 11   | 0    | 155        | 18                       | 0    | 7    | 0    | 25         | 343        |
| 03:15 PM   | 2                                 | 160  | 2    | 0    | 164        | 2                        | 0    | 3    | 0    | 5          | 11                                | 164  | 18   | 0    | 193        | 18                       | 0    | 4    | 0    | 22         | 384        |
| 03:30 PM   | 3                                 | 157  | 2    | 0    | 162        | 0                        | 0    | 0    | 0    | 0          | 11                                | 178  | 19   | 0    | 208        | 21                       | 3    | 4    | 0    | 28         | 398        |
| 03:45 PM   | 5                                 | 186  | 1    | 0    | 192        | 2                        | 0    | 3    | 0    | 5          | 7                                 | 166  | 28   | 0    | 201        | 17                       | 0    | 2    | 0    | 19         | 417        |
| Total      | 17                                | 652  | 7    | 0    | 676        | 5                        | 0    | 10   | 0    | 15         | 36                                | 645  | 76   | 0    | 757        | 74                       | 3    | 17   | 0    | 94         | 1542       |
| 04:00 PM   | 5                                 | 173  | 1    | 2    | 181        | 1                        | 0    | 2    | 0    | 3          | 7                                 | 149  | 28   | 0    | 184        | 17                       | 0    | 6    | 0    | 23         | 391        |
| 04:15 PM   | 6                                 | 178  | 1    | 0    | 185        | 2                        | 0    | 2    | 0    | 4          | 2                                 | 171  | 29   | 0    | 202        | 13                       | 0    | 5    | 0    | 18         | 409        |
| 04:30 PM   | 4                                 | 205  | 2    | 0    | 211        | 3                        | 0    | 6    | 0    | 9          | 8                                 | 183  | 24   | 1    | 216        | 15                       | 0    | 8    | 0    | 23         | 459        |
| 04:45 PM   | 12                                | 199  | 0    | 0    | 211        | 3                        | 0    | 2    | 1    | 6          | 8                                 | 201  | 23   | 0    | 232        | 29                       | 0    | 8    | 0    | 37         | 486        |
| Total      | 27                                | 755  | 4    | 2    | 788        | 9                        | 0    | 12   | 1    | 22         | 25                                | 704  | 104  | 1    | 834        | 74                       | 0    | 27   | 0    | 101        | 1745       |

# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project:** Elmwood M-22 Traffic Study  
**Location:** M-22 & Grandview  
**Weather:** Sunny, Dry PM 70's  
**Count By:** Miovison Video SCU 4BT

**File Name :** TMC3\_M-22&Grandview\_6-24-15  
**Site Code :** TMC\_3  
**Start Date :** 6/24/2015  
**Page No :** 2

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

| Start Time     | Bay Shore Drive (M-22) Southbound |      |      |      |            | Elmwood Marina Westbound |      |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |      |            | Grandview Road Eastbound |      |      |      |            | Int. Total |
|----------------|-----------------------------------|------|------|------|------------|--------------------------|------|------|------|------------|-----------------------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------|
|                | Rgt                               | Thru | Left | Peds | App. Total | Rgt                      | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total | Rgt                      | Thru | Left | Peds | App. Total |            |
| 05:00 PM       | 8                                 | 185  | 2    | 0    | 195        | 1                        | 0    | 5    | 1    | 7          | 6                                 | 221  | 23   | 0    | 250        | 22                       | 0    | 3    | 1    | 26         | 478        |
| 05:15 PM       | 9                                 | 179  | 2    | 0    | 190        | 1                        | 0    | 3    | 0    | 4          | 5                                 | 206  | 41   | 0    | 252        | 31                       | 1    | 1    | 0    | 33         | 479        |
| 05:30 PM       | 6                                 | 199  | 1    | 0    | 206        | 2                        | 0    | 1    | 0    | 3          | 7                                 | 200  | 35   | 0    | 242        | 18                       | 0    | 9    | 1    | 28         | 479        |
| 05:45 PM       | 9                                 | 162  | 2    | 0    | 173        | 0                        | 0    | 3    | 0    | 3          | 9                                 | 195  | 24   | 0    | 228        | 14                       | 0    | 7    | 0    | 21         | 425        |
| Total          | 32                                | 725  | 7    | 0    | 764        | 4                        | 0    | 12   | 1    | 17         | 27                                | 822  | 123  | 0    | 972        | 85                       | 1    | 20   | 2    | 108        | 1861       |
| 06:00 PM       | 1                                 | 154  | 0    | 0    | 155        | 1                        | 0    | 2    | 0    | 3          | 10                                | 186  | 27   | 0    | 223        | 20                       | 0    | 8    | 0    | 28         | 409        |
| 06:15 PM       | 4                                 | 123  | 2    | 0    | 129        | 0                        | 0    | 1    | 0    | 1          | 6                                 | 165  | 13   | 0    | 184        | 14                       | 2    | 2    | 0    | 18         | 332        |
| 06:30 PM       | 8                                 | 130  | 3    | 0    | 141        | 0                        | 0    | 0    | 0    | 0          | 8                                 | 138  | 23   | 0    | 169        | 24                       | 0    | 8    | 0    | 32         | 342        |
| 06:45 PM       | 3                                 | 130  | 1    | 0    | 134        | 1                        | 0    | 2    | 0    | 3          | 8                                 | 147  | 15   | 0    | 170        | 23                       | 0    | 7    | 0    | 30         | 337        |
| Total          | 16                                | 537  | 6    | 0    | 559        | 2                        | 0    | 5    | 0    | 7          | 32                                | 636  | 78   | 0    | 746        | 81                       | 2    | 25   | 0    | 108        | 1420       |
| Grand Total    | 279                               | 7672 | 57   | 6    | 8014       | 32                       | 4    | 74   | 2    | 112        | 286                               | 7029 | 759  | 1    | 8075       | 822                      | 14   | 261  | 7    | 1104       | 17305      |
| Apprch %       | 3.5                               | 95.7 | 0.7  | 0.1  |            | 28.6                     | 3.6  | 66.1 | 1.8  |            | 3.5                               | 87   | 9.4  | 0    |            | 74.5                     | 1.3  | 23.6 | 0.6  |            |            |
| Total %        | 1.6                               | 44.3 | 0.3  | 0    | 46.3       | 0.2                      | 0    | 0.4  | 0    | 0.6        | 1.7                               | 40.6 | 4.4  | 0    | 46.7       | 4.8                      | 0.1  | 1.5  | 0    | 6.4        |            |
| Pass Cars      | 269                               | 7456 | 55   | 0    | 7780       | 32                       | 4    | 74   | 0    | 110        | 285                               | 6832 | 750  | 0    | 7867       | 806                      | 14   | 252  | 0    | 1072       | 16829      |
| % Pass Cars    | 96.4                              | 97.2 | 96.5 | 0    | 97.1       | 100                      | 100  | 100  | 0    | 98.2       | 99.7                              | 97.2 | 98.8 | 0    | 97.4       | 98.1                     | 100  | 96.6 | 0    | 97.1       | 97.2       |
| Single Units   | 10                                | 168  | 2    | 0    | 180        | 0                        | 0    | 0    | 0    | 0          | 0                                 | 163  | 8    | 0    | 171        | 14                       | 0    | 9    | 0    | 23         | 374        |
| % Single Units | 3.6                               | 2.2  | 3.5  | 0    | 2.2        | 0                        | 0    | 0    | 0    | 0          | 0                                 | 2.3  | 1.1  | 0    | 2.1        | 1.7                      | 0    | 3.4  | 0    | 2.1        | 2.2        |
| Heavy Trucks   | 0                                 | 48   | 0    | 0    | 48         | 0                        | 0    | 0    | 0    | 0          | 1                                 | 34   | 1    | 0    | 36         | 2                        | 0    | 0    | 0    | 2          | 86         |
| % Heavy Trucks | 0                                 | 0.6  | 0    | 0    | 0.6        | 0                        | 0    | 0    | 0    | 0          | 0.3                               | 0.5  | 0.1  | 0    | 0.4        | 0.2                      | 0    | 0    | 0    | 0.2        | 0.5        |
| Ped            | 0                                 | 0    | 0    | 6    | 6          | 0                        | 0    | 0    | 2    | 2          | 0                                 | 0    | 0    | 1    | 1          | 0                        | 0    | 0    | 7    | 7          | 16         |
| % Ped          | 0                                 | 0    | 0    | 100  | 0.1        | 0                        | 0    | 0    | 100  | 1.8        | 0                                 | 0    | 0    | 100  | 0          | 0                        | 0    | 0    | 100  | 0.6        | 0.1        |

Comments: 12 hour traffic study conducted during typical weekday (Wednesday) from 7:00 AM morning - 7:00 PM afternoon peak hours. Non-signalized intersection. Miovison SCU video camera located within SE intersection quadrant.

# Traffic Data Collection, TDC

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Phone: (586) 786-5407

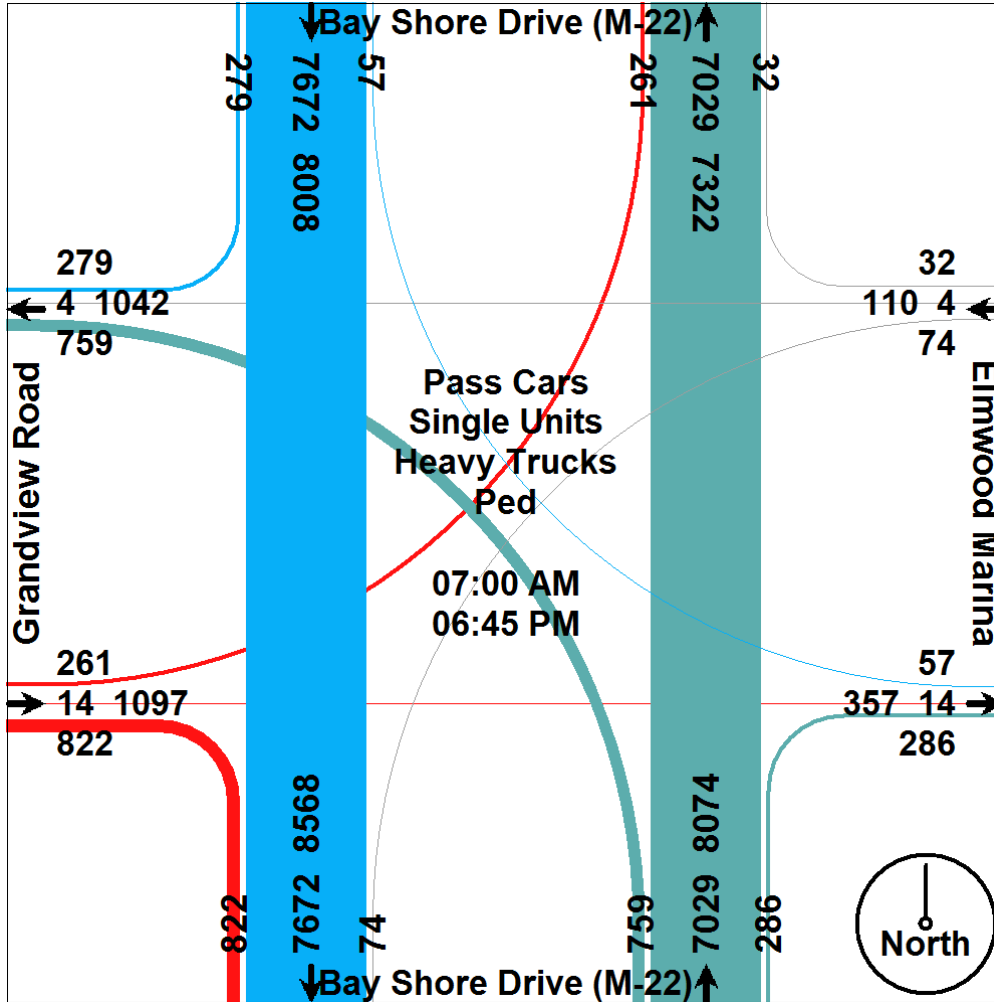
Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
 Location: M-22 & Grandview  
 Weather: Sunny, Dry PM 70's  
 Count By: Miovison Video SCU 4BT

File Name : TMC3\_M-22&Grandview\_6-24-15  
 Site Code : TMC\_3  
 Start Date : 6/24/2015  
 Page No : 3



# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

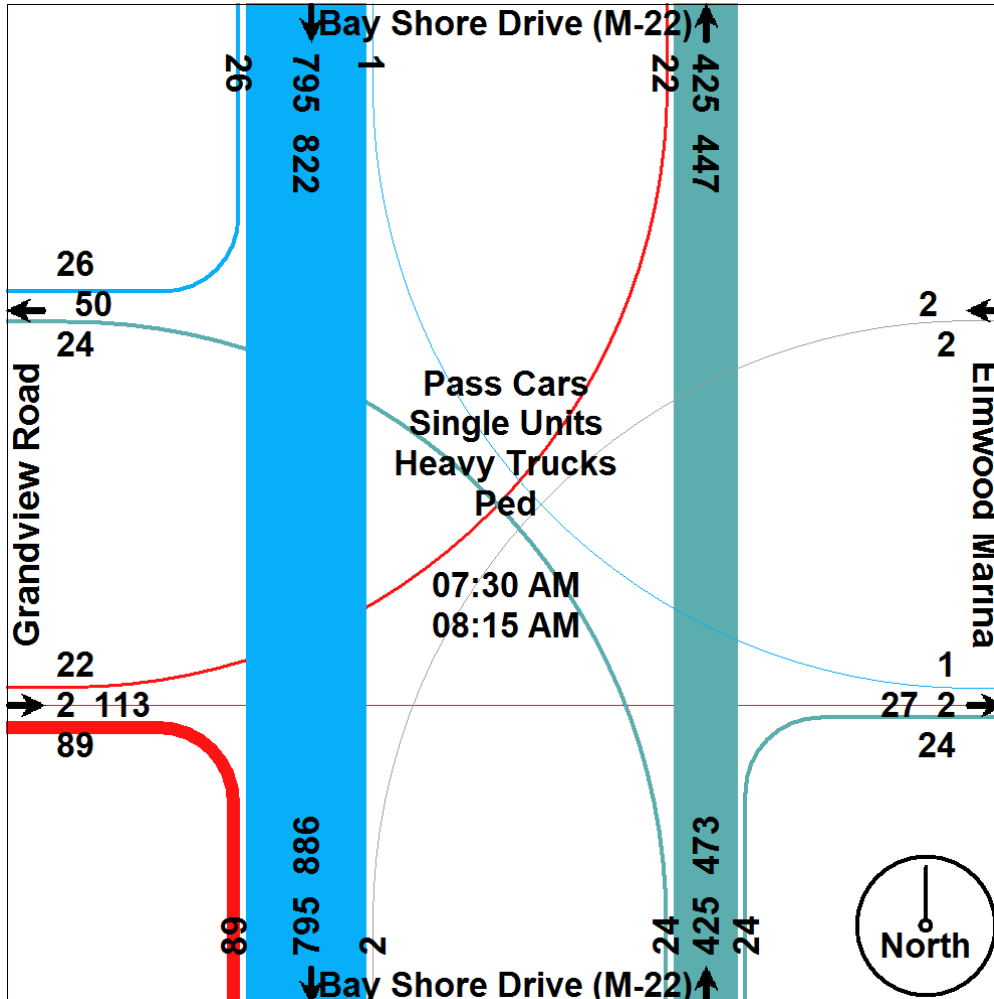
**Progressive AE**



**Project:** Elmwood M-22 Traffic Study  
**Location:** M-22 & Grandview  
**Weather:** Sunny, Dry PM 70's  
**Count By:** Miovison Video SCU 4BT

**File Name :** TMC3\_M-22&Grandview\_6-24-15  
**Site Code :** TMC\_3  
**Start Date :** 6/24/2015  
**Page No :** 4

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Elmwood Marina Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Grandview Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|--------------------------|------|------|------------|-----------------------------------|------|------|------------|--------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                      | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                      | Thru | Left | App. Total |            |
| Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1 |                                   |      |      |            |                          |      |      |            |                                   |      |      |            |                          |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                                   |      |      |            |                          |      |      |            |                                   |      |      |            |                          |      |      |            |            |
| 07:30 AM   | 3                                 | 219  | 1    | 223        | 0                        | 0    | 0    | 0          | 2                                 | 104  | 3    | 109        | 18                       | 0    | 4    | 22         | 354        |
| 07:45 AM   | 10                                | 218  | 0    | 228        | 0                        | 0    | 0    | 0          | 5                                 | 96   | 9    | 110        | 20                       | 1    | 7    | 28         | 366        |
| 08:00 AM   | 6                                 | 189  | 0    | 195        | 0                        | 0    | 0    | 0          | 9                                 | 118  | 7    | 134        | 28                       | 1    | 7    | 36         | 365        |
| 08:15 AM   | 7                                 | 169  | 0    | 176        | 0                        | 0    | 2    | 2          | 8                                 | 107  | 5    | 120        | 23                       | 0    | 4    | 27         | 325        |
| Total Volume   | 26                                | 795  | 1    | 822        | 0                        | 0    | 2    | 2          | 24                                | 425  | 24   | 473        | 89                       | 2    | 22   | 113        | 1410       |
| % App. Total   | 3.2                               | 96.7 | 0.1  |            | 0                        | 0    | 100  |            | 5.1                               | 89.9 | 5.1  |            | 78.8                     | 1.8  | 19.5 |            |            |
| PHF  | .650                              | .908 | .250 | .901       | .000                     | .000 | .250 | .250       | .667                              | .900 | .667 | .882       | .795                     | .500 | .786 | .785       | .963       |
| Pass Cars  | 26                                | 786  | 1    | 813        | 0                        | 0    | 2    | 2          | 24                                | 400  | 23   | 447        | 88                       | 2    | 19   | 109        | 1371       |
| % Pass Cars  | 100                               | 98.9 | 100  | 98.9       | 0                        | 0    | 100  | 100        | 100                               | 94.1 | 95.8 | 94.5       | 98.9                     | 100  | 86.4 | 96.5       | 97.2       |
| Single Units   | 0                                 | 7    | 0    | 7          | 0                        | 0    | 0    | 0          | 0                                 | 20   | 1    | 21         | 1                        | 0    | 3    | 4          | 32         |
| % Single Units   | 0                                 | 0.9  | 0    | 0.9        | 0                        | 0    | 0    | 0          | 0                                 | 4.7  | 4.2  | 4.4        | 1.1                      | 0    | 13.6 | 3.5        | 2.3        |
| Heavy Trucks   | 0                                 | 2    | 0    | 2          | 0                        | 0    | 0    | 0          | 0                                 | 5    | 0    | 5          | 0                        | 0    | 0    | 0          | 7          |
| % Heavy Trucks   | 0                                 | 0.3  | 0    | 0.2        | 0                        | 0    | 0    | 0          | 0                                 | 1.2  | 0    | 1.1        | 0                        | 0    | 0    | 0          | 0.5        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

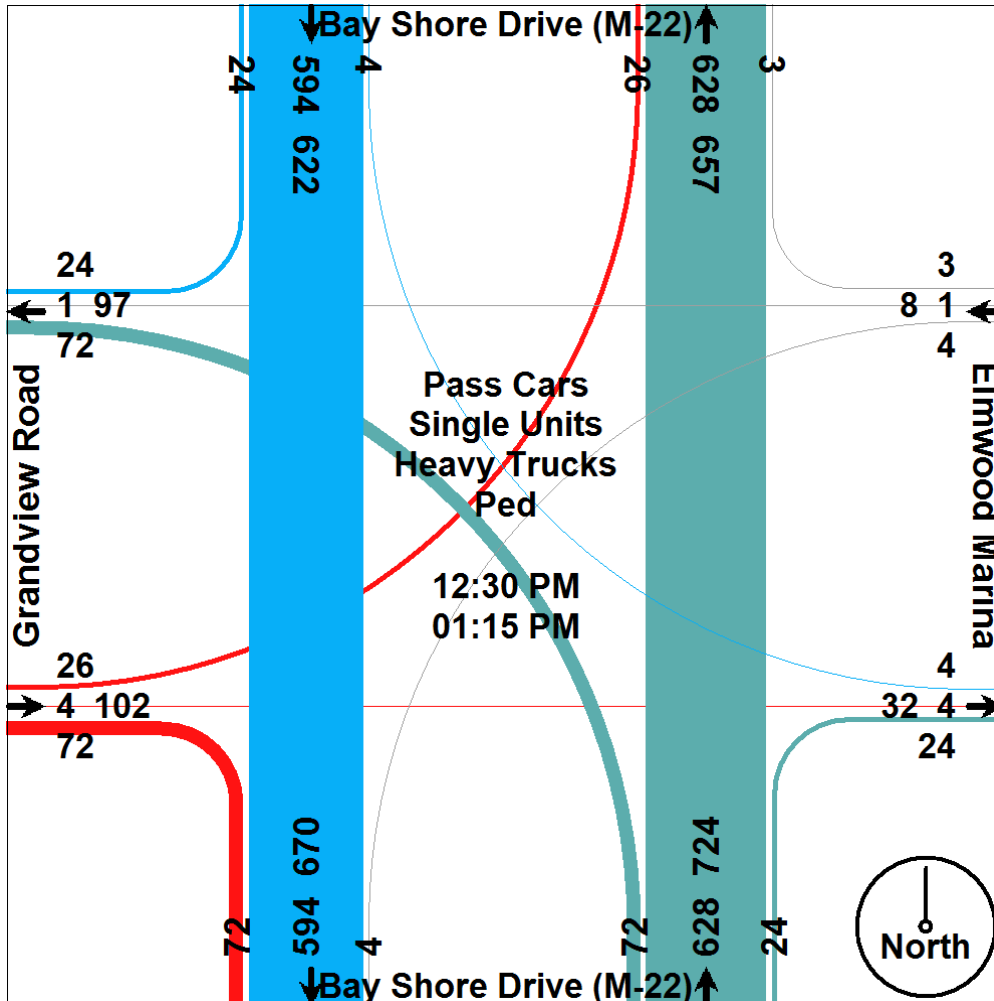
**Progressive AE**



**Project:** Elmwood M-22 Traffic Study  
**Location:** M-22 & Grandview  
**Weather:** Sunny, Dry PM 70's  
**Count By:** Miovison Video SCU 4BT

**File Name :** TMC3\_M-22&Grandview\_6-24-15  
**Site Code :** TMC\_3  
**Start Date :** 6/24/2015  
**Page No :** 5

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Elmwood Marina Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Grandview Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|--------------------------|------|------|------------|-----------------------------------|------|------|------------|--------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                      | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                      | Thru | Left | App. Total |            |
| Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1 |                                   |      |      |            |                          |      |      |            |                                   |      |      |            |                          |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 12:30 PM       |                                   |      |      |            |                          |      |      |            |                                   |      |      |            |                          |      |      |            |            |
| 12:30 PM   | 4                                 | 149  | 2    | 155        | 0                        | 0    | 1    | 1          | 2                                 | 147  | 27   | 176        | 15                       | 1    | 6    | 22         | 354        |
| 12:45 PM   | 2                                 | 177  | 1    | 180        | 1                        | 0    | 1    | 2          | 6                                 | 153  | 17   | 176        | 29                       | 3    | 4    | 36         | 394        |
| 01:00 PM   | 12                                | 138  | 0    | 150        | 1                        | 1    | 1    | 3          | 7                                 | 171  | 14   | 192        | 14                       | 0    | 4    | 18         | 363        |
| 01:15 PM   | 6                                 | 130  | 1    | 137        | 1                        | 0    | 1    | 2          | 9                                 | 157  | 14   | 180        | 14                       | 0    | 12   | 26         | 345        |
| Total Volume   | 24                                | 594  | 4    | 622        | 3                        | 1    | 4    | 8          | 24                                | 628  | 72   | 724        | 72                       | 4    | 26   | 102        | 1456       |
| % App. Total   | 3.9                               | 95.5 | 0.6  |            | 37.5                     | 12.5 | 50   |            | 3.3                               | 86.7 | 9.9  |            | 70.6                     | 3.9  | 25.5 |            |            |
| PHF  | .500                              | .839 | .500 | .864       | .750                     | .250 | 1.00 | .667       | .667                              | .918 | .667 | .943       | .621                     | .333 | .542 | .708       | .924       |
| Pass Cars  | 23                                | 578  | 4    | 605        | 3                        | 1    | 4    | 8          | 23                                | 612  | 72   | 707        | 71                       | 4    | 26   | 101        | 1421       |
| % Pass Cars  | 95.8                              | 97.3 | 100  | 97.3       | 100                      | 100  | 100  | 100        | 95.8                              | 97.5 | 100  | 97.7       | 98.6                     | 100  | 100  | 99.0       | 97.6       |
| Single Units   | 1                                 | 10   | 0    | 11         | 0                        | 0    | 0    | 0          | 0                                 | 10   | 0    | 10         | 1                        | 0    | 0    | 1          | 22         |
| % Single Units   | 4.2                               | 1.7  | 0    | 1.8        | 0                        | 0    | 0    | 0          | 0                                 | 1.6  | 0    | 1.4        | 1.4                      | 0    | 0    | 1.0        | 1.5        |
| Heavy Trucks   | 0                                 | 6    | 0    | 6          | 0                        | 0    | 0    | 0          | 1                                 | 6    | 0    | 7          | 0                        | 0    | 0    | 0          | 13         |
| % Heavy Trucks   | 0                                 | 1.0  | 0    | 1.0        | 0                        | 0    | 0    | 0          | 4.2                               | 1.0  | 0    | 1.0        | 0                        | 0    | 0    | 0          | 0.9        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

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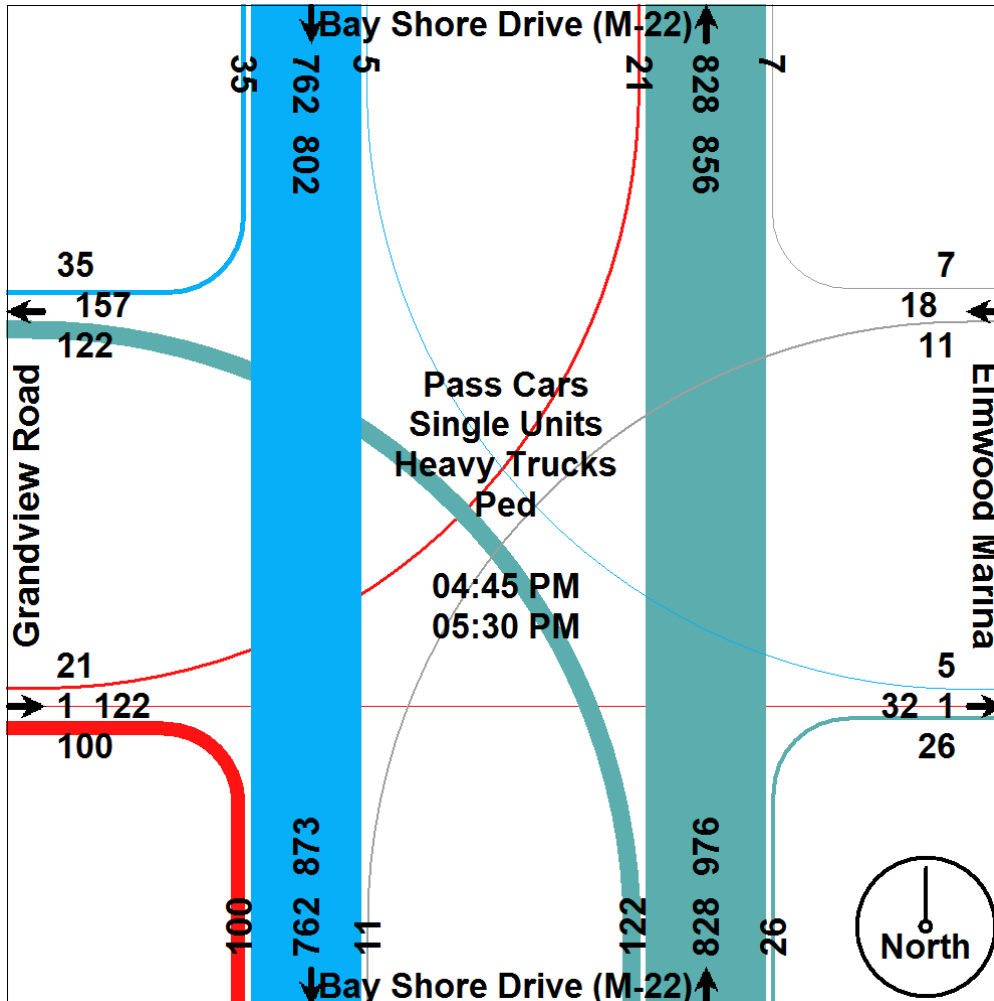
Phone: (586) 786-5407

Traffic Study Performed For:  
**Progressive AE**

Project: Elmwood M-22 Traffic Study  
Location: M-22 & Grandview  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 4BT

File Name : TMC3\_M-22&Grandview\_6-24-15  
Site Code : TMC\_3  
Start Date : 6/24/2015  
Page No : 6

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Elmwood Marina Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Grandview Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|--------------------------|------|------|------------|-----------------------------------|------|------|------------|--------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                      | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                      | Thru | Left | App. Total |            |
| Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1 |                                   |      |      |            |                          |      |      |            |                                   |      |      |            |                          |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                                   |      |      |            |                          |      |      |            |                                   |      |      |            |                          |      |      |            |            |
| 04:45 PM   | 12                                | 199  | 0    | 211        | 3                        | 0    | 2    | 5          | 8                                 | 201  | 23   | 232        | 29                       | 0    | 8    | 37         | 485        |
| 05:00 PM   | 8                                 | 185  | 2    | 195        | 1                        | 0    | 5    | 6          | 6                                 | 221  | 23   | 250        | 22                       | 0    | 3    | 25         | 476        |
| 05:15 PM   | 9                                 | 179  | 2    | 190        | 1                        | 0    | 3    | 4          | 5                                 | 206  | 41   | 252        | 31                       | 1    | 1    | 33         | 479        |
| 05:30 PM   | 6                                 | 199  | 1    | 206        | 2                        | 0    | 1    | 3          | 7                                 | 200  | 35   | 242        | 18                       | 0    | 9    | 27         | 478        |
| Total Volume   | 35                                | 762  | 5    | 802        | 7                        | 0    | 11   | 18         | 26                                | 828  | 122  | 976        | 100                      | 1    | 21   | 122        | 1918       |
| % App. Total   | 4.4                               | 95   | 0.6  |            | 38.9                     | 0    | 61.1 |            | 2.7                               | 84.8 | 12.5 |            | 82                       | 0.8  | 17.2 |            |            |
| PHF  | .729                              | .957 | .625 | .950       | .583                     | .000 | .550 | .750       | .813                              | .937 | .744 | .968       | .806                     | .250 | .583 | .824       | .989       |
| Pass Cars  | 33                                | 733  | 5    | 771        | 7                        | 0    | 11   | 18         | 26                                | 822  | 122  | 970        | 99                       | 1    | 21   | 121        | 1880       |
| % Pass Cars  | 94.3                              | 96.2 | 100  | 96.1       | 100                      | 0    | 100  | 100        | 100                               | 99.3 | 100  | 99.4       | 99.0                     | 100  | 100  | 99.2       | 98.0       |
| Single Units   | 2                                 | 26   | 0    | 28         | 0                        | 0    | 0    | 0          | 0                                 | 4    | 0    | 4          | 1                        | 0    | 0    | 1          | 33         |
| % Single Units   | 5.7                               | 3.4  | 0    | 3.5        | 0                        | 0    | 0    | 0          | 0                                 | 0.5  | 0    | 0.4        | 1.0                      | 0    | 0    | 0.8        | 1.7        |
| Heavy Trucks   | 0                                 | 3    | 0    | 3          | 0                        | 0    | 0    | 0          | 0                                 | 2    | 0    | 2          | 0                        | 0    | 0    | 0          | 5          |
| % Heavy Trucks   | 0                                 | 0.4  | 0    | 0.4        | 0                        | 0    | 0    | 0          | 0                                 | 0.2  | 0    | 0.2        | 0                        | 0    | 0    | 0          | 0.3        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                        | 0    | 0    | 0          | 0          |





# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & Grandview  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 4BT

File Name : TMC3\_M-22&Grandview\_6-24-15  
Site Code : TMC\_3  
Start Date : 6/24/2015  
Page No : 7

Aerial Photo



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Brewery Creek**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovision Video SCU 34G**

**File Name : TMC4\_M-22&BreweryCk\_6-24-15**  
**Site Code : TMC\_4**  
**Start Date : 6/24/2015**  
**Page No : 1**

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

| Start Time      | Bay Shore Drive (M-22) Southbound |      |      |      |            | Greilickville Harbor Park Westbound |      |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |      |            | Brewery Creek Eastbound |      |      |      |            | Int. Total |
|-----------------|-----------------------------------|------|------|------|------------|-------------------------------------|------|------|------|------------|-----------------------------------|------|------|------|------------|-------------------------|------|------|------|------------|------------|
|                 | Rgt                               | Thru | Left | Peds | App. Total | Rgt                                 | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total | Rgt                     | Thru | Left | Peds | App. Total |            |
| 07:00 AM        | 0                                 | 143  | 0    | 0    | 143        | 0                                   | 0    | 1    | 0    | 1          | 0                                 | 60   | 3    | 0    | 63         | 0                       | 0    | 1    | 0    | 1          | 208        |
| 07:15 AM        | 1                                 | 175  | 0    | 0    | 176        | 1                                   | 0    | 0    | 0    | 1          | 1                                 | 99   | 1    | 0    | 101        | 1                       | 0    | 0    | 0    | 1          | 279        |
| 07:30 AM        | 0                                 | 240  | 1    | 0    | 241        | 0                                   | 0    | 0    | 0    | 0          | 1                                 | 118  | 2    | 0    | 121        | 3                       | 0    | 0    | 0    | 3          | 365        |
| 07:45 AM        | 0                                 | 238  | 0    | 0    | 238        | 1                                   | 0    | 0    | 0    | 1          | 0                                 | 117  | 3    | 0    | 120        | 1                       | 0    | 0    | 0    | 1          | 360        |
| Total           | 1                                 | 796  | 1    | 0    | 798        | 2                                   | 0    | 1    | 0    | 3          | 2                                 | 394  | 9    | 0    | 405        | 5                       | 0    | 1    | 0    | 6          | 1212       |
| 08:00 AM        | 1                                 | 215  | 0    | 0    | 216        | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 139  | 3    | 0    | 142        | 3                       | 0    | 0    | 0    | 3          | 361        |
| 08:15 AM        | 1                                 | 200  | 0    | 0    | 201        | 0                                   | 0    | 0    | 1    | 1          | 0                                 | 132  | 0    | 0    | 132        | 1                       | 0    | 1    | 1    | 3          | 337        |
| 08:30 AM        | 0                                 | 184  | 0    | 0    | 184        | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 126  | 1    | 0    | 127        | 1                       | 0    | 0    | 0    | 1          | 312        |
| 08:45 AM        | 1                                 | 185  | 0    | 0    | 186        | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 149  | 1    | 0    | 150        | 0                       | 0    | 0    | 0    | 0          | 336        |
| Total           | 3                                 | 784  | 0    | 0    | 787        | 0                                   | 0    | 0    | 1    | 1          | 0                                 | 546  | 5    | 0    | 551        | 5                       | 0    | 1    | 1    | 7          | 1346       |
| **** BREAK **** |                                   |      |      |      |            |                                     |      |      |      |            |                                   |      |      |      |            |                         |      |      |      |            |            |
| 04:00 PM        | 1                                 | 203  | 1    | 0    | 205        | 2                                   | 0    | 6    | 0    | 8          | 3                                 | 196  | 1    | 0    | 200        | 4                       | 0    | 1    | 0    | 5          | 418        |
| 04:15 PM        | 1                                 | 194  | 0    | 0    | 195        | 1                                   | 0    | 3    | 0    | 4          | 4                                 | 215  | 5    | 0    | 224        | 7                       | 0    | 1    | 0    | 8          | 431        |
| 04:30 PM        | 3                                 | 230  | 2    | 0    | 235        | 2                                   | 0    | 1    | 0    | 3          | 5                                 | 228  | 2    | 0    | 235        | 4                       | 0    | 1    | 3    | 8          | 481        |
| 04:45 PM        | 1                                 | 231  | 5    | 1    | 238        | 0                                   | 0    | 3    | 0    | 3          | 12                                | 242  | 3    | 1    | 258        | 3                       | 0    | 1    | 3    | 7          | 506        |
| Total           | 6                                 | 858  | 8    | 1    | 873        | 5                                   | 0    | 13   | 0    | 18         | 24                                | 881  | 11   | 1    | 917        | 18                      | 0    | 4    | 6    | 28         | 1836       |
| 05:00 PM        | 0                                 | 223  | 3    | 3    | 229        | 0                                   | 0    | 4    | 0    | 4          | 8                                 | 260  | 3    | 0    | 271        | 2                       | 0    | 0    | 0    | 2          | 506        |
| 05:15 PM        | 0                                 | 223  | 2    | 2    | 227        | 3                                   | 0    | 3    | 2    | 8          | 2                                 | 260  | 6    | 0    | 268        | 6                       | 0    | 0    | 0    | 6          | 509        |
| 05:30 PM        | 1                                 | 223  | 0    | 0    | 224        | 3                                   | 0    | 1    | 0    | 4          | 7                                 | 251  | 1    | 0    | 259        | 9                       | 0    | 0    | 1    | 10         | 497        |
| 05:45 PM        | 0                                 | 179  | 5    | 0    | 184        | 3                                   | 0    | 3    | 0    | 6          | 5                                 | 244  | 3    | 0    | 252        | 3                       | 0    | 0    | 0    | 3          | 445        |
| Total           | 1                                 | 848  | 10   | 5    | 864        | 9                                   | 0    | 11   | 2    | 22         | 22                                | 1015 | 13   | 0    | 1050       | 20                      | 0    | 0    | 1    | 21         | 1957       |
| Grand Total     | 11                                | 3286 | 19   | 6    | 3322       | 16                                  | 0    | 25   | 3    | 44         | 48                                | 2836 | 38   | 1    | 2923       | 48                      | 0    | 6    | 8    | 62         | 6351       |
| Apprch %        | 0.3                               | 98.9 | 0.6  | 0.2  |            | 36.4                                | 0    | 56.8 | 6.8  |            | 1.6                               | 97   | 1.3  | 0    |            | 77.4                    | 0    | 9.7  | 12.9 |            |            |
| Total %         | 0.2                               | 51.7 | 0.3  | 0.1  | 52.3       | 0.3                                 | 0    | 0.4  | 0    | 0.7        | 0.8                               | 44.7 | 0.6  | 0    | 46         | 0.8                     | 0    | 0.1  | 0.1  | 1          |            |
| Pass Cars       | 9                                 | 3215 | 19   | 0    | 3243       | 16                                  | 0    | 25   | 0    | 41         | 48                                | 2756 | 37   | 0    | 2841       | 47                      | 0    | 6    | 0    | 53         | 6178       |
| % Pass Cars     | 81.8                              | 97.8 | 100  | 0    | 97.6       | 100                                 | 0    | 100  | 0    | 93.2       | 100                               | 97.2 | 97.4 | 0    | 97.2       | 97.9                    | 0    | 100  | 0    | 85.5       | 97.3       |
| Single Units    | 2                                 | 58   | 0    | 0    | 60         | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 70   | 1    | 0    | 71         | 1                       | 0    | 0    | 0    | 1          | 132        |
| % Single Units  | 18.2                              | 1.8  | 0    | 0    | 1.8        | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 2.5  | 2.6  | 0    | 2.4        | 2.1                     | 0    | 0    | 0    | 1.6        | 2.1        |
| Heavy Trucks    | 0                                 | 13   | 0    | 0    | 13         | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 10   | 0    | 0    | 10         | 0                       | 0    | 0    | 0    | 0          | 23         |
| % Heavy Trucks  | 0                                 | 0.4  | 0    | 0    | 0.4        | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 0.4  | 0    | 0    | 0.3        | 0                       | 0    | 0    | 0    | 0          | 0.4        |
| Ped             | 0                                 | 0    | 0    | 6    | 6          | 0                                   | 0    | 0    | 3    | 3          | 0                                 | 0    | 0    | 1    | 1          | 0                       | 0    | 0    | 8    | 8          | 18         |
| % Ped           | 0                                 | 0    | 0    | 100  | 0.2        | 0                                   | 0    | 0    | 100  | 6.8        | 0                                 | 0    | 0    | 100  | 0          | 0                       | 0    | 0    | 100  | 12.9       | 0.3        |

Comments: 4 hour traffic study conducted during typical weekday (Wednesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours. Non-signalized intersection, mid-block ped. X-walk located at north leg. Miovision SCU video camera located within NE intersection quadrant.

# Traffic Data Collection, TDC

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Phone: (586) 786-5407

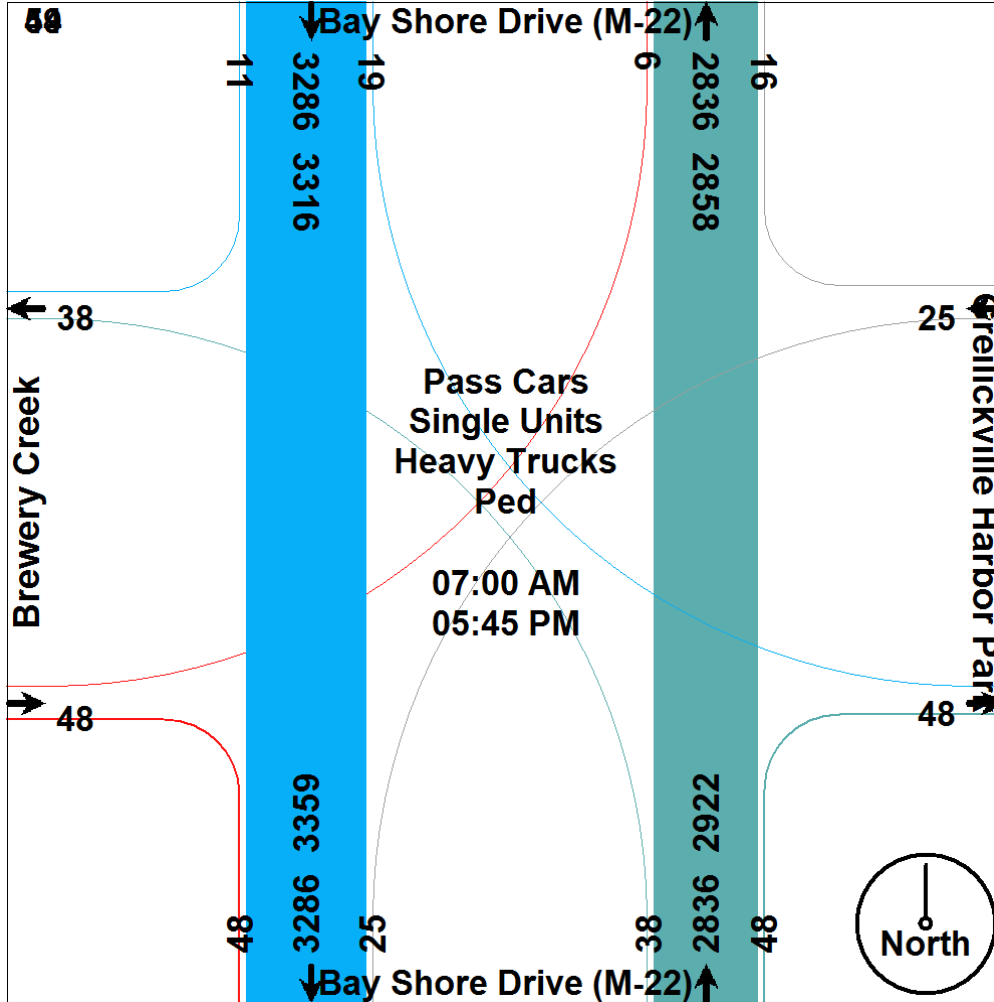
Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & Brewery Creek  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 34G

File Name : TMC4\_M-22&BreweryCk\_6-24-15  
Site Code : TMC\_4  
Start Date : 6/24/2015  
Page No : 2



# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

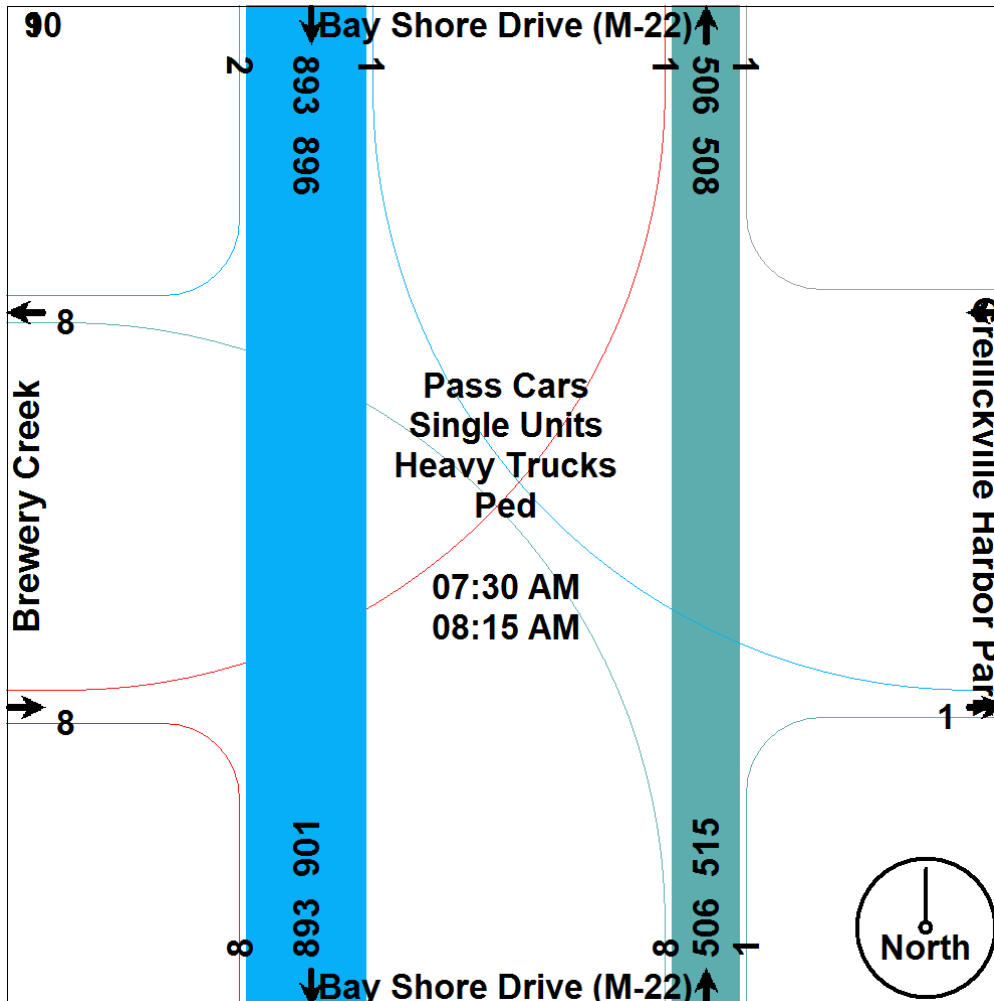
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Brewery Creek**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 34G**

**File Name : TMC4\_M-22&BreweryCk\_6-24-15**  
**Site Code : TMC\_4**  
**Start Date : 6/24/2015**  
**Page No : 3**

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Greilickville Harbor Park Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Brewery Creek Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|-------------------------------------|------|------|------------|-----------------------------------|------|------|------------|-------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                                 | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                     | Thru | Left | App. Total |            |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 |                                   |      |      |            |                                     |      |      |            |                                   |      |      |            |                         |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                                   |      |      |            |                                     |      |      |            |                                   |      |      |            |                         |      |      |            |            |
| 07:30 AM   | 0                                 | 240  | 1    | 241        | 0                                   | 0    | 0    | 0          | 1                                 | 118  | 2    | 121        | 3                       | 0    | 0    | 3          | 365        |
| 07:45 AM   | 0                                 | 238  | 0    | 238        | 1                                   | 0    | 0    | 1          | 0                                 | 117  | 3    | 120        | 1                       | 0    | 0    | 1          | 360        |
| 08:00 AM   | 1                                 | 215  | 0    | 216        | 0                                   | 0    | 0    | 0          | 0                                 | 139  | 3    | 142        | 3                       | 0    | 0    | 3          | 361        |
| 08:15 AM   | 1                                 | 200  | 0    | 201        | 0                                   | 0    | 0    | 0          | 0                                 | 132  | 0    | 132        | 1                       | 0    | 1    | 2          | 335        |
| Total Volume   | 2                                 | 893  | 1    | 896        | 1                                   | 0    | 0    | 1          | 1                                 | 506  | 8    | 515        | 8                       | 0    | 1    | 9          | 1421       |
| % App. Total   | 0.2                               | 99.7 | 0.1  |            | 100                                 | 0    | 0    |            | 0.2                               | 98.3 | 1.6  |            | 88.9                    | 0    | 11.1 |            |            |
| PHF  | .500                              | .930 | .250 | .929       | .250                                | .000 | .000 | .250       | .250                              | .910 | .667 | .907       | .667                    | .000 | .250 | .750       | .973       |
| Pass Cars  | 1                                 | 882  | 1    | 884        | 1                                   | 0    | 0    | 1          | 1                                 | 473  | 8    | 482        | 8                       | 0    | 1    | 9          | 1376       |
| % Pass Cars  | 50.0                              | 98.8 | 100  | 98.7       | 100                                 | 0    | 0    | 100        | 100                               | 93.5 | 100  | 93.6       | 100                     | 0    | 100  | 100        | 96.8       |
| Single Units   | 1                                 | 8    | 0    | 9          | 0                                   | 0    | 0    | 0          | 0                                 | 28   | 0    | 28         | 0                       | 0    | 0    | 0          | 37         |
| % Single Units   | 50.0                              | 0.9  | 0    | 1.0        | 0                                   | 0    | 0    | 0          | 0                                 | 5.5  | 0    | 5.4        | 0                       | 0    | 0    | 0          | 2.6        |
| Heavy Trucks   | 0                                 | 3    | 0    | 3          | 0                                   | 0    | 0    | 0          | 0                                 | 5    | 0    | 5          | 0                       | 0    | 0    | 0          | 8          |
| % Heavy Trucks   | 0                                 | 0.3  | 0    | 0.3        | 0                                   | 0    | 0    | 0          | 0                                 | 1.0  | 0    | 1.0        | 0                       | 0    | 0    | 0          | 0.6        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                       | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                       | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

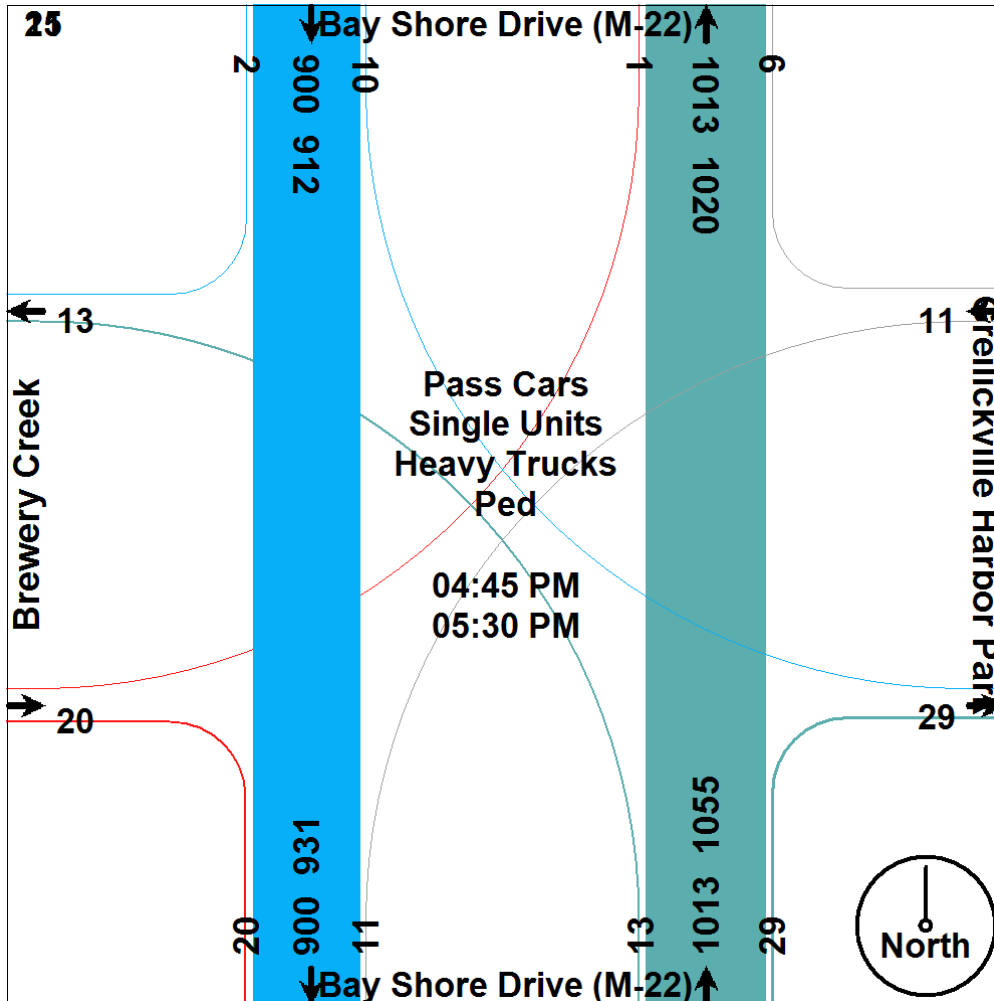
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Brewery Creek**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 34G**

**File Name : TMC4\_M-22&BreweryCk\_6-24-15**  
**Site Code : TMC\_4**  
**Start Date : 6/24/2015**  
**Page No : 4**

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Greilickville Harbor Park Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Brewery Creek Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|-------------------------------------|------|------|------------|-----------------------------------|------|------|------------|-------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                                 | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                     | Thru | Left | App. Total |            |
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 |                                   |      |      |            |                                     |      |      |            |                                   |      |      |            |                         |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                                   |      |      |            |                                     |      |      |            |                                   |      |      |            |                         |      |      |            |            |
| 04:45 PM   | 1                                 | 231  | 5    | 237        | 0                                   | 0    | 3    | 3          | 12                                | 242  | 3    | 257        | 3                       | 0    | 1    | 4          | 501        |
| 05:00 PM   | 0                                 | 223  | 3    | 226        | 0                                   | 0    | 4    | 4          | 8                                 | 260  | 3    | 271        | 2                       | 0    | 0    | 2          | 503        |
| 05:15 PM   | 0                                 | 223  | 2    | 225        | 3                                   | 0    | 3    | 6          | 2                                 | 260  | 6    | 268        | 6                       | 0    | 0    | 6          | 505        |
| 05:30 PM   | 1                                 | 223  | 0    | 224        | 3                                   | 0    | 1    | 4          | 7                                 | 251  | 1    | 259        | 9                       | 0    | 0    | 9          | 496        |
| Total Volume   | 2                                 | 900  | 10   | 912        | 6                                   | 0    | 11   | 17         | 29                                | 1013 | 13   | 1055       | 20                      | 0    | 1    | 21         | 2005       |
| % App. Total   | 0.2                               | 98.7 | 1.1  |            | 35.3                                | 0    | 64.7 |            | 2.7                               | 96   | 1.2  |            | 95.2                    | 0    | 4.8  |            |            |
| PHF  | .500                              | .974 | .500 | .962       | .500                                | .000 | .688 | .708       | .604                              | .974 | .542 | .973       | .556                    | .000 | .250 | .583       | .993       |
| Pass Cars  | 2                                 | 870  | 10   | 882        | 6                                   | 0    | 11   | 17         | 29                                | 1004 | 12   | 1045       | 19                      | 0    | 1    | 20         | 1964       |
| % Pass Cars  | 100                               | 96.7 | 100  | 96.7       | 100                                 | 0    | 100  | 100        | 100                               | 99.1 | 92.3 | 99.1       | 95.0                    | 0    | 100  | 95.2       | 98.0       |
| Single Units   | 0                                 | 26   | 0    | 26         | 0                                   | 0    | 0    | 0          | 0                                 | 7    | 1    | 8          | 1                       | 0    | 0    | 1          | 35         |
| % Single Units   | 0                                 | 2.9  | 0    | 2.9        | 0                                   | 0    | 0    | 0          | 0                                 | 0.7  | 7.7  | 0.8        | 5.0                     | 0    | 0    | 4.8        | 1.7        |
| Heavy Trucks   | 0                                 | 4    | 0    | 4          | 0                                   | 0    | 0    | 0          | 0                                 | 2    | 0    | 2          | 0                       | 0    | 0    | 0          | 6          |
| % Heavy Trucks   | 0                                 | 0.4  | 0    | 0.4        | 0                                   | 0    | 0    | 0          | 0                                 | 0.2  | 0    | 0.2        | 0                       | 0    | 0    | 0          | 0.3        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                       | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                       | 0    | 0    | 0          | 0          |





# Traffic Data Collection, TDC

[tdccounts.com](http://tdccounts.com)

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & Brewery Creek  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 34G

File Name : TMC4\_M-22&BreweryCk\_6-24-15  
Site Code : TMC\_4  
Start Date : 6/24/2015  
Page No : 5

Aerial Photo



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Carter**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 4SY**

**File Name : TMC5\_M-22&Carter\_6-24-15**  
**Site Code : TMC\_5**  
**Start Date : 6/24/2015**  
**Page No : 1**

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

| Start Time      | Bay Shore Drive (M-22) Southbound |      |      |      |            | Westbound |      |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |      |            | Carter Road Eastbound |      |      |      |            | Int. Total |
|-----------------|-----------------------------------|------|------|------|------------|-----------|------|------|------|------------|-----------------------------------|------|------|------|------------|-----------------------|------|------|------|------------|------------|
|                 | Rgt                               | Thru | Left | Peds | App. Total | Rgt       | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total | Rgt                   | Thru | Left | Peds | App. Total |            |
| 07:00 AM        | 0                                 | 138  | 0    | 0    | 138        | 0         | 0    | 0    | 0    | 0          | 0                                 | 73   | 8    | 0    | 81         | 2                     | 0    | 0    | 0    | 2          | 221        |
| 07:15 AM        | 2                                 | 178  | 0    | 0    | 180        | 0         | 0    | 0    | 0    | 0          | 0                                 | 103  | 10   | 0    | 113        | 9                     | 0    | 2    | 0    | 11         | 304        |
| 07:30 AM        | 4                                 | 228  | 0    | 0    | 232        | 0         | 0    | 0    | 0    | 0          | 0                                 | 121  | 8    | 0    | 129        | 15                    | 0    | 2    | 0    | 17         | 378        |
| 07:45 AM        | 3                                 | 215  | 0    | 0    | 218        | 0         | 0    | 0    | 0    | 0          | 0                                 | 131  | 8    | 0    | 139        | 17                    | 0    | 0    | 0    | 17         | 374        |
| Total           | 9                                 | 759  | 0    | 0    | 768        | 0         | 0    | 0    | 0    | 0          | 0                                 | 428  | 34   | 0    | 462        | 43                    | 0    | 4    | 0    | 47         | 1277       |
| 08:00 AM        | 7                                 | 215  | 0    | 0    | 222        | 0         | 0    | 0    | 0    | 0          | 0                                 | 143  | 5    | 0    | 148        | 9                     | 0    | 2    | 0    | 11         | 381        |
| 08:15 AM        | 7                                 | 207  | 0    | 0    | 214        | 0         | 0    | 0    | 0    | 0          | 0                                 | 131  | 4    | 0    | 135        | 9                     | 0    | 6    | 0    | 15         | 364        |
| 08:30 AM        | 4                                 | 206  | 0    | 0    | 210        | 0         | 0    | 0    | 0    | 0          | 0                                 | 131  | 7    | 0    | 138        | 10                    | 0    | 0    | 0    | 10         | 358        |
| 08:45 AM        | 5                                 | 167  | 0    | 0    | 172        | 0         | 0    | 0    | 0    | 0          | 0                                 | 158  | 14   | 2    | 174        | 9                     | 0    | 2    | 0    | 11         | 357        |
| Total           | 23                                | 795  | 0    | 0    | 818        | 0         | 0    | 0    | 0    | 0          | 0                                 | 563  | 30   | 2    | 595        | 37                    | 0    | 10   | 0    | 47         | 1460       |
| **** BREAK **** |                                   |      |      |      |            |           |      |      |      |            |                                   |      |      |      |            |                       |      |      |      |            |            |
| 04:00 PM        | 7                                 | 210  | 0    | 0    | 217        | 0         | 0    | 0    | 0    | 0          | 0                                 | 207  | 17   | 5    | 229        | 14                    | 0    | 2    | 0    | 16         | 462        |
| 04:15 PM        | 4                                 | 208  | 0    | 1    | 213        | 0         | 0    | 0    | 0    | 0          | 0                                 | 248  | 14   | 3    | 265        | 13                    | 0    | 0    | 0    | 13         | 491        |
| 04:30 PM        | 6                                 | 241  | 0    | 0    | 247        | 0         | 0    | 0    | 0    | 0          | 0                                 | 234  | 15   | 3    | 252        | 12                    | 0    | 4    | 1    | 17         | 516        |
| 04:45 PM        | 6                                 | 241  | 0    | 3    | 250        | 0         | 0    | 0    | 0    | 0          | 0                                 | 268  | 12   | 5    | 285        | 18                    | 0    | 2    | 1    | 21         | 556        |
| Total           | 23                                | 900  | 0    | 4    | 927        | 0         | 0    | 0    | 0    | 0          | 0                                 | 957  | 58   | 16   | 1031       | 57                    | 0    | 8    | 2    | 67         | 2025       |
| 05:00 PM        | 6                                 | 227  | 0    | 0    | 233        | 0         | 0    | 0    | 0    | 0          | 0                                 | 278  | 15   | 1    | 294        | 14                    | 0    | 1    | 2    | 17         | 544        |
| 05:15 PM        | 11                                | 232  | 0    | 3    | 246        | 0         | 0    | 0    | 0    | 0          | 0                                 | 276  | 20   | 4    | 300        | 5                     | 0    | 1    | 0    | 6          | 552        |
| 05:30 PM        | 2                                 | 240  | 0    | 0    | 242        | 0         | 0    | 0    | 0    | 0          | 0                                 | 268  | 18   | 0    | 286        | 18                    | 0    | 6    | 3    | 27         | 555        |
| 05:45 PM        | 10                                | 213  | 0    | 0    | 223        | 0         | 0    | 0    | 0    | 0          | 0                                 | 262  | 13   | 0    | 275        | 12                    | 0    | 3    | 0    | 15         | 513        |
| Total           | 29                                | 912  | 0    | 3    | 944        | 0         | 0    | 0    | 0    | 0          | 0                                 | 1084 | 66   | 5    | 1155       | 49                    | 0    | 11   | 5    | 65         | 2164       |
| Grand Total     | 84                                | 3366 | 0    | 7    | 3457       | 0         | 0    | 0    | 0    | 0          | 0                                 | 3032 | 188  | 23   | 3243       | 186                   | 0    | 33   | 7    | 226        | 6926       |
| Apprch %        | 2.4                               | 97.4 | 0    | 0.2  |            | 0         | 0    | 0    | 0    | 0          | 0                                 | 93.5 | 5.8  | 0.7  |            | 82.3                  | 0    | 14.6 | 3.1  |            |            |
| Total %         | 1.2                               | 48.6 | 0    | 0.1  | 49.9       | 0         | 0    | 0    | 0    | 0          | 0                                 | 43.8 | 2.7  | 0.3  | 46.8       | 2.7                   | 0    | 0.5  | 0.1  | 3.3        |            |
| Pass Cars       | 82                                | 3294 | 0    | 0    | 3376       | 0         | 0    | 0    | 0    | 0          | 0                                 | 2949 | 184  | 0    | 3133       | 182                   | 0    | 32   | 0    | 214        | 6723       |
| % Pass Cars     | 97.6                              | 97.9 | 0    | 0    | 97.7       | 0         | 0    | 0    | 0    | 0          | 0                                 | 97.3 | 97.9 | 0    | 96.6       | 97.8                  | 0    | 97   | 0    | 94.7       | 97.1       |
| Single Units    | 2                                 | 57   | 0    | 0    | 59         | 0         | 0    | 0    | 0    | 0          | 0                                 | 73   | 0    | 0    | 73         | 1                     | 0    | 1    | 0    | 2          | 134        |
| % Single Units  | 2.4                               | 1.7  | 0    | 0    | 1.7        | 0         | 0    | 0    | 0    | 0          | 0                                 | 2.4  | 0    | 0    | 2.3        | 0.5                   | 0    | 3    | 0    | 0.9        | 1.9        |
| Heavy Trucks    | 0                                 | 15   | 0    | 0    | 15         | 0         | 0    | 0    | 0    | 0          | 0                                 | 10   | 4    | 0    | 14         | 3                     | 0    | 0    | 0    | 3          | 32         |
| % Heavy Trucks  | 0                                 | 0.4  | 0    | 0    | 0.4        | 0         | 0    | 0    | 0    | 0          | 0                                 | 0.3  | 2.1  | 0    | 0.4        | 1.6                   | 0    | 0    | 0    | 1.3        | 0.5        |
| Ped             | 0                                 | 0    | 0    | 7    | 7          | 0         | 0    | 0    | 0    | 0          | 0                                 | 0    | 0    | 23   | 23         | 0                     | 0    | 0    | 7    | 7          | 37         |
| % Ped           | 0                                 | 0    | 0    | 100  | 0.2        | 0         | 0    | 0    | 0    | 0          | 0                                 | 0    | 0    | 100  | 0.7        | 0                     | 0    | 0    | 100  | 3.1        | 0.5        |

Comments: 4 hour traffic study conducted during typical weekday (Wednesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours. Non-signalized T intersection. Miovison SCU video camera located within NE intersection quadrant.

# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

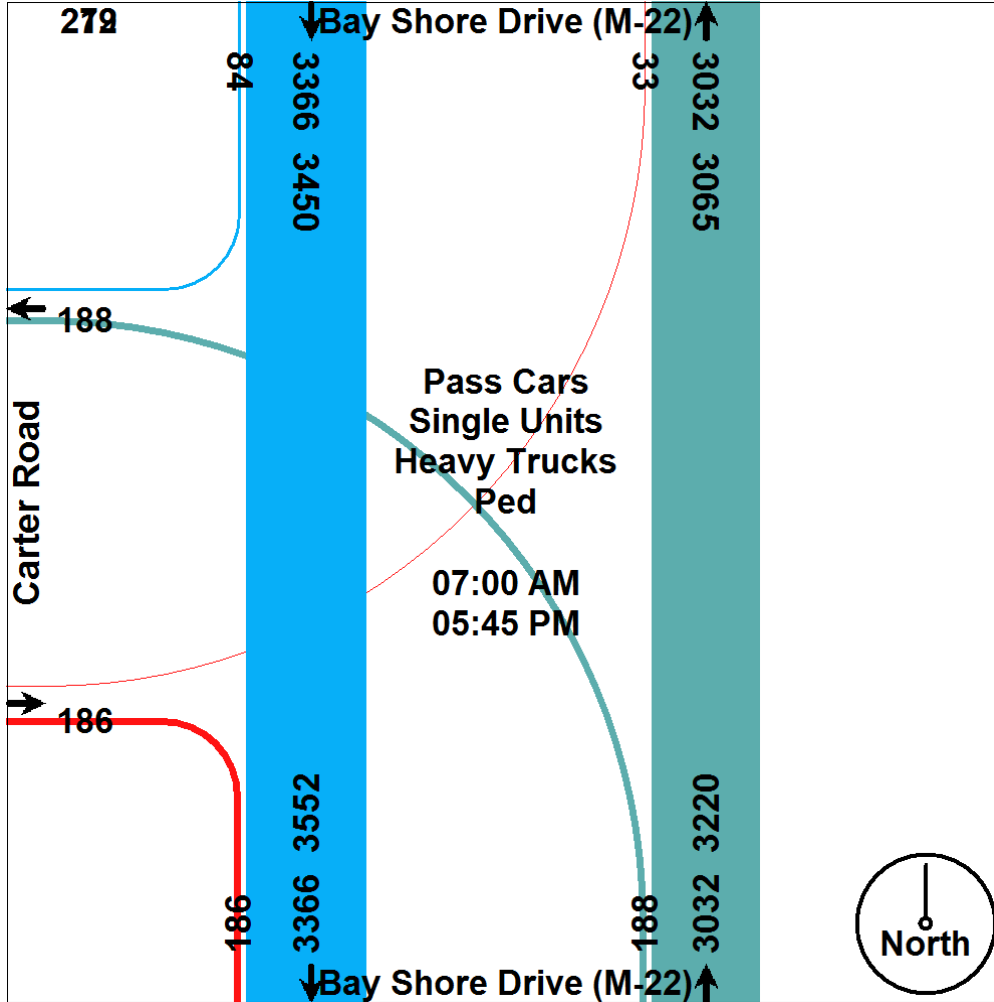
Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & Carter  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 4SY

File Name : TMC5\_M-22&Carter\_6-24-15  
Site Code : TMC\_5  
Start Date : 6/24/2015  
Page No : 2



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

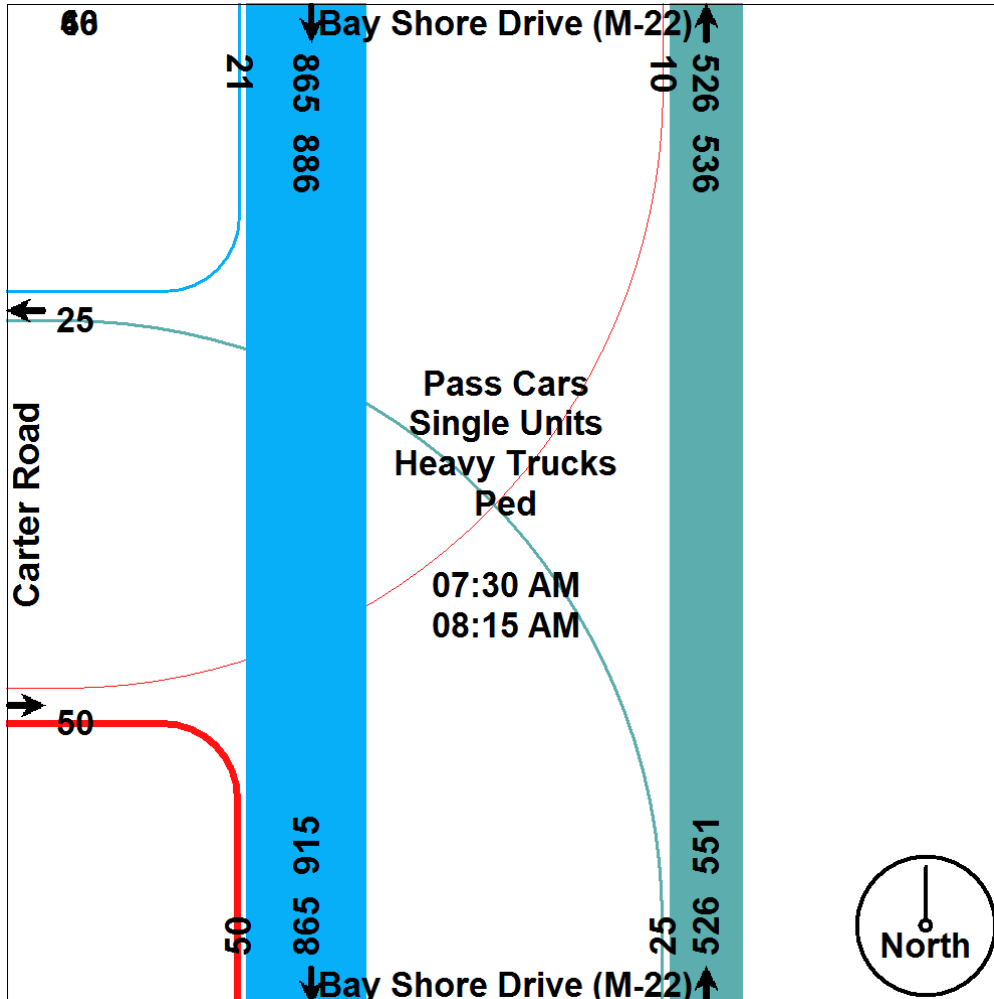
**Progressive AE**



**Project:** Elmwood M-22 Traffic Study  
**Location:** M-22 & Carter  
**Weather:** Sunny, Dry PM 70's  
**Count By:** Miovison Video SCU 4SY

**File Name :** TMC5\_M-22&Carter\_6-24-15  
**Site Code :** TMC\_5  
**Start Date :** 6/24/2015  
**Page No :** 3

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Carter Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|-----------|------|------|------------|-----------------------------------|------|------|------------|-----------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt       | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                   | Thru | Left | App. Total |            |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 |                                   |      |      |            |           |      |      |            |                                   |      |      |            |                       |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                                   |      |      |            |           |      |      |            |                                   |      |      |            |                       |      |      |            |            |
| 07:30 AM   | 4                                 | 228  | 0    | 232        | 0         | 0    | 0    | 0          | 0                                 | 121  | 8    | 129        | 15                    | 0    | 2    | 17         | 378        |
| 07:45 AM   | 3                                 | 215  | 0    | 218        | 0         | 0    | 0    | 0          | 0                                 | 131  | 8    | 139        | 17                    | 0    | 0    | 17         | 374        |
| 08:00 AM   | 7                                 | 215  | 0    | 222        | 0         | 0    | 0    | 0          | 0                                 | 143  | 5    | 148        | 9                     | 0    | 2    | 11         | 381        |
| 08:15 AM   | 7                                 | 207  | 0    | 214        | 0         | 0    | 0    | 0          | 0                                 | 131  | 4    | 135        | 9                     | 0    | 6    | 15         | 364        |
| Total Volume   | 21                                | 865  | 0    | 886        | 0         | 0    | 0    | 0          | 0                                 | 526  | 25   | 551        | 50                    | 0    | 10   | 60         | 1497       |
| % App. Total   | 2.4                               | 97.6 | 0    |            | 0         | 0    | 0    |            | 0                                 | 95.5 | 4.5  |            | 83.3                  | 0    | 16.7 |            |            |
| PHF  | .750                              | .948 | .000 | .955       | .000      | .000 | .000 | .000       | .000                              | .920 | .781 | .931       | .735                  | .000 | .417 | .882       | .982       |
| Pass Cars  | 21                                | 852  | 0    | 873        | 0         | 0    | 0    | 0          | 0                                 | 490  | 25   | 515        | 48                    | 0    | 10   | 58         | 1446       |
| % Pass Cars  | 100                               | 98.5 | 0    | 98.5       | 0         | 0    | 0    | 0          | 0                                 | 93.2 | 100  | 93.5       | 96.0                  | 0    | 100  | 96.7       | 96.6       |
| Single Units   | 0                                 | 10   | 0    | 10         | 0         | 0    | 0    | 0          | 0                                 | 30   | 0    | 30         | 0                     | 0    | 0    | 0          | 40         |
| % Single Units   | 0                                 | 1.2  | 0    | 1.1        | 0         | 0    | 0    | 0          | 0                                 | 5.7  | 0    | 5.4        | 0                     | 0    | 0    | 0          | 2.7        |
| Heavy Trucks   | 0                                 | 3    | 0    | 3          | 0         | 0    | 0    | 0          | 0                                 | 6    | 0    | 6          | 2                     | 0    | 0    | 2          | 11         |
| % Heavy Trucks   | 0                                 | 0.3  | 0    | 0.3        | 0         | 0    | 0    | 0          | 0                                 | 1.1  | 0    | 1.1        | 4.0                   | 0    | 0    | 3.3        | 0.7        |
| Ped  | 0                                 | 0    | 0    | 0          | 0         | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0         | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

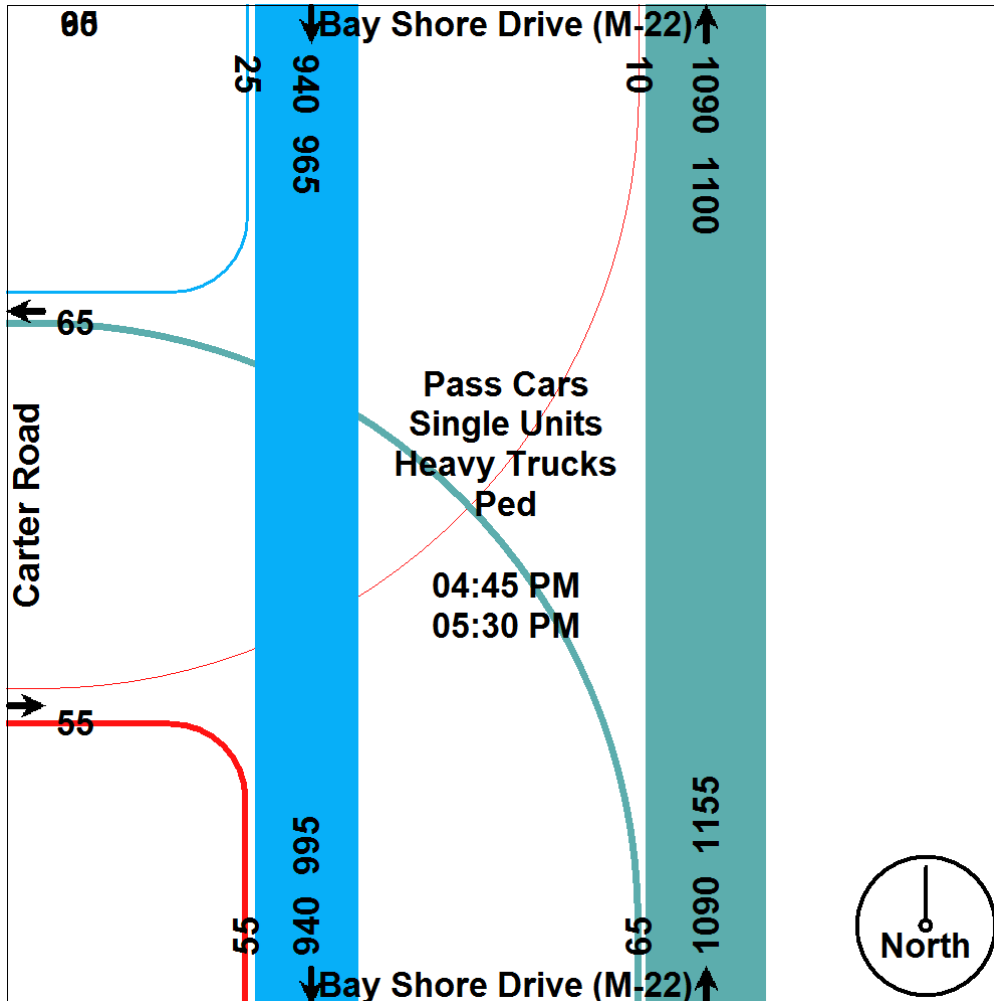
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & Carter**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 4SY**

**File Name : TMC5\_M-22&Carter\_6-24-15**  
**Site Code : TMC\_5**  
**Start Date : 6/24/2015**  
**Page No : 4**

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Westbound |      |      |            | Bay Shore Drive (M-22) Northbound |      |      |            | Carter Road Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|-----------|------|------|------------|-----------------------------------|------|------|------------|-----------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt       | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total | Rgt                   | Thru | Left | App. Total |            |
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 |                                   |      |      |            |           |      |      |            |                                   |      |      |            |                       |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                                   |      |      |            |           |      |      |            |                                   |      |      |            |                       |      |      |            |            |
| 04:45 PM   | 6                                 | 241  | 0    | 247        | 0         | 0    | 0    | 0          | 0                                 | 268  | 12   | 280        | 18                    | 0    | 2    | 20         | 547        |
| 05:00 PM   | 6                                 | 227  | 0    | 233        | 0         | 0    | 0    | 0          | 0                                 | 278  | 15   | 293        | 14                    | 0    | 1    | 15         | 541        |
| 05:15 PM   | 11                                | 232  | 0    | 243        | 0         | 0    | 0    | 0          | 0                                 | 276  | 20   | 296        | 5                     | 0    | 1    | 6          | 545        |
| 05:30 PM   | 2                                 | 240  | 0    | 242        | 0         | 0    | 0    | 0          | 0                                 | 268  | 18   | 286        | 18                    | 0    | 6    | 24         | 552        |
| Total Volume   | 25                                | 940  | 0    | 965        | 0         | 0    | 0    | 0          | 0                                 | 1090 | 65   | 1155       | 55                    | 0    | 10   | 65         | 2185       |
| % App. Total   | 2.6                               | 97.4 | 0    |            | 0         | 0    | 0    |            | 0                                 | 94.4 | 5.6  |            | 84.6                  | 0    | 15.4 |            |            |
| PHF  | .568                              | .975 | .000 | .977       | .000      | .000 | .000 | .000       | .000                              | .980 | .813 | .976       | .764                  | .000 | .417 | .677       | .990       |
| Pass Cars  | 24                                | 915  | 0    | 939        | 0         | 0    | 0    | 0          | 0                                 | 1078 | 65   | 1143       | 53                    | 0    | 10   | 63         | 2145       |
| % Pass Cars  | 96.0                              | 97.3 | 0    | 97.3       | 0         | 0    | 0    | 0          | 0                                 | 98.9 | 100  | 99.0       | 96.4                  | 0    | 100  | 96.9       | 98.2       |
| Single Units   | 1                                 | 22   | 0    | 23         | 0         | 0    | 0    | 0          | 0                                 | 9    | 0    | 9          | 1                     | 0    | 0    | 1          | 33         |
| % Single Units   | 4.0                               | 2.3  | 0    | 2.4        | 0         | 0    | 0    | 0          | 0                                 | 0.8  | 0    | 0.8        | 1.8                   | 0    | 0    | 1.5        | 1.5        |
| Heavy Trucks   | 0                                 | 3    | 0    | 3          | 0         | 0    | 0    | 0          | 0                                 | 3    | 0    | 3          | 1                     | 0    | 0    | 1          | 7          |
| % Heavy Trucks   | 0                                 | 0.3  | 0    | 0.3        | 0         | 0    | 0    | 0          | 0                                 | 0.3  | 0    | 0.3        | 1.8                   | 0    | 0    | 1.5        | 0.3        |
| Ped  | 0                                 | 0    | 0    | 0          | 0         | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0         | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0          |





# Traffic Data Collection, TDC

[tdccounts.com](http://tdccounts.com)

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & Carter  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 4SY

File Name : TMC5\_M-22&Carter\_6-24-15  
Site Code : TMC\_5  
Start Date : 6/24/2015  
Page No : 5

Aerial Photo



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-22 & M-72**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovision Video SCU 2Z4**

**File Name : TMC6\_M-22&M-72\_6-24-15**  
**Site Code : TMC\_6**  
**Start Date : 6/24/2015**  
**Page No : 1**

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

| Start Time      | Bay Shore Drive (M-22) Southbound |      |      |      |            | Sunny County Driveway Westbound |      |      |      |            | Grandview Parkway (M-22) Northbound |      |      |      |            | Traverse Highway (M-72) Eastbound |      |      |      |            | Int. Total |
|-----------------|-----------------------------------|------|------|------|------------|---------------------------------|------|------|------|------------|-------------------------------------|------|------|------|------------|-----------------------------------|------|------|------|------------|------------|
|                 | Rgt                               | Thru | Left | Peds | App. Total | Rgt                             | Thru | Left | Peds | App. Total | Rgt                                 | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total |            |
| 07:00 AM        | 24                                | 121  | 0    | 0    | 145        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 79   | 36   | 0    | 115        | 62                                | 0    | 13   | 0    | 75         | 335        |
| 07:15 AM        | 40                                | 145  | 0    | 0    | 185        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 118  | 40   | 0    | 158        | 95                                | 0    | 18   | 0    | 113        | 456        |
| 07:30 AM        | 31                                | 187  | 0    | 0    | 218        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 115  | 72   | 0    | 187        | 112                               | 0    | 23   | 0    | 135        | 540        |
| 07:45 AM        | 35                                | 198  | 0    | 0    | 233        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 133  | 65   | 0    | 198        | 134                               | 0    | 33   | 4    | 171        | 602        |
| Total           | 130                               | 651  | 0    | 0    | 781        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 445  | 213  | 0    | 658        | 403                               | 0    | 87   | 4    | 494        | 1933       |
| 08:00 AM        | 39                                | 186  | 0    | 0    | 225        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 140  | 65   | 0    | 205        | 88                                | 0    | 40   | 21   | 149        | 579        |
| 08:15 AM        | 34                                | 191  | 0    | 0    | 225        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 119  | 59   | 0    | 178        | 82                                | 0    | 37   | 2    | 121        | 524        |
| 08:30 AM        | 26                                | 204  | 0    | 0    | 230        | 0                               | 0    | 1    | 0    | 1          | 0                                   | 141  | 68   | 0    | 209        | 91                                | 0    | 20   | 8    | 119        | 559        |
| 08:45 AM        | 30                                | 155  | 0    | 0    | 185        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 141  | 57   | 0    | 198        | 95                                | 0    | 46   | 12   | 153        | 536        |
| Total           | 129                               | 736  | 0    | 0    | 865        | 0                               | 0    | 1    | 0    | 1          | 0                                   | 541  | 249  | 0    | 790        | 356                               | 0    | 143  | 43   | 542        | 2198       |
| **** BREAK **** |                                   |      |      |      |            |                                 |      |      |      |            |                                     |      |      |      |            |                                   |      |      |      |            |            |
| 04:00 PM        | 46                                | 174  | 0    | 0    | 220        | 0                               | 0    | 1    | 0    | 1          | 0                                   | 192  | 107  | 0    | 299        | 81                                | 0    | 33   | 0    | 114        | 634        |
| 04:15 PM        | 49                                | 176  | 0    | 0    | 225        | 0                               | 0    | 0    | 0    | 0          | 2                                   | 225  | 112  | 0    | 339        | 74                                | 0    | 50   | 1    | 125        | 689        |
| 04:30 PM        | 35                                | 229  | 0    | 0    | 264        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 217  | 89   | 0    | 306        | 79                                | 0    | 48   | 1    | 128        | 698        |
| 04:45 PM        | 23                                | 236  | 0    | 0    | 259        | 1                               | 0    | 0    | 0    | 1          | 0                                   | 245  | 94   | 0    | 339        | 84                                | 0    | 47   | 0    | 131        | 730        |
| Total           | 153                               | 815  | 0    | 0    | 968        | 1                               | 0    | 1    | 0    | 2          | 2                                   | 879  | 402  | 0    | 1283       | 318                               | 0    | 178  | 2    | 498        | 2751       |
| 05:00 PM        | 39                                | 222  | 0    | 0    | 261        | 1                               | 1    | 0    | 1    | 3          | 0                                   | 259  | 94   | 0    | 353        | 92                                | 0    | 57   | 1    | 150        | 767        |
| 05:15 PM        | 36                                | 215  | 0    | 1    | 252        | 0                               | 0    | 0    | 2    | 2          | 0                                   | 261  | 105  | 0    | 366        | 81                                | 0    | 58   | 0    | 139        | 759        |
| 05:30 PM        | 29                                | 221  | 0    | 0    | 250        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 253  | 99   | 0    | 352        | 85                                | 0    | 53   | 0    | 138        | 740        |
| 05:45 PM        | 21                                | 221  | 0    | 0    | 242        | 1                               | 0    | 0    | 0    | 1          | 0                                   | 245  | 108  | 0    | 353        | 61                                | 0    | 50   | 1    | 112        | 708        |
| Total           | 125                               | 879  | 0    | 1    | 1005       | 2                               | 1    | 0    | 3    | 6          | 0                                   | 1018 | 406  | 0    | 1424       | 319                               | 0    | 218  | 2    | 539        | 2974       |
| Grand Total     | 537                               | 3081 | 0    | 1    | 3619       | 3                               | 1    | 2    | 3    | 9          | 2                                   | 2883 | 1270 | 0    | 4155       | 1396                              | 0    | 626  | 51   | 2073       | 9856       |
| Apprch %        | 14.8                              | 85.1 | 0    | 0    |            | 33.3                            | 11.1 | 22.2 | 33.3 |            | 0                                   | 69.4 | 30.6 | 0    |            | 67.3                              | 0    | 30.2 | 2.5  |            |            |
| Total %         | 5.4                               | 31.3 | 0    | 0    | 36.7       | 0                               | 0    | 0    | 0    | 0.1        | 0                                   | 29.3 | 12.9 | 0    | 42.2       | 14.2                              | 0    | 6.4  | 0.5  | 21         |            |
| Pass Cars       | 528                               | 3006 | 0    | 0    | 3534       | 3                               | 1    | 2    | 0    | 6          | 2                                   | 2816 | 1202 | 0    | 4020       | 1341                              | 0    | 616  | 0    | 1957       | 9517       |
| % Pass Cars     | 98.3                              | 97.6 | 0    | 0    | 97.7       | 100                             | 100  | 100  | 0    | 66.7       | 100                                 | 97.7 | 94.6 | 0    | 96.8       | 96.1                              | 0    | 98.4 | 0    | 94.4       | 96.6       |
| Single Units    | 8                                 | 58   | 0    | 0    | 66         | 0                               | 0    | 0    | 0    | 0          | 0                                   | 52   | 55   | 0    | 107        | 33                                | 0    | 10   | 0    | 43         | 216        |
| % Single Units  | 1.5                               | 1.9  | 0    | 0    | 1.8        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 1.8  | 4.3  | 0    | 2.6        | 2.4                               | 0    | 1.6  | 0    | 2.1        | 2.2        |
| Heavy Trucks    | 1                                 | 17   | 0    | 0    | 18         | 0                               | 0    | 0    | 0    | 0          | 0                                   | 15   | 13   | 0    | 28         | 22                                | 0    | 0    | 0    | 22         | 68         |
| % Heavy Trucks  | 0.2                               | 0.6  | 0    | 0    | 0.5        | 0                               | 0    | 0    | 0    | 0          | 0                                   | 0.5  | 1    | 0    | 0.7        | 1.6                               | 0    | 0    | 0    | 1.1        | 0.7        |
| Ped             | 0                                 | 0    | 0    | 1    | 1          | 0                               | 0    | 0    | 3    | 3          | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 0    | 0    | 51   | 51         | 55         |
| % Ped           | 0                                 | 0    | 0    | 100  | 0          | 0                               | 0    | 0    | 100  | 33.3       | 0                                   | 0    | 0    | 0    | 0          | 0                                 | 0    | 0    | 100  | 2.5        | 0.6        |

Comments: 4 hour traffic study conducted during typical weekday (Wednesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours. Signalized intersection with ped. signals for west, north & south legs. drants., no push buttons. Miovision SCU video camera located within SW intersection quadrant.

# Traffic Data Collection, TDC

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Phone: (586) 786-5407

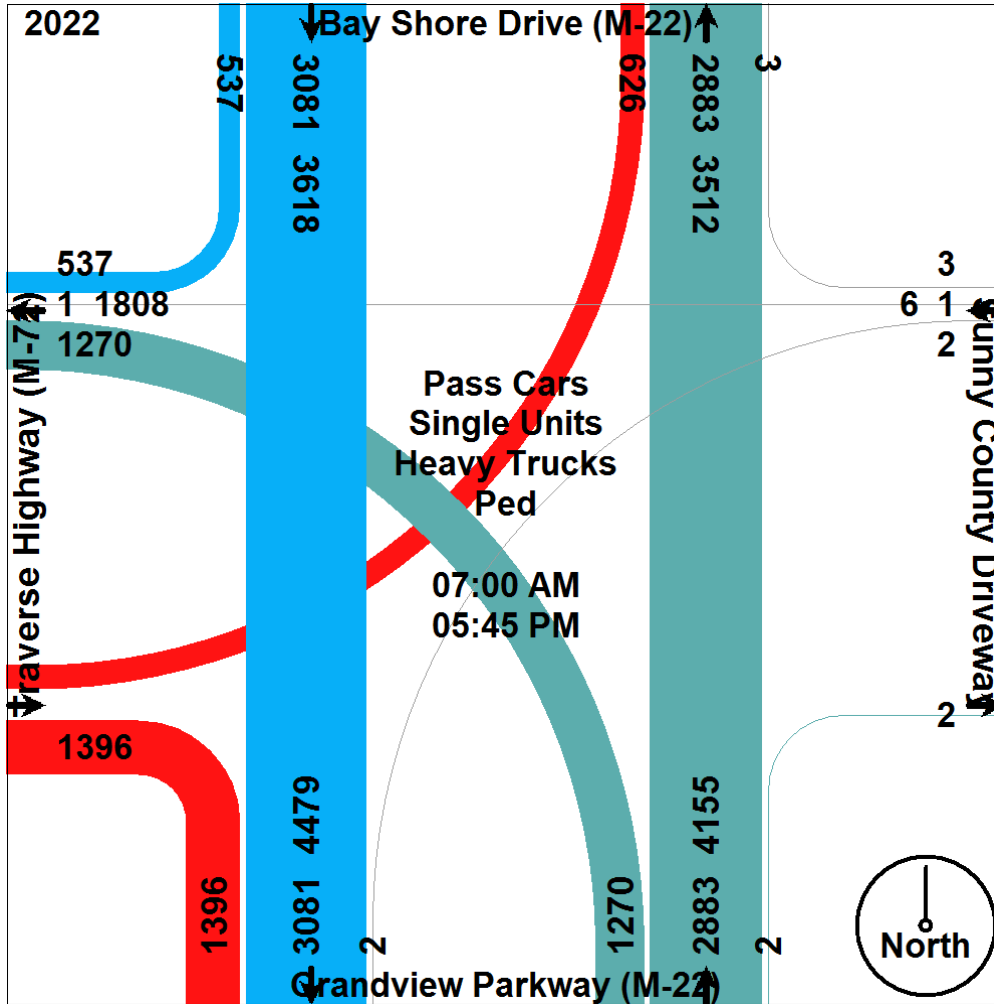
Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
 Location: M-22 & M-72  
 Weather: Sunny, Dry PM 70's  
 Count By: Miovison Video SCU 2Z4

File Name : TMC6\_M-22&M-72\_6-24-15  
 Site Code : TMC\_6  
 Start Date : 6/24/2015  
 Page No : 2



# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

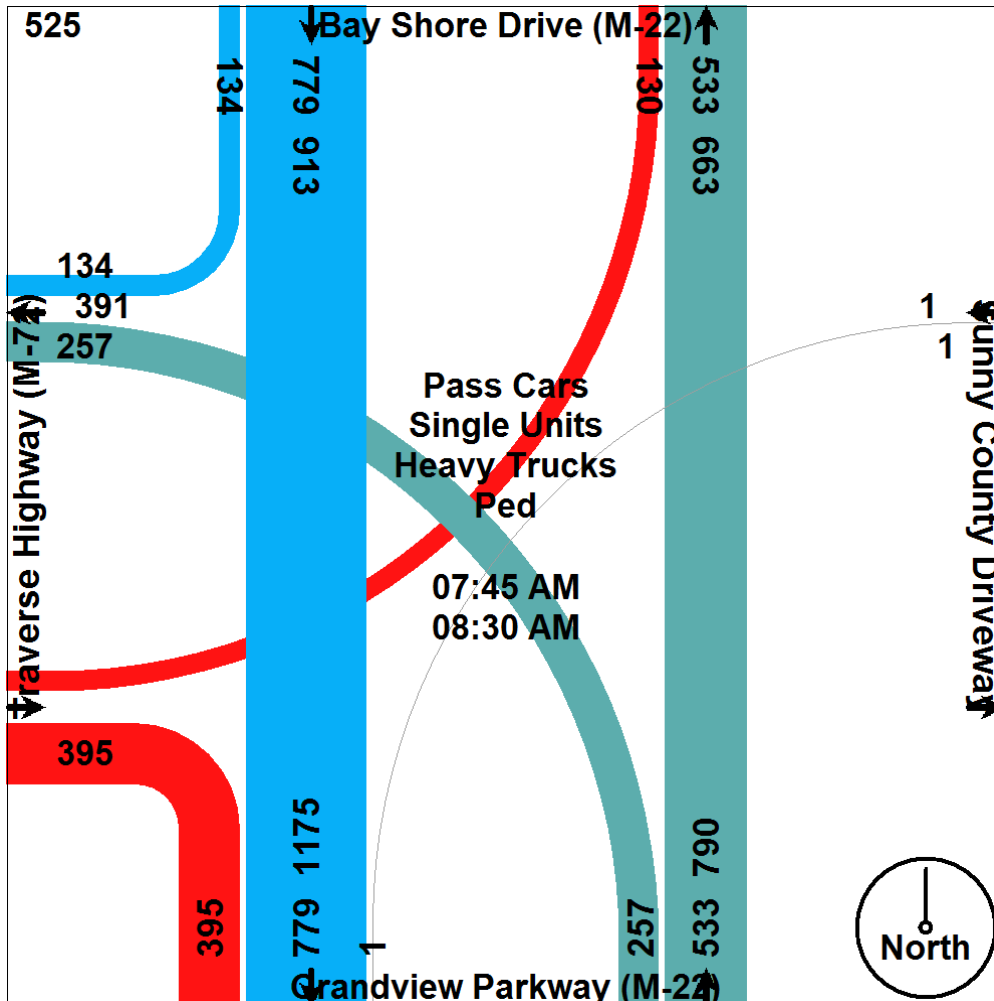
**Progressive AE**



Project: Elmwood M-22 Traffic Study  
 Location: M-22 & M-72  
 Weather: Sunny, Dry PM 70's  
 Count By: Miovison Video SCU 2Z4

File Name : TMC6\_M-22&M-72\_6-24-15  
 Site Code : TMC\_6  
 Start Date : 6/24/2015  
 Page No : 3

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Sunny County Driveway Westbound |      |      |            | Grandview Parkway (M-22) Northbound |      |      |            | Traverse Highway (M-72) Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|---------------------------------|------|------|------------|-------------------------------------|------|------|------------|-----------------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                             | Thru | Left | App. Total | Rgt                                 | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total |            |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 |                                   |      |      |            |                                 |      |      |            |                                     |      |      |            |                                   |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:45 AM       |                                   |      |      |            |                                 |      |      |            |                                     |      |      |            |                                   |      |      |            |            |
| 07:45 AM   | 35                                | 198  | 0    | 233        | 0                               | 0    | 0    | 0          | 0                                   | 133  | 65   | 198        | 134                               | 0    | 33   | 167        | 598        |
| 08:00 AM   | 39                                | 186  | 0    | 225        | 0                               | 0    | 0    | 0          | 0                                   | 140  | 65   | 205        | 88                                | 0    | 40   | 128        | 558        |
| 08:15 AM   | 34                                | 191  | 0    | 225        | 0                               | 0    | 0    | 0          | 0                                   | 119  | 59   | 178        | 82                                | 0    | 37   | 119        | 522        |
| 08:30 AM   | 26                                | 204  | 0    | 230        | 0                               | 0    | 1    | 1          | 0                                   | 141  | 68   | 209        | 91                                | 0    | 20   | 111        | 551        |
| Total Volume   | 134                               | 779  | 0    | 913        | 0                               | 0    | 1    | 1          | 0                                   | 533  | 257  | 790        | 395                               | 0    | 130  | 525        | 2229       |
| % App. Total   | 14.7                              | 85.3 | 0    |            | 0                               | 0    | 100  |            | 0                                   | 67.5 | 32.5 |            | 75.2                              | 0    | 24.8 |            |            |
| PHF  | .859                              | .955 | .000 | .980       | .000                            | .000 | .250 | .250       | .000                                | .945 | .945 | .945       | .737                              | .000 | .813 | .786       | .932       |
| Pass Cars  | 131                               | 768  | 0    | 899        | 0                               | 0    | 1    | 1          | 0                                   | 498  | 231  | 729        | 376                               | 0    | 128  | 504        | 2133       |
| % Pass Cars  | 97.8                              | 98.6 | 0    | 98.5       | 0                               | 0    | 100  | 100        | 0                                   | 93.4 | 89.9 | 92.3       | 95.2                              | 0    | 98.5 | 96.0       | 95.7       |
| Single Units   | 3                                 | 8    | 0    | 11         | 0                               | 0    | 0    | 0          | 0                                   | 26   | 22   | 48         | 12                                | 0    | 2    | 14         | 73         |
| % Single Units   | 2.2                               | 1.0  | 0    | 1.2        | 0                               | 0    | 0    | 0          | 0                                   | 4.9  | 8.6  | 6.1        | 3.0                               | 0    | 1.5  | 2.7        | 3.3        |
| Heavy Trucks   | 0                                 | 3    | 0    | 3          | 0                               | 0    | 0    | 0          | 0                                   | 9    | 4    | 13         | 7                                 | 0    | 0    | 7          | 23         |
| % Heavy Trucks   | 0                                 | 0.4  | 0    | 0.3        | 0                               | 0    | 0    | 0          | 0                                   | 1.7  | 1.6  | 1.6        | 1.8                               | 0    | 0    | 1.3        | 1.0        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                               | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                               | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

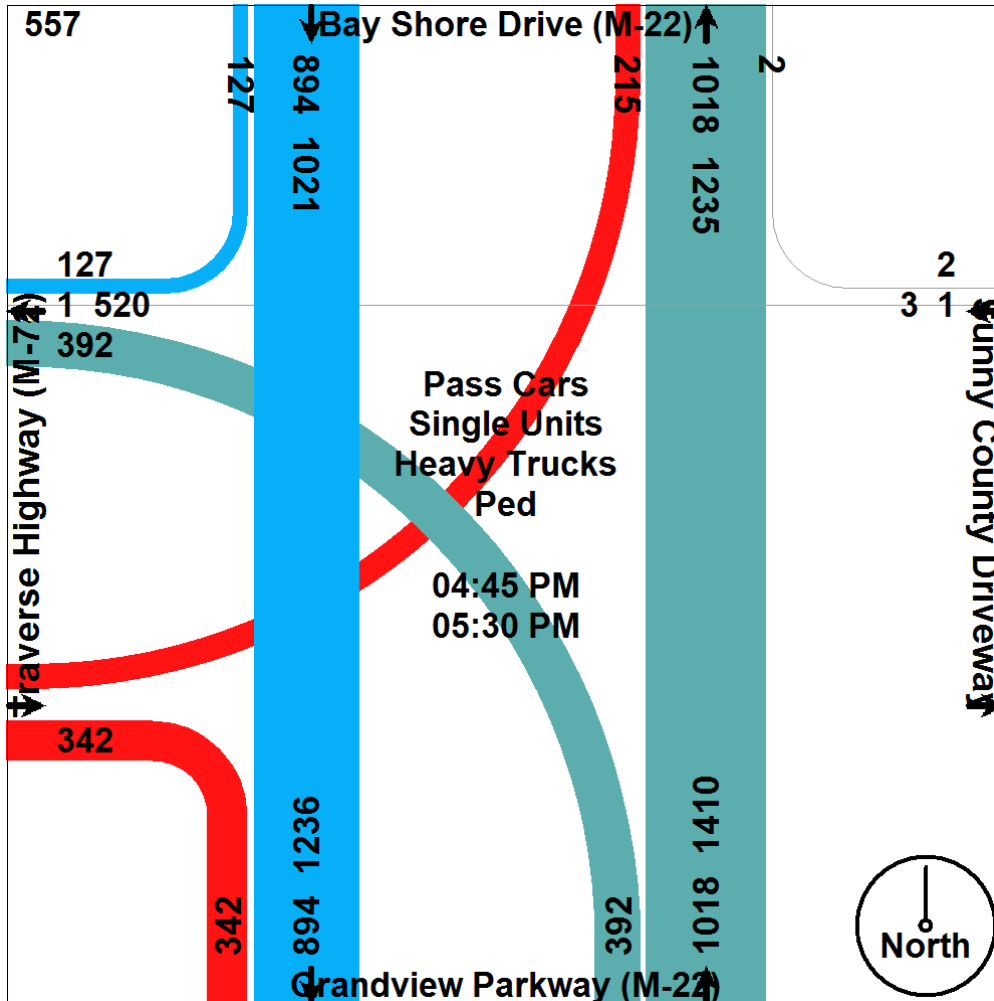
**Progressive AE**



**Project:** Elmwood M-22 Traffic Study  
**Location:** M-22 & M-72  
**Weather:** Sunny, Dry PM 70's  
**Count By:** Miovison Video SCU 2Z4

**File Name :** TMC6\_M-22&M-72\_6-24-15  
**Site Code :** TMC\_6  
**Start Date :** 6/24/2015  
**Page No :** 4

| Start Time   | Bay Shore Drive (M-22) Southbound |      |      |            | Sunny County Driveway Westbound |      |      |            | Grandview Parkway (M-22) Northbound |      |      |            | Traverse Highway (M-72) Eastbound |      |      |            | Int. Total |
|--|-----------------------------------|------|------|------------|---------------------------------|------|------|------------|-------------------------------------|------|------|------------|-----------------------------------|------|------|------------|------------|
|  | Rgt                               | Thru | Left | App. Total | Rgt                             | Thru | Left | App. Total | Rgt                                 | Thru | Left | App. Total | Rgt                               | Thru | Left | App. Total |            |
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 |                                   |      |      |            |                                 |      |      |            |                                     |      |      |            |                                   |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                                   |      |      |            |                                 |      |      |            |                                     |      |      |            |                                   |      |      |            |            |
| 04:45 PM   | 23                                | 236  | 0    | 259        | 1                               | 0    | 0    | 1          | 0                                   | 245  | 94   | 339        | 84                                | 0    | 47   | 131        | 730        |
| 05:00 PM   | 39                                | 222  | 0    | 261        | 1                               | 1    | 0    | 2          | 0                                   | 259  | 94   | 353        | 92                                | 0    | 57   | 149        | 765        |
| 05:15 PM   | 36                                | 215  | 0    | 251        | 0                               | 0    | 0    | 0          | 0                                   | 261  | 105  | 366        | 81                                | 0    | 58   | 139        | 756        |
| 05:30 PM   | 29                                | 221  | 0    | 250        | 0                               | 0    | 0    | 0          | 0                                   | 253  | 99   | 352        | 85                                | 0    | 53   | 138        | 740        |
| Total Volume   | 127                               | 894  | 0    | 1021       | 2                               | 1    | 0    | 3          | 0                                   | 1018 | 392  | 1410       | 342                               | 0    | 215  | 557        | 2991       |
| % App. Total   | 12.4                              | 87.6 | 0    |            | 66.7                            | 33.3 | 0    |            | 0                                   | 72.2 | 27.8 |            | 61.4                              | 0    | 38.6 |            |            |
| PHF  | .814                              | .947 | .000 | .978       | .500                            | .250 | .000 | .375       | .000                                | .975 | .933 | .963       | .929                              | .000 | .927 | .935       | .977       |
| Pass Cars  | 125                               | 865  | 0    | 990        | 2                               | 1    | 0    | 3          | 0                                   | 1010 | 386  | 1396       | 334                               | 0    | 213  | 547        | 2936       |
| % Pass Cars  | 98.4                              | 96.8 | 0    | 97.0       | 100                             | 100  | 0    | 100        | 0                                   | 99.2 | 98.5 | 99.0       | 97.7                              | 0    | 99.1 | 98.2       | 98.2       |
| Single Units   | 2                                 | 23   | 0    | 25         | 0                               | 0    | 0    | 0          | 0                                   | 6    | 2    | 8          | 4                                 | 0    | 2    | 6          | 39         |
| % Single Units   | 1.6                               | 2.6  | 0    | 2.4        | 0                               | 0    | 0    | 0          | 0                                   | 0.6  | 0.5  | 0.6        | 1.2                               | 0    | 0.9  | 1.1        | 1.3        |
| Heavy Trucks   | 0                                 | 6    | 0    | 6          | 0                               | 0    | 0    | 0          | 0                                   | 2    | 4    | 6          | 4                                 | 0    | 0    | 4          | 16         |
| % Heavy Trucks   | 0                                 | 0.7  | 0    | 0.6        | 0                               | 0    | 0    | 0          | 0                                   | 0.2  | 1.0  | 0.4        | 1.2                               | 0    | 0    | 0.7        | 0.5        |
| Ped  | 0                                 | 0    | 0    | 0          | 0                               | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0          |
| % Ped  | 0                                 | 0    | 0    | 0          | 0                               | 0    | 0    | 0          | 0                                   | 0    | 0    | 0          | 0                                 | 0    | 0    | 0          | 0          |





# Traffic Data Collection, TDC

[tdccounts.com](http://tdccounts.com)

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-22 & M-72  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 2Z4

File Name : TMC6\_M-22&M-72\_6-24-15  
Site Code : TMC\_6  
Start Date : 6/24/2015  
Page No : 5

Aerial Photo



# Traffic Data Collection, TDC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-72 & Bay**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 1TM**

**File Name : TMC7\_M-72&Bay\_6-24-15**  
**Site Code : TMC\_7**  
**Start Date : 6/24/2015**  
**Page No : 1**

**Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped**

| Start Time      | Southbound |      |      |      |            | Traverse Hwy. (M-72)<br>Westbound |      |      |      |            | Bay Street<br>Northbound |      |      |      |            | Traverse Hwy. (M-72)<br>Eastbound |      |      |      |            | Int. Total |
|-----------------|------------|------|------|------|------------|-----------------------------------|------|------|------|------------|--------------------------|------|------|------|------------|-----------------------------------|------|------|------|------------|------------|
|                 | Rgt        | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total | Rgt                      | Thru | Left | Peds | App. Total | Rgt                               | Thru | Left | Peds | App. Total |            |
| 07:00 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 40   | 19   | 5    | 64         | 6                        | 0    | 3    | 1    | 10         | 4                                 | 70   | 0    | 0    | 74         | 148        |
| 07:15 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 56   | 25   | 6    | 87         | 10                       | 0    | 6    | 0    | 16         | 11                                | 104  | 0    | 0    | 115        | 218        |
| 07:30 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 78   | 24   | 4    | 106        | 10                       | 0    | 12   | 0    | 22         | 11                                | 131  | 0    | 0    | 142        | 270        |
| 07:45 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 59   | 43   | 9    | 111        | 21                       | 0    | 11   | 1    | 33         | 18                                | 153  | 0    | 0    | 171        | 315        |
| Total           | 0          | 0    | 0    | 0    | 0          | 0                                 | 233  | 111  | 24   | 368        | 47                       | 0    | 32   | 2    | 81         | 44                                | 458  | 0    | 0    | 502        | 951        |
| 08:00 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 65   | 40   | 18   | 123        | 25                       | 0    | 7    | 0    | 32         | 11                                | 103  | 0    | 0    | 114        | 269        |
| 08:15 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 59   | 35   | 2    | 96         | 21                       | 0    | 3    | 0    | 24         | 14                                | 98   | 0    | 0    | 112        | 232        |
| 08:30 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 68   | 26   | 16   | 110        | 16                       | 0    | 12   | 4    | 32         | 7                                 | 96   | 0    | 0    | 103        | 245        |
| 08:45 AM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 59   | 26   | 14   | 99         | 33                       | 0    | 8    | 0    | 41         | 15                                | 110  | 0    | 0    | 125        | 265        |
| Total           | 0          | 0    | 0    | 0    | 0          | 0                                 | 251  | 127  | 50   | 428        | 95                       | 0    | 30   | 4    | 129        | 47                                | 407  | 0    | 0    | 454        | 1011       |
| **** BREAK **** |            |      |      |      |            |                                   |      |      |      |            |                          |      |      |      |            |                                   |      |      |      |            |            |
| 04:00 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 119  | 32   | 0    | 151        | 18                       | 0    | 13   | 0    | 31         | 23                                | 99   | 0    | 0    | 122        | 304        |
| 04:15 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 120  | 39   | 1    | 160        | 24                       | 0    | 13   | 0    | 37         | 22                                | 98   | 0    | 0    | 120        | 317        |
| 04:30 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 104  | 24   | 0    | 128        | 30                       | 0    | 12   | 0    | 42         | 25                                | 96   | 0    | 0    | 121        | 291        |
| 04:45 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 89   | 28   | 3    | 120        | 28                       | 0    | 9    | 0    | 37         | 11                                | 108  | 0    | 0    | 119        | 276        |
| Total           | 0          | 0    | 0    | 0    | 0          | 0                                 | 432  | 123  | 4    | 559        | 100                      | 0    | 47   | 0    | 147        | 81                                | 401  | 0    | 0    | 482        | 1188       |
| 05:00 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 109  | 21   | 2    | 132        | 29                       | 0    | 19   | 0    | 48         | 33                                | 120  | 0    | 0    | 153        | 333        |
| 05:15 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 118  | 24   | 0    | 142        | 32                       | 0    | 14   | 0    | 46         | 15                                | 110  | 0    | 0    | 125        | 313        |
| 05:30 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 105  | 23   | 3    | 131        | 23                       | 0    | 10   | 0    | 33         | 21                                | 115  | 0    | 0    | 136        | 300        |
| 05:45 PM        | 0          | 0    | 0    | 0    | 0          | 0                                 | 115  | 14   | 2    | 131        | 23                       | 0    | 8    | 0    | 31         | 8                                 | 88   | 0    | 0    | 96         | 258        |
| Total           | 0          | 0    | 0    | 0    | 0          | 0                                 | 447  | 82   | 7    | 536        | 107                      | 0    | 51   | 0    | 158        | 77                                | 433  | 0    | 0    | 510        | 1204       |
| Grand Total     | 0          | 0    | 0    | 0    | 0          | 0                                 | 1363 | 443  | 85   | 1891       | 349                      | 0    | 160  | 6    | 515        | 249                               | 1699 | 0    | 0    | 1948       | 4354       |
| Apprch %        | 0          | 0    | 0    | 0    | 0          | 0                                 | 72.1 | 23.4 | 4.5  |            | 67.8                     | 0    | 31.1 | 1.2  |            | 12.8                              | 87.2 | 0    | 0    |            |            |
| Total %         | 0          | 0    | 0    | 0    | 0          | 0                                 | 31.3 | 10.2 | 2    | 43.4       | 8                        | 0    | 3.7  | 0.1  | 11.8       | 5.7                               | 39   | 0    | 0    | 44.7       |            |
| Pass Cars       | 0          | 0    | 0    | 0    | 0          | 0                                 | 1297 | 438  | 0    | 1735       | 347                      | 0    | 158  | 0    | 505        | 249                               | 1639 | 0    | 0    | 1888       | 4128       |
| % Pass Cars     | 0          | 0    | 0    | 0    | 0          | 0                                 | 95.2 | 98.9 | 0    | 91.8       | 99.4                     | 0    | 98.8 | 0    | 98.1       | 100                               | 96.5 | 0    | 0    | 96.9       | 94.8       |
| Single Units    | 0          | 0    | 0    | 0    | 0          | 0                                 | 51   | 4    | 0    | 55         | 2                        | 0    | 2    | 0    | 4          | 0                                 | 37   | 0    | 0    | 37         | 96         |
| % Single Units  | 0          | 0    | 0    | 0    | 0          | 0                                 | 3.7  | 0.9  | 0    | 2.9        | 0.6                      | 0    | 1.2  | 0    | 0.8        | 0                                 | 2.2  | 0    | 0    | 1.9        | 2.2        |
| Heavy Trucks    | 0          | 0    | 0    | 0    | 0          | 0                                 | 15   | 1    | 0    | 16         | 0                        | 0    | 0    | 0    | 0          | 0                                 | 23   | 0    | 0    | 23         | 39         |
| % Heavy Trucks  | 0          | 0    | 0    | 0    | 0          | 0                                 | 1.1  | 0.2  | 0    | 0.8        | 0                        | 0    | 0    | 0    | 0          | 0                                 | 1.4  | 0    | 0    | 1.2        | 0.9        |
| Ped             | 0          | 0    | 0    | 0    | 0          | 0                                 | 0    | 0    | 85   | 85         | 0                        | 0    | 0    | 6    | 6          | 0                                 | 0    | 0    | 0    | 0          | 91         |
| % Ped           | 0          | 0    | 0    | 0    | 0          | 0                                 | 0    | 0    | 100  | 4.5        | 0                        | 0    | 0    | 100  | 1.2        | 0                                 | 0    | 0    | 0    | 0          | 2.1        |

Comments: 4 hour traffic study conducted during typical weekday (Wednesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours. Flashing red signal for EB Traverse Hwy. at Bay Street, Signal is located within 100' feet of M-22 & M-72 traffic signalized intersection and has left turns overlapping. Miovison SCU video camera located within NW intersection quadrant.

# Traffic Data Collection, TDC

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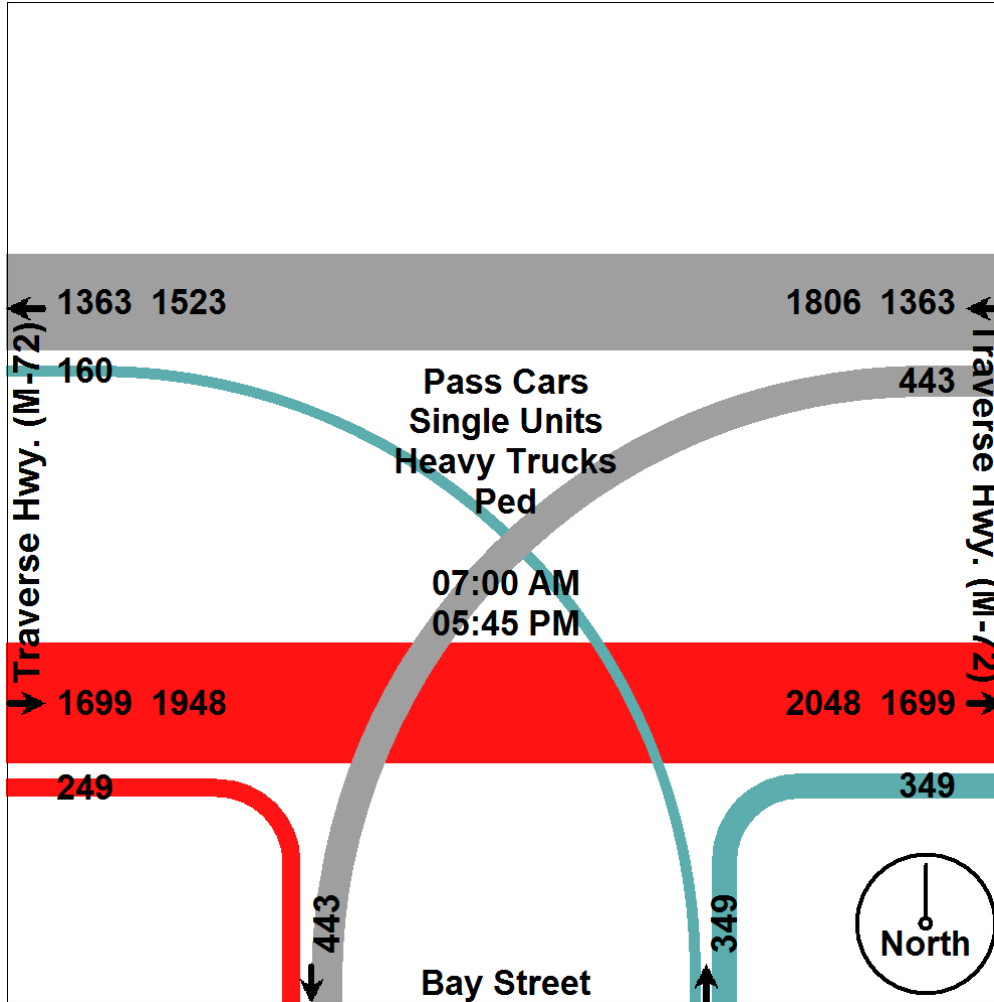
Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-72 & Bay  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 1TM

File Name : TMC7\_M-72&Bay\_6-24-15  
Site Code : TMC\_7  
Start Date : 6/24/2015  
Page No : 2



# Traffic Data Collection, TDC

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Phone: (586) 786-5407

Traffic Study Performed For:

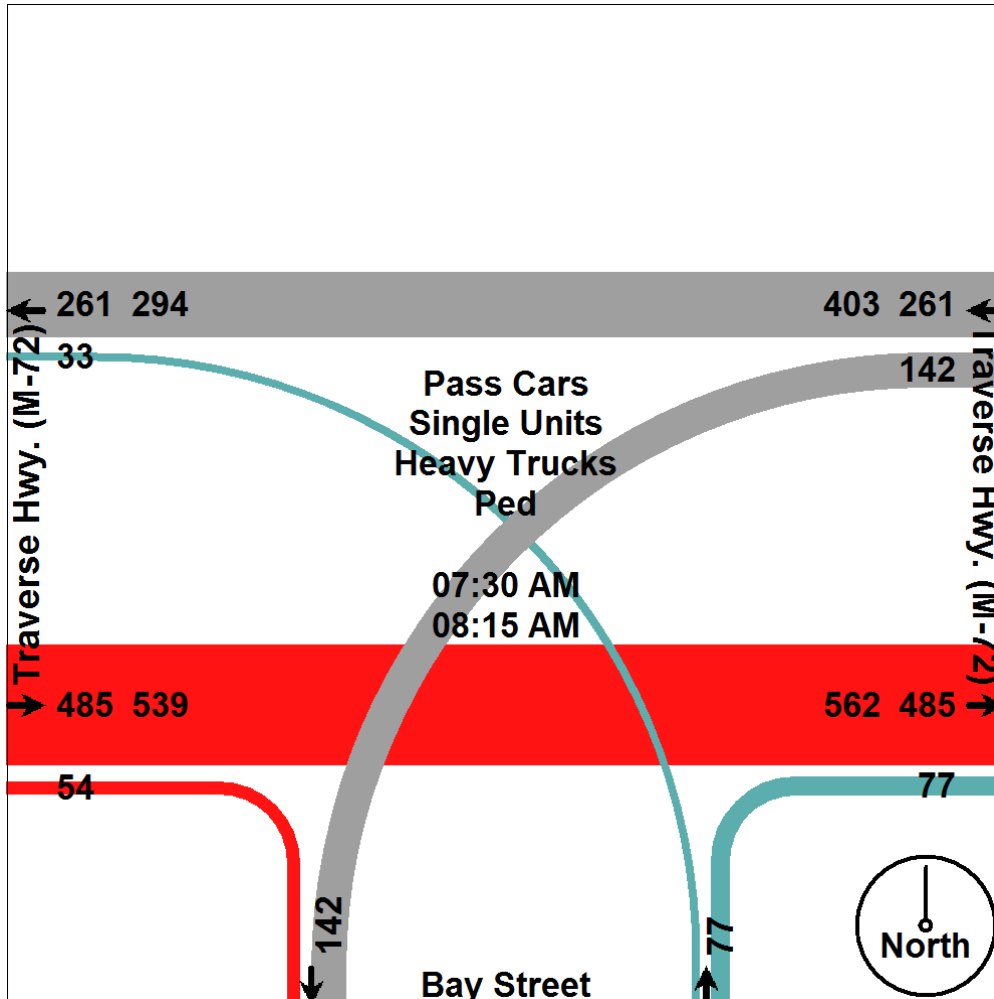
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-72 & Bay**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 1TM**

**File Name : TMC7\_M-72&Bay\_6-24-15**  
**Site Code : TMC\_7**  
**Start Date : 6/24/2015**  
**Page No : 3**

| Start Time   | Southbound |      |      |            | Traverse Hwy. (M-72) Westbound |      |      |            | Bay Street Northbound |      |      |            | Traverse Hwy. (M-72) Eastbound |      |      |            | Int. Total |
|--|------------|------|------|------------|--------------------------------|------|------|------------|-----------------------|------|------|------------|--------------------------------|------|------|------------|------------|
|  | Rgt        | Thru | Left | App. Total | Rgt                            | Thru | Left | App. Total | Rgt                   | Thru | Left | App. Total | Rgt                            | Thru | Left | App. Total |            |
| Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 |            |      |      |            |                                |      |      |            |                       |      |      |            |                                |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |            |      |      |            |                                |      |      |            |                       |      |      |            |                                |      |      |            |            |
| 07:30 AM   | 0          | 0    | 0    | 0          | 0                              | 78   | 24   | 102        | 10                    | 0    | 12   | 22         | 11                             | 131  | 0    | 142        | 266        |
| 07:45 AM   | 0          | 0    | 0    | 0          | 0                              | 59   | 43   | 102        | 21                    | 0    | 11   | 32         | 18                             | 153  | 0    | 171        | 305        |
| 08:00 AM   | 0          | 0    | 0    | 0          | 0                              | 65   | 40   | 105        | 25                    | 0    | 7    | 32         | 11                             | 103  | 0    | 114        | 251        |
| 08:15 AM   | 0          | 0    | 0    | 0          | 0                              | 59   | 35   | 94         | 21                    | 0    | 3    | 24         | 14                             | 98   | 0    | 112        | 230        |
| Total Volume   | 0          | 0    | 0    | 0          | 0                              | 261  | 142  | 403        | 77                    | 0    | 33   | 110        | 54                             | 485  | 0    | 539        | 1052       |
| % App. Total   | 0          | 0    | 0    | 0          | 0                              | 64.8 | 35.2 |            | 70                    | 0    | 30   |            | 10                             | 90   | 0    |            |            |
| PHF  | .000       | .000 | .000 | .000       | .000                           | .837 | .826 | .960       | .770                  | .000 | .688 | .859       | .750                           | .792 | .000 | .788       | .862       |
| Pass Cars  | 0          | 0    | 0    | 0          | 0                              | 234  | 138  | 372        | 77                    | 0    | 33   | 110        | 54                             | 471  | 0    | 525        | 1007       |
| % Pass Cars  | 0          | 0    | 0    | 0          | 0                              | 89.7 | 97.2 | 92.3       | 100                   | 0    | 100  | 100        | 100                            | 97.1 | 0    | 97.4       | 95.7       |
| Single Units   | 0          | 0    | 0    | 0          | 0                              | 22   | 3    | 25         | 0                     | 0    | 0    | 0          | 0                              | 10   | 0    | 10         | 35         |
| % Single Units   | 0          | 0    | 0    | 0          | 0                              | 8.4  | 2.1  | 6.2        | 0                     | 0    | 0    | 0          | 0                              | 2.1  | 0    | 1.9        | 3.3        |
| Heavy Trucks   | 0          | 0    | 0    | 0          | 0                              | 5    | 1    | 6          | 0                     | 0    | 0    | 0          | 0                              | 4    | 0    | 4          | 10         |
| % Heavy Trucks   | 0          | 0    | 0    | 0          | 0                              | 1.9  | 0.7  | 1.5        | 0                     | 0    | 0    | 0          | 0                              | 0.8  | 0    | 0.7        | 1.0        |
| Ped  | 0          | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0          |
| % Ped  | 0          | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0          |



# Traffic Data Collection, TDC

tdccounts.com

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Traffic Study Performed For:

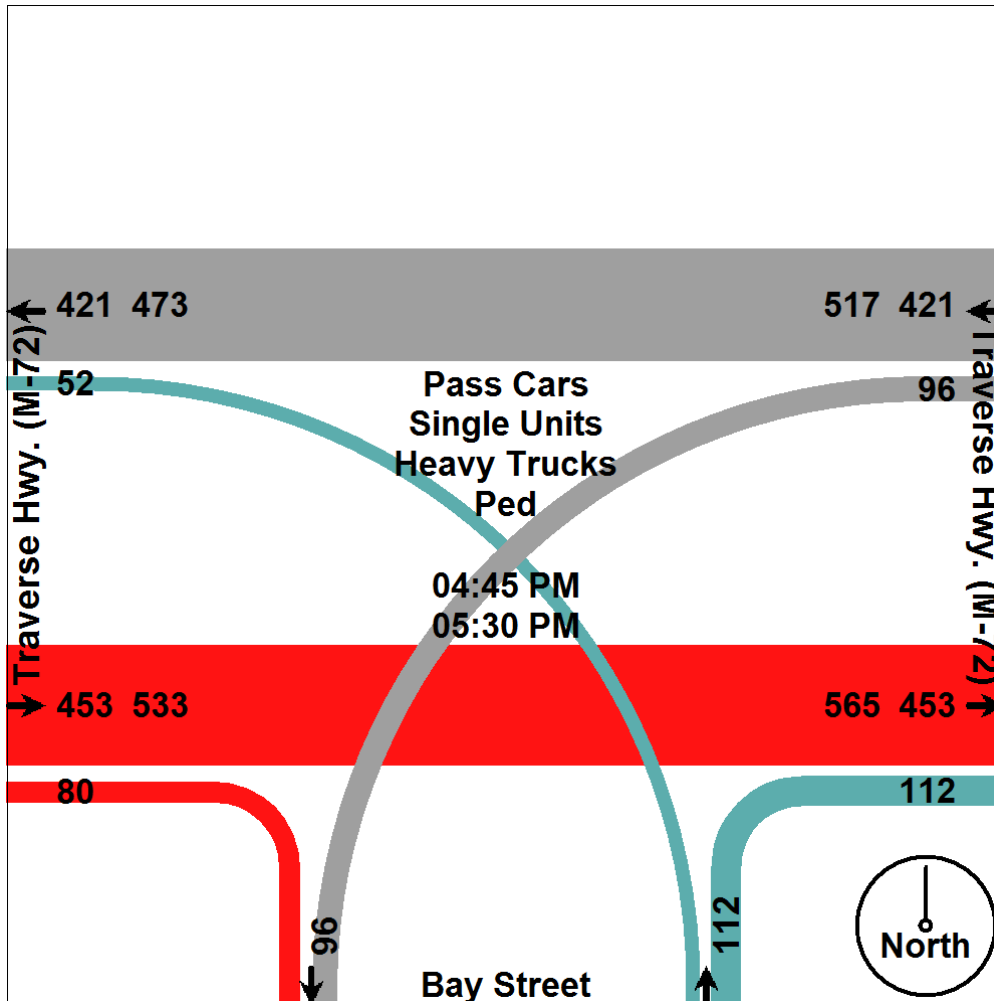
**Progressive AE**



**Project: Elmwood M-22 Traffic Study**  
**Location: M-72 & Bay**  
**Weather: Sunny, Dry PM 70's**  
**Count By: Miovison Video SCU 1TM**

**File Name : TMC7\_M-72&Bay\_6-24-15**  
**Site Code : TMC\_7**  
**Start Date : 6/24/2015**  
**Page No : 4**

| Start Time   | Southbound |      |      |            | Traverse Hwy. (M-72) Westbound |      |      |            | Bay Street Northbound |      |      |            | Traverse Hwy. (M-72) Eastbound |      |      |            | Int. Total |
|--|------------|------|------|------------|--------------------------------|------|------|------------|-----------------------|------|------|------------|--------------------------------|------|------|------------|------------|
|  | Rgt        | Thru | Left | App. Total | Rgt                            | Thru | Left | App. Total | Rgt                   | Thru | Left | App. Total | Rgt                            | Thru | Left | App. Total |            |
| Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1 |            |      |      |            |                                |      |      |            |                       |      |      |            |                                |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |            |      |      |            |                                |      |      |            |                       |      |      |            |                                |      |      |            |            |
| 04:45 PM   | 0          | 0    | 0    | 0          | 0                              | 89   | 28   | 117        | 28                    | 0    | 9    | 37         | 11                             | 108  | 0    | 119        | 273        |
| 05:00 PM   | 0          | 0    | 0    | 0          | 0                              | 109  | 21   | 130        | 29                    | 0    | 19   | 48         | 33                             | 120  | 0    | 153        | 331        |
| 05:15 PM   | 0          | 0    | 0    | 0          | 0                              | 118  | 24   | 142        | 32                    | 0    | 14   | 46         | 15                             | 110  | 0    | 125        | 313        |
| 05:30 PM   | 0          | 0    | 0    | 0          | 0                              | 105  | 23   | 128        | 23                    | 0    | 10   | 33         | 21                             | 115  | 0    | 136        | 297        |
| Total Volume   | 0          | 0    | 0    | 0          | 0                              | 421  | 96   | 517        | 112                   | 0    | 52   | 164        | 80                             | 453  | 0    | 533        | 1214       |
| % App. Total   | 0          | 0    | 0    | 0          | 0                              | 81.4 | 18.6 |            | 68.3                  | 0    | 31.7 |            | 15                             | 85   | 0    |            |            |
| PHF  | .000       | .000 | .000 | .000       | .000                           | .892 | .857 | .910       | .875                  | .000 | .684 | .854       | .606                           | .944 | .000 | .871       | .917       |
| Pass Cars  | 0          | 0    | 0    | 0          | 0                              | 413  | 96   | 509        | 111                   | 0    | 51   | 162        | 80                             | 444  | 0    | 524        | 1195       |
| % Pass Cars  | 0          | 0    | 0    | 0          | 0                              | 98.1 | 100  | 98.5       | 99.1                  | 0    | 98.1 | 98.8       | 100                            | 98.0 | 0    | 98.3       | 98.4       |
| Single Units   | 0          | 0    | 0    | 0          | 0                              | 4    | 0    | 4          | 1                     | 0    | 1    | 2          | 0                              | 5    | 0    | 5          | 11         |
| % Single Units   | 0          | 0    | 0    | 0          | 0                              | 1.0  | 0    | 0.8        | 0.9                   | 0    | 1.9  | 1.2        | 0                              | 1.1  | 0    | 0.9        | 0.9        |
| Heavy Trucks   | 0          | 0    | 0    | 0          | 0                              | 4    | 0    | 4          | 0                     | 0    | 0    | 0          | 0                              | 4    | 0    | 4          | 8          |
| % Heavy Trucks   | 0          | 0    | 0    | 0          | 0                              | 1.0  | 0    | 0.8        | 0                     | 0    | 0    | 0          | 0                              | 0.9  | 0    | 0.8        | 0.7        |
| Ped  | 0          | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0          |
| % Ped  | 0          | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0                     | 0    | 0    | 0          | 0                              | 0    | 0    | 0          | 0          |





# Traffic Data Collection, TDC

[tdccounts.com](http://tdccounts.com)

Phone: (586) 786-5407

Traffic Study Performed For:

**Progressive AE**



Project: Elmwood M-22 Traffic Study  
Location: M-72 & Bay  
Weather: Sunny, Dry PM 70's  
Count By: Miovison Video SCU 1TM

File Name : TMC7\_M-72&Bay\_6-24-15  
Site Code : TMC\_7  
Start Date : 6/24/2015  
Page No : 5

Aerial Photo



# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Match Pav't : Asphalt 1 Lane

**tdccounts.com**  
 Phone (586) 786-5407  
 Traffic Study Performed For:  
**Progressive AE**

ATR\_1 M-22&Grandview\_EB  
 Grandview Road  
 (75' West of M-22)  
 Station ID: Eastbound  
 Site Code: ATR 1 EB  
 Date Start: 23-Jun-15

| Start Time | Mon<br>22-Jun-15 | Tue | Wed  | Thu | Fri | Average<br>Day | Sat | Sun | Week<br>Average |
|------------|------------------|-----|------|-----|-----|----------------|-----|-----|-----------------|
| 12:00 AM   | *                | *   | 5    | 6   | *   | 6              | *   | *   | 6               |
| 01:00      | *                | *   | 1    | 3   | *   | 2              | *   | *   | 2               |
| 02:00      | *                | *   | 5    | 2   | *   | 4              | *   | *   | 4               |
| 03:00      | *                | *   | 4    | 1   | *   | 2              | *   | *   | 2               |
| 04:00      | *                | *   | 6    | 4   | *   | 5              | *   | *   | 5               |
| 05:00      | *                | *   | 14   | 18  | *   | 16             | *   | *   | 16              |
| 06:00      | *                | *   | 54   | 29  | *   | 42             | *   | *   | 42              |
| 07:00      | *                | *   | 87   | 102 | *   | 94             | *   | *   | 94              |
| 08:00      | *                | *   | 106  | 104 | *   | 105            | *   | *   | 105             |
| 09:00      | *                | *   | 71   | 74  | *   | 72             | *   | *   | 72              |
| 10:00      | *                | *   | 65   | 82  | *   | 74             | *   | *   | 74              |
| 11:00      | *                | 68  | 91   | 84  | *   | 81             | *   | *   | 81              |
| 12:00 PM   | *                | 75  | 90   | 83  | *   | 83             | *   | *   | 83              |
| 01:00      | *                | 85  | 75   | *   | *   | 80             | *   | *   | 80              |
| 02:00      | *                | 91  | 91   | *   | *   | 91             | *   | *   | 91              |
| 03:00      | *                | 85  | 94   | *   | *   | 90             | *   | *   | 90              |
| 04:00      | *                | 73  | 95   | *   | *   | 84             | *   | *   | 84              |
| 05:00      | *                | 95  | 99   | *   | *   | 97             | *   | *   | 97              |
| 06:00      | *                | 84  | 103  | *   | *   | 94             | *   | *   | 94              |
| 07:00      | *                | 72  | 75   | *   | *   | 74             | *   | *   | 74              |
| 08:00      | *                | 78  | 68   | *   | *   | 73             | *   | *   | 73              |
| 09:00      | *                | 40  | 47   | *   | *   | 44             | *   | *   | 44              |
| 10:00      | *                | 21  | 36   | *   | *   | 28             | *   | *   | 28              |
| 11:00      | *                | 16  | 16   | *   | *   | 16             | *   | *   | 16              |
| Total      | 0                | 883 | 1398 | 592 | 0   | 1357           | 0   | 0   | 1357            |

|              |      |       |        |       |      |        |      |      |       |
|--------------|------|-------|--------|-------|------|--------|------|------|-------|
| % Avg. WkDay | 0.0% | 65.1% | 103.0% | 43.6% | 0.0% | 100.0% |      |      |       |
| % Avg. Week  | 0.0% | 65.1% | 103.0% | 43.6% | 0.0% | 100.0% | 0.0% | 0.0% |       |
| AM Peak      | -    | 11:00 | 08:00  | 08:00 | -    | 08:00  | -    | -    | 08:00 |
| Vol.         | -    | 68    | 106    | 104   | -    | 105    | -    | -    | 105   |
| PM Peak      | -    | 17:00 | 18:00  | 12:00 | -    | 17:00  | -    | -    | 17:00 |
| Vol.         | -    | 95    | 103    | 83    | -    | 97     | -    | -    | 97    |
| Total        | 0    | 883   | 1398   | 592   | 0    | 1357   | 0    | 0    | 1357  |

ADT                      ADT 1,354                      AADT 1,354

# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Match Pav't : Asphalt 2 Lanes

**tdccounts.com**  
 Phone (586) 786-5407  
 Traffic Study Performed For:  
**Progressive AE**

ATR\_1 M-22&Grandview\_NB  
 Bay Shore Drive (M-22)  
 (200' South of Grandview Road)  
 Station ID: Northbound  
 Site Code: ATR 1 NB  
 Date Start: 23-Jun-15

| Start Time   | Mon<br>22-Jun-15 | Tue           | Wed           | Thu          | Fri  | Average<br>Day | Sat  | Sun  | Week<br>Average |
|--------------|------------------|---------------|---------------|--------------|------|----------------|------|------|-----------------|
| 12:00 AM     | *                | *             | 71            | 80           | *    | 76             | *    | *    | 76              |
| 01:00        | *                | *             | 46            | 50           | *    | 48             | *    | *    | 48              |
| 02:00        | *                | *             | 24            | 17           | *    | 20             | *    | *    | 20              |
| 03:00        | *                | *             | 25            | 23           | *    | 24             | *    | *    | 24              |
| 04:00        | *                | *             | 24            | 21           | *    | 22             | *    | *    | 22              |
| 05:00        | *                | *             | 71            | 57           | *    | 64             | *    | *    | 64              |
| 06:00        | *                | *             | 164           | 154          | *    | 159            | *    | *    | 159             |
| 07:00        | *                | *             | 413           | 428          | *    | 420            | *    | *    | 420             |
| 08:00        | *                | *             | 563           | 538          | *    | 550            | *    | *    | 550             |
| 09:00        | *                | *             | 603           | 558          | *    | 580            | *    | *    | 580             |
| 10:00        | *                | 587           | 602           | 576          | *    | 588            | *    | *    | 588             |
| 11:00        | *                | <b>685</b>    | <b>669</b>    | <b>730</b>   | *    | <b>695</b>     | *    | *    | <b>695</b>      |
| 12:00 PM     | *                | 721           | 735           | *            | *    | 728            | *    | *    | 728             |
| 01:00        | *                | 790           | 796           | *            | *    | 793            | *    | *    | 793             |
| 02:00        | *                | 727           | 776           | *            | *    | 752            | *    | *    | 752             |
| 03:00        | *                | 828           | 830           | *            | *    | 829            | *    | *    | 829             |
| 04:00        | *                | 907           | 887           | *            | *    | 897            | *    | *    | 897             |
| 05:00        | *                | <b>1040</b>   | <b>1028</b>   | *            | *    | <b>1034</b>    | *    | *    | <b>1034</b>     |
| 06:00        | *                | 773           | 802           | *            | *    | 788            | *    | *    | 788             |
| 07:00        | *                | 568           | 585           | *            | *    | 576            | *    | *    | 576             |
| 08:00        | *                | 477           | 541           | *            | *    | 509            | *    | *    | 509             |
| 09:00        | *                | 398           | 446           | *            | *    | 422            | *    | *    | 422             |
| 10:00        | *                | 270           | 225           | *            | *    | 248            | *    | *    | 248             |
| 11:00        | *                | 146           | 135           | *            | *    | 140            | *    | *    | 140             |
| Total        | 0                | 8917          | 11061         | 3232         | 0    | 10962          | 0    | 0    | 10962           |
| % Avg. WkDay | 0.0%             | 81.3%         | 100.9%        | 29.5%        | 0.0% | 100.0%         |      |      |                 |
| % Avg. Week  | 0.0%             | 81.3%         | 100.9%        | 29.5%        | 0.0% | 100.0%         | 0.0% | 0.0% |                 |
| AM Peak Vol. | -                | 11:00<br>685  | 11:00<br>669  | 11:00<br>730 | -    | 11:00<br>695   | -    | -    | 11:00<br>695    |
| PM Peak Vol. | -                | 17:00<br>1040 | 17:00<br>1028 | -            | -    | 17:00<br>1034  | -    | -    | 17:00<br>1034   |
| Total        | 0                | 8917          | 11061         | 3232         | 0    | 10962          | 0    | 0    | 10962           |
| ADT          | ADT 10,899       | AADT 10,899   |               |              |      |                |      |      |                 |

# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Match Pav't : Asphalt 2 Lanes

**tdccounts.com**  
 Phone (586) 786-5407  
 Traffic Study Performed For:  
**Progressive AE**

ATR\_1 M-22&Grandview\_SB  
 Bay Shore Drive (M-22)  
 (125' North of Grandview Road)  
 Station ID: Southbound  
 Site Code: ATR 1 SB  
 Date Start: 23-Jun-15

| Start Time   | Mon<br>22-Jun-15 | Tue         | Wed        | Thu        | Fri  | Average<br>Day | Sat  | Sun  | Week<br>Average |
|--------------|------------------|-------------|------------|------------|------|----------------|------|------|-----------------|
| 12:00 AM     | *                | *           | 29         | 19         | *    | 24             | *    | *    | 24              |
| 01:00        | *                | *           | 19         | 15         | *    | 17             | *    | *    | 17              |
| 02:00        | *                | *           | 18         | 17         | *    | 18             | *    | *    | 18              |
| 03:00        | *                | *           | 13         | 16         | *    | 14             | *    | *    | 14              |
| 04:00        | *                | *           | 56         | 49         | *    | 52             | *    | *    | 52              |
| 05:00        | *                | *           | 122        | 124        | *    | 123            | *    | *    | 123             |
| 06:00        | *                | *           | 346        | 306        | *    | 326            | *    | *    | 326             |
| 07:00        | *                | *           | <b>757</b> | <b>717</b> | *    | <b>737</b>     | *    | *    | <b>737</b>      |
| 08:00        | *                | *           | 713        | 693        | *    | 703            | *    | *    | 703             |
| 09:00        | *                | *           | 665        | 704        | *    | 684            | *    | *    | 684             |
| 10:00        | *                | *           | 653        | 713        | *    | 683            | *    | *    | 683             |
| 11:00        | *                | <b>643</b>  | 642        | 669        | *    | 651            | *    | *    | 651             |
| 12:00 PM     | *                | 646         | 670        | *          | *    | 658            | *    | *    | 658             |
| 01:00        | *                | 653         | 617        | *          | *    | 635            | *    | *    | 635             |
| 02:00        | *                | 681         | 663        | *          | *    | 672            | *    | *    | 672             |
| 03:00        | *                | <b>760</b>  | 700        | *          | *    | 730            | *    | *    | 730             |
| 04:00        | *                | 749         | <b>825</b> | *          | *    | <b>787</b>     | *    | *    | <b>787</b>      |
| 05:00        | *                | 755         | 796        | *          | *    | 776            | *    | *    | 776             |
| 06:00        | *                | 582         | 585        | *          | *    | 584            | *    | *    | 584             |
| 07:00        | *                | 432         | 439        | *          | *    | 436            | *    | *    | 436             |
| 08:00        | *                | 337         | 366        | *          | *    | 352            | *    | *    | 352             |
| 09:00        | *                | 217         | 238        | *          | *    | 228            | *    | *    | 228             |
| 10:00        | *                | 136         | 136        | *          | *    | 136            | *    | *    | 136             |
| 11:00        | *                | 65          | 49         | *          | *    | 57             | *    | *    | 57              |
| Total        | 0                | 6656        | 10117      | 4042       | 0    | 10083          | 0    | 0    | 10083           |
| % Avg. WkDay | 0.0%             | 66.0%       | 100.3%     | 40.1%      | 0.0% | 100.0%         |      |      |                 |
| % Avg. Week  | 0.0%             | 66.0%       | 100.3%     | 40.1%      | 0.0% | 100.0%         | 0.0% | 0.0% |                 |
| AM Peak      | -                | 11:00       | 07:00      | 07:00      | -    | 07:00          | -    | -    | 07:00           |
| Vol.         | -                | 643         | 757        | 717        | -    | 737            | -    | -    | 737             |
| PM Peak      | -                | 15:00       | 16:00      | -          | -    | 16:00          | -    | -    | 16:00           |
| Vol.         | -                | 760         | 825        | -          | -    | 787            | -    | -    | 787             |
| Total        | 0                | 6656        | 10117      | 4042       | 0    | 10083          | 0    | 0    | 10083           |
| ADT          | ADT 10,039       | AADT 10,039 |            |            |      |                |      |      |                 |



# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Matich Pav't: Asphalt 2 Lanes

tdccounts.com  
 Phone (586) 786-540Z

Traffic Study Performed For:  
**Progressive AE**

ATR\_1 M-22&Grandview\_WB  
 Elmwood Marina  
 (175 NE of M-22)  
 Station ID: 2 Way Count  
 Site Code: ATR 2 WB  
 Date Start: 23-Jun-15

| Start Time   | 22-Jun-15 |         | 23-Jun-15 |          | 24-Jun-15 |       | 25-Jun-15 |       | 26-Jun-15 |    | 27-Jun-15 |       | 28-Jun-15 |    |
|--------------|-----------|---------|-----------|----------|-----------|-------|-----------|-------|-----------|----|-----------|-------|-----------|----|
|              | EB        | WB      | EB        | WB       | EB        | WB    | EB        | WB    | EB        | WB | EB        | WB    | EB        | WB |
| 12:00 AM     | *         | *       | *         | *        | 0         | 1     | 0         | 1     | *         | *  | 0         | 1     | *         | *  |
| 01:00        | *         | *       | *         | *        | 0         | 0     | 0         | 0     | *         | *  | 0         | 0     | *         | *  |
| 02:00        | *         | *       | *         | *        | 0         | 0     | 0         | 0     | *         | *  | 0         | 0     | *         | *  |
| 03:00        | *         | *       | *         | *        | 1         | 1     | 0         | 0     | *         | *  | 0         | 0     | *         | *  |
| 04:00        | *         | *       | *         | *        | 1         | 2     | 0         | 1     | *         | *  | 0         | 2     | *         | *  |
| 05:00        | *         | *       | *         | *        | 1         | 0     | 1         | 0     | *         | *  | 1         | 0     | *         | *  |
| 06:00        | *         | *       | *         | *        | 7         | 1     | 7         | 1     | *         | *  | 7         | 1     | *         | *  |
| 07:00        | *         | *       | *         | *        | 14        | 0     | 14        | 1     | *         | *  | 14        | 0     | *         | *  |
| 08:00        | *         | *       | *         | *        | 28        | 2     | 22        | 5     | *         | *  | 25        | 4     | *         | *  |
| 09:00        | *         | *       | *         | *        | 21        | 5     | 21        | 7     | *         | *  | 21        | 6     | *         | *  |
| 10:00        | *         | *       | *         | *        | 20        | 5     | 28        | 8     | *         | *  | 24        | 6     | *         | *  |
| 11:00        | *         | *       | *         | *        | 30        | 8     | 16        | 16    | *         | *  | 24        | 13    | *         | *  |
| 12:00 PM     | *         | *       | *         | *        | 23        | 13    | *         | *     | *         | *  | 25        | 12    | *         | *  |
| 01:00        | *         | *       | *         | *        | 35        | 15    | *         | *     | *         | *  | 40        | 12    | *         | *  |
| 02:00        | *         | *       | *         | *        | 20        | 12    | *         | *     | *         | *  | 28        | 12    | *         | *  |
| 03:00        | *         | *       | *         | *        | 19        | 8     | *         | *     | *         | *  | 36        | 12    | *         | *  |
| 04:00        | *         | *       | *         | *        | 32        | 23    | *         | *     | *         | *  | 32        | 22    | *         | *  |
| 05:00        | *         | *       | *         | *        | 26        | 20    | *         | *     | *         | *  | 33        | 18    | *         | *  |
| 06:00        | *         | *       | *         | *        | 31        | 8     | *         | *     | *         | *  | 36        | 8     | *         | *  |
| 07:00        | *         | *       | *         | *        | 13        | 8     | *         | *     | *         | *  | 16        | 8     | *         | *  |
| 08:00        | *         | *       | *         | *        | 16        | 9     | *         | *     | *         | *  | 14        | 11    | *         | *  |
| 09:00        | *         | *       | *         | *        | 11        | 5     | *         | *     | *         | *  | 12        | 6     | *         | *  |
| 10:00        | *         | *       | *         | *        | 1         | 0     | *         | *     | *         | *  | 2         | 1     | *         | *  |
| 11:00        | *         | *       | *         | *        | 0         | 0     | *         | *     | *         | *  | 0         | 0     | *         | *  |
| Total Day    | 0         | 0       | 252       | 134      | 443       | 150   | 109       | 149   | 40        | 0  | 390       | 155   | 0         | 0  |
| AM Peak Vol. | -         | -       | 11:00     | 11:00    | 11:00     | 11:00 | 10:00     | 11:00 | 11:00     | -  | 08:00     | 11:00 | -         | -  |
| PM Peak Vol. | -         | -       | 13:00     | 16:00    | 15:00     | 16:00 | -         | -     | -         | -  | 13:00     | 16:00 | -         | -  |
| Comb. Total  | 0         | 0       | 386       | 366      | 593       | 593   | 149       | 149   | 40        | 0  | 545       | 155   | 0         | 0  |
| ADT          | ADT 544   | ADT 544 | AADT 544  | AADT 544 | 593       | 593   | 149       | 149   | 0         | 0  | 545       | 155   | 0         | 0  |

# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Match Pav't : Asphalt 1 Lane

**tdccounts.com**  
 Phone (586) 786-5407  
 Traffic Study Performed For:  
**Progressive AE**

ATR\_2 M-22&Carter\_EB  
 Carter Road  
 (100' West of M-22)  
 Station ID: Eastbound  
 Site Code: ATR EB  
 Date Start: 23-Jun-15

| Start Time   | Mon<br>22-Jun-15 | Tue       | Wed       | Thu       | Fri  | Average<br>Day | Sat  | Sun  | Week<br>Average |
|--------------|------------------|-----------|-----------|-----------|------|----------------|------|------|-----------------|
| 12:00 AM     | *                | *         | 3         | 7         | *    | 5              | *    | *    | 5               |
| 01:00        | *                | *         | 1         | 3         | *    | 2              | *    | *    | 2               |
| 02:00        | *                | *         | 2         | 0         | *    | 1              | *    | *    | 1               |
| 03:00        | *                | *         | 2         | 4         | *    | 3              | *    | *    | 3               |
| 04:00        | *                | *         | 1         | 2         | *    | 2              | *    | *    | 2               |
| 05:00        | *                | *         | 15        | 7         | *    | 11             | *    | *    | 11              |
| 06:00        | *                | *         | 19        | 12        | *    | 16             | *    | *    | 16              |
| 07:00        | *                | *         | 48        | 43        | *    | 46             | *    | *    | 46              |
| 08:00        | *                | *         | 55        | 45        | *    | 50             | *    | *    | 50              |
| 09:00        | *                | *         | 61        | 51        | *    | 56             | *    | *    | 56              |
| 10:00        | *                | 61        | 53        | 49        | *    | 54             | *    | *    | 54              |
| 11:00        | *                | <b>75</b> | <b>70</b> | <b>71</b> | *    | <b>72</b>      | *    | *    | <b>72</b>       |
| 12:00 PM     | *                | 77        | 69        | *         | *    | 73             | *    | *    | 73              |
| 01:00        | *                | 47        | 66        | *         | *    | 56             | *    | *    | 56              |
| 02:00        | *                | 59        | 42        | *         | *    | 50             | *    | *    | 50              |
| 03:00        | *                | <b>78</b> | 65        | *         | *    | 72             | *    | *    | 72              |
| 04:00        | *                | 77        | <b>70</b> | *         | *    | <b>74</b>      | *    | *    | <b>74</b>       |
| 05:00        | *                | 72        | 65        | *         | *    | 68             | *    | *    | 68              |
| 06:00        | *                | 49        | 53        | *         | *    | 51             | *    | *    | 51              |
| 07:00        | *                | 27        | 51        | *         | *    | 39             | *    | *    | 39              |
| 08:00        | *                | 37        | 64        | *         | *    | 50             | *    | *    | 50              |
| 09:00        | *                | 29        | 66        | *         | *    | 48             | *    | *    | 48              |
| 10:00        | *                | 27        | 26        | *         | *    | 26             | *    | *    | 26              |
| 11:00        | *                | 9         | 18        | *         | *    | 14             | *    | *    | 14              |
| Total        | 0                | 724       | 985       | 294       | 0    | 939            | 0    | 0    | 939             |
| % Avg. WkDay | 0.0%             | 77.1%     | 104.9%    | 31.3%     | 0.0% | 100.0%         |      |      |                 |
| % Avg. Week  | 0.0%             | 77.1%     | 104.9%    | 31.3%     | 0.0% | 100.0%         | 0.0% | 0.0% |                 |
| AM Peak      | -                | 11:00     | 11:00     | 11:00     | -    | 11:00          | -    | -    | 11:00           |
| Vol.         | -                | 75        | 70        | 71        | -    | 72             | -    | -    | 72              |
| PM Peak      | -                | 15:00     | 16:00     | -         | -    | 16:00          | -    | -    | 16:00           |
| Vol.         | -                | 78        | 70        | -         | -    | 74             | -    | -    | 74              |
| Total        | 0                | 724       | 985       | 294       | 0    | 939            | 0    | 0    | 939             |
| ADT          | ADT 928          |           | AADT 928  |           |      |                |      |      |                 |

# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Match Pav't : Asphalt 2 Lanes

**tdccounts.com**  
 Phone (586) 786-5407  
 Traffic Study Performed For:  
**Progressive AE**

ATR\_2 M-22&Carter\_NB  
 Bay Shore Drive (M-22)  
 (250' South of Carter Road)  
 Station ID: Northbound  
 Site Code: ATR 2 NB  
 Date Start: 23-Jun-15

| Start Time   | Mon<br>22-Jun-15 | Tue         | Wed         | Thu        | Fri  | Average<br>Day | Sat  | Sun  | Week<br>Average |
|--------------|------------------|-------------|-------------|------------|------|----------------|------|------|-----------------|
| 12:00 AM     | *                | *           | 78          | 84         | *    | 81             | *    | *    | 81              |
| 01:00        | *                | *           | 48          | 49         | *    | 48             | *    | *    | 48              |
| 02:00        | *                | *           | 27          | 21         | *    | 24             | *    | *    | 24              |
| 03:00        | *                | *           | 26          | 22         | *    | 24             | *    | *    | 24              |
| 04:00        | *                | *           | 24          | 24         | *    | 24             | *    | *    | 24              |
| 05:00        | *                | *           | 66          | 59         | *    | 62             | *    | *    | 62              |
| 06:00        | *                | *           | 189         | 167        | *    | 178            | *    | *    | 178             |
| 07:00        | *                | *           | 469         | 486        | *    | 478            | *    | *    | 478             |
| 08:00        | *                | *           | 614         | 608        | *    | 611            | *    | *    | 611             |
| 09:00        | *                | *           | 697         | 628        | *    | 662            | *    | *    | 662             |
| 10:00        | *                | 715         | 687         | 645        | *    | 682            | *    | *    | 682             |
| 11:00        | *                | <b>787</b>  | <b>796</b>  | <b>847</b> | *    | <b>810</b>     | *    | *    | <b>810</b>      |
| 12:00 PM     | *                | 825         | 815         | *          | *    | 820            | *    | *    | 820             |
| 01:00        | *                | 887         | 882         | *          | *    | 884            | *    | *    | 884             |
| 02:00        | *                | 830         | 857         | *          | *    | 844            | *    | *    | 844             |
| 03:00        | *                | 904         | 906         | *          | *    | 905            | *    | *    | 905             |
| 04:00        | *                | 1001        | 1038        | *          | *    | 1020           | *    | *    | 1020            |
| 05:00        | *                | <b>1165</b> | <b>1213</b> | *          | *    | <b>1189</b>    | *    | *    | <b>1189</b>     |
| 06:00        | *                | 888         | 996         | *          | *    | 942            | *    | *    | 942             |
| 07:00        | *                | 634         | 671         | *          | *    | 652            | *    | *    | 652             |
| 08:00        | *                | 531         | 569         | *          | *    | 550            | *    | *    | 550             |
| 09:00        | *                | 411         | 466         | *          | *    | 438            | *    | *    | 438             |
| 10:00        | *                | 285         | 253         | *          | *    | 269            | *    | *    | 269             |
| 11:00        | *                | 151         | 148         | *          | *    | 150            | *    | *    | 150             |
| Total        | 0                | 10014       | 12535       | 3640       | 0    | 12347          | 0    | 0    | 12347           |
| % Avg. WkDay | 0.0%             | 81.1%       | 101.5%      | 29.5%      | 0.0% | 100.0%         |      |      |                 |
| % Avg. Week  | 0.0%             | 81.1%       | 101.5%      | 29.5%      | 0.0% | 100.0%         | 0.0% | 0.0% |                 |
| AM Peak      | -                | 11:00       | 11:00       | 11:00      | -    | 11:00          | -    | -    | 11:00           |
| Vol.         | -                | 787         | 796         | 847        | -    | 810            | -    | -    | 810             |
| PM Peak      | -                | 17:00       | 17:00       | -          | -    | 17:00          | -    | -    | 17:00           |
| Vol.         | -                | 1165        | 1213        | -          | -    | 1189           | -    | -    | 1189            |
| Total        | 0                | 10014       | 12535       | 3640       | 0    | 12347          | 0    | 0    | 12347           |
| ADT          | ADT 12,289       |             | AADT 12,289 |            |      |                |      |      |                 |

# Traffic Data Collection (TDC)

Project: Elmwood Twp. Traffic Study  
 Count Type: 48 Hr. ATR Volume Count  
 Weather: Clear, Dry 70's Degs.  
 Count By: M.Match Pav't : Asphalt 2 Lanes

**tdccounts.com**  
 Phone (586) 786-5407  
 Traffic Study Performed For:  
**Progressive AE**

ATR\_2 M-22&Carter\_SB  
 Bay Shore Drive (M-22)  
 (300' North of Carter Road)  
 Station ID: Southbound  
 Site Code: ATR 2 SB  
 Date Start: 23-Jun-15

| Start Time   | Mon<br>22-Jun-15 | Tue        | Wed         | Thu        | Fri  | Average<br>Day | Sat  | Sun  | Week<br>Average |
|--------------|------------------|------------|-------------|------------|------|----------------|------|------|-----------------|
| 12:00 AM     | *                | *          | 35          | 28         | *    | 32             | *    | *    | 32              |
| 01:00        | *                | *          | 28          | 17         | *    | 22             | *    | *    | 22              |
| 02:00        | *                | *          | 18          | 18         | *    | 18             | *    | *    | 18              |
| 03:00        | *                | *          | 18          | 18         | *    | 18             | *    | *    | 18              |
| 04:00        | *                | *          | 60          | 51         | *    | 56             | *    | *    | 56              |
| 05:00        | *                | *          | 132         | 137        | *    | 134            | *    | *    | 134             |
| 06:00        | *                | *          | 382         | 332        | *    | 357            | *    | *    | 357             |
| 07:00        | *                | *          | 787         | 785        | *    | 786            | *    | *    | 786             |
| 08:00        | *                | *          | <b>833</b>  | 772        | *    | <b>802</b>     | *    | *    | <b>802</b>      |
| 09:00        | *                | *          | 727         | 767        | *    | 747            | *    | *    | 747             |
| 10:00        | *                | <b>763</b> | 706         | 776        | *    | 748            | *    | *    | 748             |
| 11:00        | *                | 740        | 772         | <b>789</b> | *    | 767            | *    | *    | 767             |
| 12:00 PM     | *                | 771        | 779         | *          | *    | 775            | *    | *    | 775             |
| 01:00        | *                | 749        | 693         | *          | *    | 721            | *    | *    | 721             |
| 02:00        | *                | 807        | 778         | *          | *    | 792            | *    | *    | 792             |
| 03:00        | *                | 846        | 842         | *          | *    | 844            | *    | *    | 844             |
| 04:00        | *                | 855        | 954         | *          | *    | 904            | *    | *    | 904             |
| 05:00        | *                | <b>877</b> | <b>959</b>  | *          | *    | <b>918</b>     | *    | *    | <b>918</b>      |
| 06:00        | *                | 661        | 702         | *          | *    | 682            | *    | *    | 682             |
| 07:00        | *                | 509        | 543         | *          | *    | 526            | *    | *    | 526             |
| 08:00        | *                | 416        | 504         | *          | *    | 460            | *    | *    | 460             |
| 09:00        | *                | 267        | 338         | *          | *    | 302            | *    | *    | 302             |
| 10:00        | *                | 169        | 161         | *          | *    | 165            | *    | *    | 165             |
| 11:00        | *                | 78         | 66          | *          | *    | 72             | *    | *    | 72              |
| Total        | 0                | 8508       | 11817       | 4490       | 0    | 11648          | 0    | 0    | 11648           |
| % Avg. WkDay | 0.0%             | 73.0%      | 101.5%      | 38.5%      | 0.0% | 100.0%         |      |      |                 |
| % Avg. Week  | 0.0%             | 73.0%      | 101.5%      | 38.5%      | 0.0% | 100.0%         | 0.0% | 0.0% |                 |
| AM Peak      | -                | 10:00      | 08:00       | 11:00      | -    | 08:00          | -    | -    | 08:00           |
| Vol.         | -                | 763        | 833         | 789        | -    | 802            | -    | -    | 802             |
| PM Peak      | -                | 17:00      | 17:00       | -          | -    | 17:00          | -    | -    | 17:00           |
| Vol.         | -                | 877        | 959         | -          | -    | 918            | -    | -    | 918             |
| Total        | 0                | 8508       | 11817       | 4490       | 0    | 11648          | 0    | 0    | 11648           |
| ADT          | ADT 11,584       |            | AADT 11,584 |            |      |                |      |      |                 |



# Grand Traverse County Road Commission 2015 M-22 Greilickville at Center Pointe North Bound

Page 1  
 Untitled Vo  
 Untitled Vo  
 Station ID:  
 Date Start: 08-Jun-15  
 Latitude: 0' 0.0000 South

| Start Time   | Mon<br>08-Jun-15 | Tue<br>09-Jun-15 | Wed<br>10-Jun-15 | Thu<br>11-Jun-15 | Fri<br>12-Jun-15 | Average<br>Day | Sat<br>13-Jun-15 | Sun<br>14-Jun-15 | Week<br>Average |
|--------------|------------------|------------------|------------------|------------------|------------------|----------------|------------------|------------------|-----------------|
| 12:00 AM     | *                | 43               | 48               | *                | *                | 46             | *                | *                | 46              |
| 01:00        | *                | 25               | 23               | *                | *                | 24             | *                | *                | 24              |
| 02:00        | *                | 24               | 16               | *                | *                | 20             | *                | *                | 20              |
| 03:00        | *                | 10               | 19               | *                | *                | 14             | *                | *                | 14              |
| 04:00        | *                | 14               | 12               | *                | *                | 13             | *                | *                | 13              |
| 05:00        | *                | 40               | 41               | *                | *                | 40             | *                | *                | 40              |
| 06:00        | *                | 122              | 128              | *                | *                | 125            | *                | *                | 125             |
| 07:00        | *                | 324              | 348              | *                | *                | 336            | *                | *                | 336             |
| 08:00        | *                | 466              | <b>480</b>       | *                | *                | 473            | *                | *                | 473             |
| 09:00        | *                | 464              | 440              | *                | *                | 452            | *                | *                | 452             |
| 10:00        | *                | 489              | 245              | *                | *                | 367            | *                | *                | 367             |
| 11:00        | <b>488</b>       | <b>530</b>       | *                | *                | *                | <b>509</b>     | *                | *                | <b>509</b>      |
| 12:00 PM     | 578              | 597              | *                | *                | *                | 588            | *                | *                | 588             |
| 01:00        | 579              | 576              | *                | *                | *                | 578            | *                | *                | 578             |
| 02:00        | 618              | 601              | *                | *                | *                | 610            | *                | *                | 610             |
| 03:00        | 626              | 650              | *                | *                | *                | 638            | *                | *                | 638             |
| 04:00        | 696              | 747              | *                | *                | *                | 722            | *                | *                | 722             |
| 05:00        | <b>828</b>       | <b>857</b>       | *                | *                | *                | <b>842</b>     | *                | *                | <b>842</b>      |
| 06:00        | 652              | 678              | *                | *                | *                | 665            | *                | *                | 665             |
| 07:00        | 446              | 432              | *                | *                | *                | 439            | *                | *                | 439             |
| 08:00        | 344              | 358              | *                | *                | *                | 351            | *                | *                | 351             |
| 09:00        | 288              | 308              | *                | *                | *                | 298            | *                | *                | 298             |
| 10:00        | 125              | 160              | *                | *                | *                | 142            | *                | *                | 142             |
| 11:00        | 78               | 94               | *                | *                | *                | 86             | *                | *                | 86              |
| Day Total    | 6346             | 8609             | 1800             | 0                | 0                | 8378           | 0                | 0                | 8378            |
| % Avg. WKDay | 75.7%            | 102.8%           | 21.5%            | 0.0%             | 0.0%             | 100.0%         | 0.0%             | 0.0%             |                 |
| % Avg. Week  | 75.7%            | 102.8%           | 21.5%            | 0.0%             | 0.0%             | 100.0%         | 0.0%             | 0.0%             |                 |
| AM Peak Vol. | 11:00<br>488     | 11:00<br>530     | 08:00<br>480     | -                | -                | 11:00<br>509   | -                | -                | 11:00<br>509    |
| PM Peak Vol. | 17:00<br>828     | 17:00<br>857     | -                | -                | -                | 17:00<br>842   | -                | -                | 17:00<br>842    |
| Grand Total  | 6346             | 8609             | 1800             | 0                | 0                | 8378           | 0                | 0                | 8378            |
| ADT          | ADT 8,208        |                  | ADT 8,208        |                  | ADT 8,208        |                |                  |                  |                 |

# Grand Traverse County Road Commission 2015 M-22 at Center Pointe South Bound

Untitled Vo  
 Station ID:  
 Date Start: 08-Jun-15  
 At Center Pointe/ Greilickville  
 Latitude: 0' 0.0000 Undefined

| Start Time   | Mon 08-Jun-15 | Tue 09-Jun-15 | Wed 10-Jun-15 | Thu 11-Jun-15 | Fri 12-Jun-15 | Average Day | Sat 13-Jun-15 | Sun 14-Jun-15 | Week Average |
|--------------|---------------|---------------|---------------|---------------|---------------|-------------|---------------|---------------|--------------|
| 12:00 AM     | *             | 21            | 20            | *             | *             | 20          | *             | *             | 20           |
| 01:00        | *             | 12            | 12            | *             | *             | 12          | *             | *             | 12           |
| 02:00        | *             | 14            | 14            | *             | *             | 14          | *             | *             | 14           |
| 03:00        | *             | 8             | 13            | *             | *             | 10          | *             | *             | 10           |
| 04:00        | *             | 48            | 42            | *             | *             | 45          | *             | *             | 45           |
| 05:00        | *             | 129           | 128           | *             | *             | 128         | *             | *             | 128          |
| 06:00        | *             | 322           | 322           | *             | *             | 322         | *             | *             | 322          |
| 07:00        | *             | 684           | <b>747</b>    | *             | *             | <b>716</b>  | *             | *             | <b>716</b>   |
| 08:00        | *             | <b>733</b>    | 685           | *             | *             | 709         | *             | *             | 709          |
| 09:00        | *             | 606           | 565           | *             | *             | 586         | *             | *             | 586          |
| 10:00        | *             | 592           | 241           | *             | *             | 416         | *             | *             | 416          |
| 11:00        | <b>620</b>    | 610           | *             | *             | *             | 615         | *             | *             | 615          |
| 12:00 PM     | 656           | 625           | *             | *             | *             | 640         | *             | *             | 640          |
| 01:00        | 586           | 608           | *             | *             | *             | 597         | *             | *             | 597          |
| 02:00        | 612           | 612           | *             | *             | *             | 612         | *             | *             | 612          |
| 03:00        | <b>684</b>    | 619           | *             | *             | *             | 652         | *             | *             | 652          |
| 04:00        | 654           | 650           | *             | *             | *             | 652         | *             | *             | 652          |
| 05:00        | 682           | <b>708</b>    | *             | *             | *             | <b>695</b>  | *             | *             | <b>695</b>   |
| 06:00        | 448           | 486           | *             | *             | *             | 467         | *             | *             | 467          |
| 07:00        | 318           | 366           | *             | *             | *             | 342         | *             | *             | 342          |
| 08:00        | 277           | 352           | *             | *             | *             | 314         | *             | *             | 314          |
| 09:00        | 130           | 189           | *             | *             | *             | 160         | *             | *             | 160          |
| 10:00        | 93            | 69            | *             | *             | *             | 81          | *             | *             | 81           |
| 11:00        | 49            | 50            | *             | *             | *             | 50          | *             | *             | 50           |
| Day Total    | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| % Avg. WKDay | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| % Avg. Week  | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| AM Peak      | 11:00         | 08:00         | 07:00         | -             | -             | 07:00       | -             | -             | 07:00        |
| Vol.         | 620           | 733           | 747           | -             | -             | 716         | -             | -             | 716          |
| PM Peak      | 15:00         | 17:00         | -             | -             | -             | 17:00       | -             | -             | 17:00        |
| Vol.         | 684           | 708           | -             | -             | -             | 695         | -             | -             | 695          |
| Grand Total  | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| ADT          |               | ADT 8,855     |               |               | AADT 8,855    |             |               |               |              |

| Start Time   | Mon 08-Jun-15 | Tue 09-Jun-15 | Wed 10-Jun-15 | Thu 11-Jun-15 | Fri 12-Jun-15 | Average Day | Sat 13-Jun-15 | Sun 14-Jun-15 | Week Average |
|--------------|---------------|---------------|---------------|---------------|---------------|-------------|---------------|---------------|--------------|
| 12:00 AM     | *             | 21            | 20            | *             | *             | 20          | *             | *             | 20           |
| 01:00        | *             | 12            | 12            | *             | *             | 12          | *             | *             | 12           |
| 02:00        | *             | 14            | 14            | *             | *             | 14          | *             | *             | 14           |
| 03:00        | *             | 8             | 13            | *             | *             | 10          | *             | *             | 10           |
| 04:00        | *             | 48            | 42            | *             | *             | 45          | *             | *             | 45           |
| 05:00        | *             | 129           | 128           | *             | *             | 128         | *             | *             | 128          |
| 06:00        | *             | 322           | 322           | *             | *             | 322         | *             | *             | 322          |
| 07:00        | *             | 684           | <b>747</b>    | *             | *             | <b>716</b>  | *             | *             | <b>716</b>   |
| 08:00        | *             | <b>733</b>    | 685           | *             | *             | 709         | *             | *             | 709          |
| 09:00        | *             | 606           | 565           | *             | *             | 586         | *             | *             | 586          |
| 10:00        | *             | 592           | 241           | *             | *             | 416         | *             | *             | 416          |
| 11:00        | <b>620</b>    | 610           | *             | *             | *             | 615         | *             | *             | 615          |
| 12:00 PM     | 656           | 625           | *             | *             | *             | 640         | *             | *             | 640          |
| 01:00        | 586           | 608           | *             | *             | *             | 597         | *             | *             | 597          |
| 02:00        | 612           | 612           | *             | *             | *             | 612         | *             | *             | 612          |
| 03:00        | <b>684</b>    | 619           | *             | *             | *             | 652         | *             | *             | 652          |
| 04:00        | 654           | 650           | *             | *             | *             | 652         | *             | *             | 652          |
| 05:00        | 682           | <b>708</b>    | *             | *             | *             | <b>695</b>  | *             | *             | <b>695</b>   |
| 06:00        | 448           | 486           | *             | *             | *             | 467         | *             | *             | 467          |
| 07:00        | 318           | 366           | *             | *             | *             | 342         | *             | *             | 342          |
| 08:00        | 277           | 352           | *             | *             | *             | 314         | *             | *             | 314          |
| 09:00        | 130           | 189           | *             | *             | *             | 160         | *             | *             | 160          |
| 10:00        | 93            | 69            | *             | *             | *             | 81          | *             | *             | 81           |
| 11:00        | 49            | 50            | *             | *             | *             | 50          | *             | *             | 50           |
| Day Total    | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| % Avg. WKDay | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| % Avg. Week  | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| AM Peak      | 11:00         | 08:00         | 07:00         | -             | -             | 07:00       | -             | -             | 07:00        |
| Vol.         | 620           | 733           | 747           | -             | -             | 716         | -             | -             | 716          |
| PM Peak      | 15:00         | 17:00         | -             | -             | -             | 17:00       | -             | -             | 17:00        |
| Vol.         | 684           | 708           | -             | -             | -             | 695         | -             | -             | 695          |
| Grand Total  | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| ADT          |               | ADT 8,855     |               |               | AADT 8,855    |             |               |               |              |

# Grand Traverse County Road Commission 2015 M-22 Greilickville at Center Pointe North Bound

| Start Time   | Mon 08-Jun-15 | Tue 09-Jun-15 | Wed 10-Jun-15 | Thu 11-Jun-15 | Fri 12-Jun-15 | Average Day | Sat 13-Jun-15 | Sun 14-Jun-15 | Week Average |
|--------------|---------------|---------------|---------------|---------------|---------------|-------------|---------------|---------------|--------------|
| 12:00 AM     |               |               |               |               |               | 46          |               |               | 46           |
| 01:00        | 43            | 25            | 23            | 24            | 24            | 24          |               |               | 24           |
| 02:00        | 24            | 24            | 16            |               |               | 20          |               |               | 20           |
| 03:00        | 10            | 19            | 19            |               |               | 14          |               |               | 14           |
| 04:00        | 14            | 14            | 12            |               |               | 13          |               |               | 13           |
| 05:00        | 40            | 40            | 41            |               |               | 40          |               |               | 40           |
| 06:00        | 122           | 122           | 128           |               |               | 125         |               |               | 125          |
| 07:00        | 324           | 324           | 348           |               |               | 336         |               |               | 336          |
| 08:00        | 466           | 466           | <b>480</b>    |               |               | 473         |               |               | 473          |
| 09:00        | 464           | 464           | 440           |               |               | 452         |               |               | 452          |
| 10:00        | 489           | 489           | 245           |               |               | 367         |               |               | 367          |
| 11:00        | <b>488</b>    | <b>530</b>    | *             | *             | *             | <b>509</b>  | *             | *             | <b>509</b>   |
| 12:00 PM     | 578           | 597           | *             | *             | *             | 588         | *             | *             | 588          |
| 01:00        | 579           | 576           | *             | *             | *             | 578         | *             | *             | 578          |
| 02:00        | 618           | 601           | *             | *             | *             | 610         | *             | *             | 610          |
| 03:00        | 626           | 650           | *             | *             | *             | 638         | *             | *             | 638          |
| 04:00        | 696           | 747           | *             | *             | *             | 722         | *             | *             | 722          |
| 05:00        | <b>828</b>    | <b>857</b>    | *             | *             | *             | <b>842</b>  | *             | *             | <b>842</b>   |
| 06:00        | 652           | 678           | *             | *             | *             | 665         | *             | *             | 665          |
| 07:00        | 446           | 432           | *             | *             | *             | 439         | *             | *             | 439          |
| 08:00        | 344           | 358           | *             | *             | *             | 351         | *             | *             | 351          |
| 09:00        | 288           | 308           | *             | *             | *             | 298         | *             | *             | 298          |
| 10:00        | 125           | 160           | *             | *             | *             | 142         | *             | *             | 142          |
| 11:00        | 78            | 94            | *             | *             | *             | 86          | *             | *             | 86           |
| Day Total    | 6346          | 8609          | 1800          | 0             | 0             | 8378        | 0             | 0             | 8378         |
| % Avg. WKDay | 75.7%         | 102.8%        | 21.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| % Avg. Week  | 75.7%         | 102.8%        | 21.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| AM Peak Vol. | 11:00 488     | 11:00 530     | 08:00 480     | -             | -             | 11:00 509   | -             | -             | 11:00 509    |
| PM Peak Vol. | 17:00 828     | 17:00 857     | -             | -             | -             | 17:00 842   | -             | -             | 17:00 842    |
| Grand Total  | 6346          | 8609          | 1800          | 0             | 0             | 8378        | 0             | 0             | 8378         |
| ADT          |               | ADT 8,208     |               |               | AADT 8,208    |             |               |               |              |

# Grand Traverse County Road Commission 2015 M-22 at Center Pointe South Bound

Untitled Vo  
 Station ID:  
 Date Start: 08-Jun-15  
 At Center Pointe/ Greilickville  
 Latitude: 0' 0.0000 Undefined

| Start Time   | Mon 08-Jun-15 | Tue 09-Jun-15 | Wed 10-Jun-15 | Thu 11-Jun-15 | Fri 12-Jun-15 | Average Day | Sat 13-Jun-15 | Sun 14-Jun-15 | Week Average |
|--------------|---------------|---------------|---------------|---------------|---------------|-------------|---------------|---------------|--------------|
| 12:00 AM     | *             | 21            | 20            | *             | *             | 20          | *             | *             | 20           |
| 01:00        | *             | 12            | 12            | *             | *             | 12          | *             | *             | 12           |
| 02:00        | *             | 14            | 14            | *             | *             | 14          | *             | *             | 14           |
| 03:00        | *             | 8             | 13            | *             | *             | 10          | *             | *             | 10           |
| 04:00        | *             | 48            | 42            | *             | *             | 45          | *             | *             | 45           |
| 05:00        | *             | 129           | 128           | *             | *             | 128         | *             | *             | 128          |
| 06:00        | *             | 322           | 322           | *             | *             | 322         | *             | *             | 322          |
| 07:00        | *             | 684           | <b>747</b>    | *             | *             | <b>716</b>  | *             | *             | <b>716</b>   |
| 08:00        | *             | <b>733</b>    | 685           | *             | *             | 709         | *             | *             | 709          |
| 09:00        | *             | 606           | 565           | *             | *             | 586         | *             | *             | 586          |
| 10:00        | *             | 592           | 241           | *             | *             | 416         | *             | *             | 416          |
| 11:00        | <b>620</b>    | 610           | *             | *             | *             | 615         | *             | *             | 615          |
| 12:00 PM     | 656           | 625           | *             | *             | *             | 640         | *             | *             | 640          |
| 01:00        | 586           | 608           | *             | *             | *             | 597         | *             | *             | 597          |
| 02:00        | 612           | 612           | *             | *             | *             | 612         | *             | *             | 612          |
| 03:00        | <b>684</b>    | 619           | *             | *             | *             | 652         | *             | *             | 652          |
| 04:00        | 654           | 650           | *             | *             | *             | 652         | *             | *             | 652          |
| 05:00        | 682           | <b>708</b>    | *             | *             | *             | <b>695</b>  | *             | *             | <b>695</b>   |
| 06:00        | 448           | 486           | *             | *             | *             | 467         | *             | *             | 467          |
| 07:00        | 318           | 366           | *             | *             | *             | 342         | *             | *             | 342          |
| 08:00        | 277           | 352           | *             | *             | *             | 314         | *             | *             | 314          |
| 09:00        | 130           | 189           | *             | *             | *             | 160         | *             | *             | 160          |
| 10:00        | 93            | 69            | *             | *             | *             | 81          | *             | *             | 81           |
| 11:00        | 49            | 50            | *             | *             | *             | 50          | *             | *             | 50           |
| Day Total    | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| % Avg. WKDay | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| % Avg. Week  | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| AM Peak      | 11:00         | 08:00         | 07:00         | -             | -             | 07:00       | -             | -             | 07:00        |
| Vol.         | 620           | 733           | 747           | -             | -             | 716         | -             | -             | 716          |
| PM Peak      | 15:00         | 17:00         | -             | -             | -             | 17:00       | -             | -             | 17:00        |
| Vol.         | 684           | 708           | -             | -             | -             | 695         | -             | -             | 695          |
| Grand Total  | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| ADT          |               | ADT 8,855     |               |               | AADT 8,855    |             |               |               |              |

| Start Time   | Mon 08-Jun-15 | Tue 09-Jun-15 | Wed 10-Jun-15 | Thu 11-Jun-15 | Fri 12-Jun-15 | Average Day | Sat 13-Jun-15 | Sun 14-Jun-15 | Week Average |
|--------------|---------------|---------------|---------------|---------------|---------------|-------------|---------------|---------------|--------------|
| 12:00 AM     | *             | 21            | 20            | *             | *             | 20          | *             | *             | 20           |
| 01:00        | *             | 12            | 12            | *             | *             | 12          | *             | *             | 12           |
| 02:00        | *             | 14            | 14            | *             | *             | 14          | *             | *             | 14           |
| 03:00        | *             | 8             | 13            | *             | *             | 10          | *             | *             | 10           |
| 04:00        | *             | 48            | 42            | *             | *             | 45          | *             | *             | 45           |
| 05:00        | *             | 129           | 128           | *             | *             | 128         | *             | *             | 128          |
| 06:00        | *             | 322           | 322           | *             | *             | 322         | *             | *             | 322          |
| 07:00        | *             | 684           | <b>747</b>    | *             | *             | <b>716</b>  | *             | *             | <b>716</b>   |
| 08:00        | *             | <b>733</b>    | 685           | *             | *             | 709         | *             | *             | 709          |
| 09:00        | *             | 606           | 565           | *             | *             | 586         | *             | *             | 586          |
| 10:00        | *             | 592           | 241           | *             | *             | 416         | *             | *             | 416          |
| 11:00        | <b>620</b>    | 610           | *             | *             | *             | 615         | *             | *             | 615          |
| 12:00 PM     | 656           | 625           | *             | *             | *             | 640         | *             | *             | 640          |
| 01:00        | 586           | 608           | *             | *             | *             | 597         | *             | *             | 597          |
| 02:00        | 612           | 612           | *             | *             | *             | 612         | *             | *             | 612          |
| 03:00        | <b>684</b>    | 619           | *             | *             | *             | 652         | *             | *             | 652          |
| 04:00        | 654           | 650           | *             | *             | *             | 652         | *             | *             | 652          |
| 05:00        | 682           | <b>708</b>    | *             | *             | *             | <b>695</b>  | *             | *             | <b>695</b>   |
| 06:00        | 448           | 486           | *             | *             | *             | 467         | *             | *             | 467          |
| 07:00        | 318           | 366           | *             | *             | *             | 342         | *             | *             | 342          |
| 08:00        | 277           | 352           | *             | *             | *             | 314         | *             | *             | 314          |
| 09:00        | 130           | 189           | *             | *             | *             | 160         | *             | *             | 160          |
| 10:00        | 93            | 69            | *             | *             | *             | 81          | *             | *             | 81           |
| 11:00        | 49            | 50            | *             | *             | *             | 50          | *             | *             | 50           |
| Day Total    | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| % Avg. WKDay | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| % Avg. Week  | 65.6%         | 102.9%        | 31.5%         | 0.0%          | 0.0%          | 100.0%      | 0.0%          | 0.0%          |              |
| AM Peak      | 11:00         | 08:00         | 07:00         | -             | -             | 07:00       | -             | -             | 07:00        |
| Vol.         | 620           | 733           | 747           | -             | -             | 716         | -             | -             | 716          |
| PM Peak      | 15:00         | 17:00         | -             | -             | -             | 17:00       | -             | -             | 17:00        |
| Vol.         | 684           | 708           | -             | -             | -             | 695         | -             | -             | 695          |
| Grand Total  | 5809          | 9113          | 2789          | 0             | 0             | 8855        | 0             | 0             | 8855         |
| ADT          |               | ADT 8,855     |               |               | AADT 8,855    |             |               |               |              |

# Grand Traverse County Road Commission 2015 M-22 at Greilickville Harbor Park NorthBound

Untitled Vo  
 Untitled Vo  
 Station ID:  
 Date Start: 04-Jun-15  
 M-22 at Greilickville Harbor Park- N.B.  
 Latitude: 0' 0.0000 Undefined

| Start Time   | Mon<br>01-Jun-15 | Tue<br>02-Jun-15 | Wed<br>03-Jun-15 | Thu<br>04-Jun-15 | Fri<br>05-Jun-15 | Average<br>Day | Sat<br>06-Jun-15 | Sun<br>07-Jun-15 | Week<br>Average |
|--------------|------------------|------------------|------------------|------------------|------------------|----------------|------------------|------------------|-----------------|
| 12:00 AM     | *                | *                | *                | *                | 60               | 60             | *                | *                | 60              |
| 01:00        | *                | *                | *                | *                | 40               | 40             | *                | *                | 40              |
| 02:00        | *                | *                | *                | *                | 24               | 24             | *                | *                | 24              |
| 03:00        | *                | *                | *                | *                | 23               | 23             | *                | *                | 23              |
| 04:00        | *                | *                | *                | *                | 18               | 18             | *                | *                | 18              |
| 05:00        | *                | *                | *                | *                | 56               | 56             | *                | *                | 56              |
| 06:00        | *                | *                | *                | *                | 140              | 140            | *                | *                | 140             |
| 07:00        | *                | *                | *                | *                | 400              | 400            | *                | *                | 400             |
| 08:00        | *                | *                | *                | *                | 540              | 540            | *                | *                | 540             |
| 09:00        | *                | *                | *                | *                | 545              | 545            | *                | *                | 545             |
| 10:00        | *                | *                | *                | 568              | 114              | 341            | *                | *                | 341             |
| 11:00        | *                | *                | *                | <b>698</b>       | *                | <b>698</b>     | *                | *                | <b>698</b>      |
| 12:00 PM     | *                | *                | *                | 694              | *                | 694            | *                | *                | 694             |
| 01:00        | *                | *                | *                | 691              | *                | 691            | *                | *                | 691             |
| 02:00        | *                | *                | *                | 738              | *                | 738            | *                | *                | 738             |
| 03:00        | *                | *                | *                | 846              | *                | 846            | *                | *                | 846             |
| 04:00        | *                | *                | *                | 906              | *                | 906            | *                | *                | 906             |
| 05:00        | *                | *                | *                | <b>955</b>       | *                | <b>955</b>     | *                | *                | <b>955</b>      |
| 06:00        | *                | *                | *                | 846              | *                | 846            | *                | *                | 846             |
| 07:00        | *                | *                | *                | 653              | *                | 653            | *                | *                | 653             |
| 08:00        | *                | *                | *                | 478              | *                | 478            | *                | *                | 478             |
| 09:00        | *                | *                | *                | 368              | *                | 368            | *                | *                | 368             |
| 10:00        | *                | *                | *                | 197              | *                | 197            | *                | *                | 197             |
| 11:00        | *                | *                | *                | 111              | *                | 111            | *                | *                | 111             |
| Day Total    | 0                | 0                | 0                | 8749             | 1960             | 10368          | 0                | 0                | 10368           |
| % Avg. WKDay | 0.0%             | 0.0%             | 0.0%             | 84.4%            | 18.9%            |                |                  |                  |                 |
| % Avg. Week  | 0.0%             | 0.0%             | 0.0%             | 84.4%            | 18.9%            | 100.0%         | 0.0%             | 0.0%             |                 |
| AM Peak Vol. | -                | -                | -                | 11:00            | 09:00            | -              | -                | -                | 11:00           |
|              | -                | -                | -                | 698              | 545              | -              | -                | -                | 698             |
| PM Peak Vol. | -                | -                | -                | 17:00            | -                | -              | -                | -                | 17:00           |
|              | -                | -                | -                | 955              | -                | -              | -                | -                | 955             |
| Grand Total  | 0                | 0                | 0                | 8749             | 1960             | 10368          | 0                | 0                | 10368           |
| ADT          | ADT 10,368       |                  |                  |                  | AADT 10,368      |                |                  |                  |                 |



# Grand Traverse County Road Commission

## 2015

### M-22 at Greilickville Harbor Park South Bound

Latitude: 0' 0.0000 Undefined

| Start Time   | Mon<br>01-Jun-15 | Tue<br>02-Jun-15 | Wed<br>03-Jun-15 | Thu<br>04-Jun-15 | Fri<br>05-Jun-15 | Average<br>Day | Sat<br>06-Jun-15 | Sun<br>07-Jun-15 | Week<br>Average |
|--------------|------------------|------------------|------------------|------------------|------------------|----------------|------------------|------------------|-----------------|
| 12:00 AM     | *                | *                | *                | *                | 32               | 32             | *                | *                | 32              |
| 01:00        | *                | *                | *                | *                | 17               | 17             | *                | *                | 17              |
| 02:00        | *                | *                | *                | *                | 12               | 12             | *                | *                | 12              |
| 03:00        | *                | *                | *                | *                | 14               | 14             | *                | *                | 14              |
| 04:00        | *                | *                | *                | *                | 58               | 58             | *                | *                | 58              |
| 05:00        | *                | *                | *                | *                | 122              | 122            | *                | *                | 122             |
| 06:00        | *                | *                | *                | *                | 361              | 361            | *                | *                | 361             |
| 07:00        | *                | *                | *                | *                | <b>834</b>       | <b>834</b>     | *                | *                | <b>834</b>      |
| 08:00        | *                | *                | *                | *                | 804              | 804            | *                | *                | 804             |
| 09:00        | *                | *                | *                | *                | 671              | 671            | *                | *                | 671             |
| 10:00        | *                | *                | *                | 679              | 223              | 451            | *                | *                | 451             |
| 11:00        | *                | *                | *                | <b>690</b>       | *                | 690            | *                | *                | 690             |
| 12:00 PM     | *                | *                | *                | 708              | *                | 708            | *                | *                | 708             |
| 01:00        | *                | *                | *                | 702              | *                | 702            | *                | *                | 702             |
| 02:00        | *                | *                | *                | 779              | *                | 779            | *                | *                | 779             |
| 03:00        | *                | *                | *                | 782              | *                | 782            | *                | *                | 782             |
| 04:00        | *                | *                | *                | <b>840</b>       | *                | <b>840</b>     | *                | *                | <b>840</b>      |
| 05:00        | *                | *                | *                | 762              | *                | 762            | *                | *                | 762             |
| 06:00        | *                | *                | *                | 569              | *                | 569            | *                | *                | 569             |
| 07:00        | *                | *                | *                | 388              | *                | 388            | *                | *                | 388             |
| 08:00        | *                | *                | *                | 394              | *                | 394            | *                | *                | 394             |
| 09:00        | *                | *                | *                | 216              | *                | 216            | *                | *                | 216             |
| 10:00        | *                | *                | *                | 124              | *                | 124            | *                | *                | 124             |
| 11:00        | *                | *                | *                | 59               | *                | 59             | *                | *                | 59              |
| Day Total    | 0                | 0                | 0                | 7692             | 3148             | 10389          | 0                | 0                | 10389           |
| % Avg. WKDay | 0.0%             | 0.0%             | 0.0%             | 74.0%            | 30.3%            |                |                  |                  |                 |
| % Avg. Week  | 0.0%             | 0.0%             | 0.0%             | 74.0%            | 30.3%            | 100.0%         | 0.0%             | 0.0%             |                 |
| AM Peak Vol. | -                | -                | -                | 11:00            | 07:00            | -              | -                | -                | 07:00           |
|              | -                | -                | -                | 690              | 834              | -              | -                | -                | 834             |
| PM Peak Vol. | -                | -                | -                | 16:00            | -                | -              | -                | -                | 16:00           |
|              | -                | -                | -                | 840              | -                | -              | -                | -                | 840             |
| Grand Total  | 0                | 0                | 0                | 7692             | 3148             | 10389          | 0                | 0                | 10389           |
| ADT          | ADT 10,389       |                  | AADT 10,389      |                  |                  |                |                  |                  |                 |

# Grand Traverse County Road Commission 2015 M-22 at Greilickville Harbor Park NorthBound

Untitled Vo  
 Untitled Vo  
 Station ID:  
 Date Start: 04-Jun-15  
 M-22 at Greilickville Harbor Park- N.B.  
 Latitude: 0' 0.0000 Undefined

| Start Time   | Mon<br>01-Jun-15 | Tue<br>02-Jun-15 | Wed<br>03-Jun-15 | Thu<br>04-Jun-15 | Fri<br>05-Jun-15 | Average<br>Day | Sat<br>06-Jun-15 | Sun<br>07-Jun-15 | Week<br>Average |
|--------------|------------------|------------------|------------------|------------------|------------------|----------------|------------------|------------------|-----------------|
| 12:00 AM     | *                | *                | *                | *                | 60               | 60             | *                | *                | 60              |
| 01:00        | *                | *                | *                | *                | 40               | 40             | *                | *                | 40              |
| 02:00        | *                | *                | *                | *                | 24               | 24             | *                | *                | 24              |
| 03:00        | *                | *                | *                | *                | 23               | 23             | *                | *                | 23              |
| 04:00        | *                | *                | *                | *                | 18               | 18             | *                | *                | 18              |
| 05:00        | *                | *                | *                | *                | 56               | 56             | *                | *                | 56              |
| 06:00        | *                | *                | *                | *                | 140              | 140            | *                | *                | 140             |
| 07:00        | *                | *                | *                | *                | 400              | 400            | *                | *                | 400             |
| 08:00        | *                | *                | *                | *                | 540              | 540            | *                | *                | 540             |
| 09:00        | *                | *                | *                | *                | 545              | 545            | *                | *                | 545             |
| 10:00        | *                | *                | *                | 568              | 114              | 341            | *                | *                | 341             |
| 11:00        | *                | *                | *                | <b>698</b>       | *                | <b>698</b>     | *                | *                | <b>698</b>      |
| 12:00 PM     | *                | *                | *                | 694              | *                | 694            | *                | *                | 694             |
| 01:00        | *                | *                | *                | 691              | *                | 691            | *                | *                | 691             |
| 02:00        | *                | *                | *                | 738              | *                | 738            | *                | *                | 738             |
| 03:00        | *                | *                | *                | 846              | *                | 846            | *                | *                | 846             |
| 04:00        | *                | *                | *                | 906              | *                | 906            | *                | *                | 906             |
| 05:00        | *                | *                | *                | <b>955</b>       | *                | <b>955</b>     | *                | *                | <b>955</b>      |
| 06:00        | *                | *                | *                | 846              | *                | 846            | *                | *                | 846             |
| 07:00        | *                | *                | *                | 653              | *                | 653            | *                | *                | 653             |
| 08:00        | *                | *                | *                | 478              | *                | 478            | *                | *                | 478             |
| 09:00        | *                | *                | *                | 368              | *                | 368            | *                | *                | 368             |
| 10:00        | *                | *                | *                | 197              | *                | 197            | *                | *                | 197             |
| 11:00        | *                | *                | *                | 111              | *                | 111            | *                | *                | 111             |
| Day Total    | 0                | 0                | 0                | 8749             | 1960             | 10368          | 0                | 0                | 10368           |
| % Avg. WKDay | 0.0%             | 0.0%             | 0.0%             | 84.4%            | 18.9%            |                |                  |                  |                 |
| % Avg. Week  | 0.0%             | 0.0%             | 0.0%             | 84.4%            | 18.9%            | 100.0%         | 0.0%             | 0.0%             |                 |
| AM Peak Vol. | -                | -                | -                | 11:00            | 09:00            | -              | -                | -                | 11:00           |
|              | -                | -                | -                | 698              | 545              | -              | -                | -                | 698             |
| PM Peak Vol. | -                | -                | -                | 17:00            | -                | -              | -                | -                | 17:00           |
|              | -                | -                | -                | 955              | -                | -              | -                | -                | 955             |
| Grand Total  | 0                | 0                | 0                | 8749             | 1960             | 10368          | 0                | 0                | 10368           |
| ADT          | ADT 10,368       |                  | AADT 10,368      |                  |                  |                |                  |                  |                 |

# Grand Traverse County Road Commission

## 2015

### M-22 at Greilickville Harbor Park South Bound

Latitude: 0' 0.0000 Undefined

| Start Time   | Mon<br>01-Jun-15 | Tue<br>02-Jun-15 | Wed<br>03-Jun-15 | Thu<br>04-Jun-15 | Fri<br>05-Jun-15 | Average<br>Day | Sat<br>06-Jun-15 | Sun<br>07-Jun-15 | Week<br>Average |
|--------------|------------------|------------------|------------------|------------------|------------------|----------------|------------------|------------------|-----------------|
| 12:00 AM     | *                | *                | *                | *                | 32               | 32             | *                | *                | 32              |
| 01:00        | *                | *                | *                | *                | 17               | 17             | *                | *                | 17              |
| 02:00        | *                | *                | *                | *                | 12               | 12             | *                | *                | 12              |
| 03:00        | *                | *                | *                | *                | 14               | 14             | *                | *                | 14              |
| 04:00        | *                | *                | *                | *                | 58               | 58             | *                | *                | 58              |
| 05:00        | *                | *                | *                | *                | 122              | 122            | *                | *                | 122             |
| 06:00        | *                | *                | *                | *                | 361              | 361            | *                | *                | 361             |
| 07:00        | *                | *                | *                | *                | <b>834</b>       | <b>834</b>     | *                | *                | <b>834</b>      |
| 08:00        | *                | *                | *                | *                | 804              | 804            | *                | *                | 804             |
| 09:00        | *                | *                | *                | *                | 671              | 671            | *                | *                | 671             |
| 10:00        | *                | *                | *                | 679              | 223              | 451            | *                | *                | 451             |
| 11:00        | *                | *                | *                | <b>690</b>       | *                | 690            | *                | *                | 690             |
| 12:00 PM     | *                | *                | *                | 708              | *                | 708            | *                | *                | 708             |
| 01:00        | *                | *                | *                | 702              | *                | 702            | *                | *                | 702             |
| 02:00        | *                | *                | *                | 779              | *                | 779            | *                | *                | 779             |
| 03:00        | *                | *                | *                | 782              | *                | 782            | *                | *                | 782             |
| 04:00        | *                | *                | *                | <b>840</b>       | *                | <b>840</b>     | *                | *                | <b>840</b>      |
| 05:00        | *                | *                | *                | 762              | *                | 762            | *                | *                | 762             |
| 06:00        | *                | *                | *                | 569              | *                | 569            | *                | *                | 569             |
| 07:00        | *                | *                | *                | 388              | *                | 388            | *                | *                | 388             |
| 08:00        | *                | *                | *                | 394              | *                | 394            | *                | *                | 394             |
| 09:00        | *                | *                | *                | 216              | *                | 216            | *                | *                | 216             |
| 10:00        | *                | *                | *                | 124              | *                | 124            | *                | *                | 124             |
| 11:00        | *                | *                | *                | 59               | *                | 59             | *                | *                | 59              |
| Day Total    | 0                | 0                | 0                | 7692             | 3148             | 10389          | 0                | 0                | 10389           |
| % Avg. WKDay | 0.0%             | 0.0%             | 0.0%             | 74.0%            | 30.3%            |                |                  |                  |                 |
| % Avg. Week  | 0.0%             | 0.0%             | 0.0%             | 74.0%            | 30.3%            | 100.0%         | 0.0%             | 0.0%             |                 |
| AM Peak Vol. | -                | -                | -                | 11:00            | 07:00            | -              | -                | -                | 07:00           |
|              | -                | -                | -                | 690              | 834              | -              | -                | -                | 834             |
| PM Peak Vol. | -                | -                | -                | 16:00            | -                | -              | -                | -                | 16:00           |
|              | -                | -                | -                | 840              | -                | -              | -                | -                | 840             |
| Grand Total  | 0                | 0                | 0                | 7692             | 3148             | 10389          | 0                | 0                | 10389           |
| ADT          | ADT 10,389       |                  | AADT 10,389      |                  |                  |                |                  |                  |                 |



**DETAILED SYNCHRO ANALYSIS  
OF  
EXISTING CONDITIONS**

















INTERSECTION 1003: M-22 & Cherry Bend Rd/Marina Village Dr  
AM PEAK

ZONE A  
EXISTING

| Movement                          | EBL  | EBT   | EBR   | WBL  | WBT  | WBR  | NBL                       | NBT  | NBR  | SBL  | SBT   | SBR  |
|-----------------------------------|------|-------|-------|------|------|------|---------------------------|------|------|------|-------|------|
| Lane Configurations               |      |       |       |      |      |      |                           |      |      |      |       |      |
| Volume (vph)                      | 7    | 3     | 320   | 12   | 0    | 0    | 108                       | 294  | 7    | 0    | 496   | 7    |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900  | 1900 | 1900 | 1900 | 1900                      | 1900 | 1900 | 1900 | 1900  | 1900 |
| Total Lost time (s)               | 6.3  | 6.3   |       | 6.3  |      |      | 5.9                       | 5.9  | 5.9  |      | 5.9   | 5.9  |
| Lane Util. Factor                 | 1.00 | 1.00  |       | 1.00 |      |      | 1.00                      | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Fr <sub>t</sub>                   | 1.00 | 0.85  |       | 1.00 |      |      | 1.00                      | 1.00 | 0.85 |      | 1.00  | 0.85 |
| Fl <sub>t</sub> Protected         | 0.95 | 1.00  |       | 0.95 |      |      | 0.95                      | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Satd. Flow (prot)                 | 1770 | 1586  |       | 1770 |      |      | 1770                      | 1863 | 1583 |      | 1863  | 1583 |
| Fl <sub>t</sub> Permitted         | 0.76 | 1.00  |       | 0.47 |      |      | 0.42                      | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Satd. Flow (perm)                 | 1410 | 1586  |       | 866  |      |      | 782                       | 1863 | 1583 |      | 1863  | 1583 |
| Peak-hour factor, PHF             | 0.89 | 0.89  | 0.89  | 0.65 | 0.65 | 0.65 | 0.87                      | 0.87 | 0.87 | 0.90 | 0.90  | 0.90 |
| Adj. Flow (vph)                   | 8    | 3     | 360   | 18   | 0    | 0    | 124                       | 338  | 8    | 0    | 551   | 8    |
| RTOR Reduction (vph)              | 0    | 284   | 0     | 0    | 0    | 0    | 0                         | 0    | 3    | 0    | 0     | 3    |
| Lane Group Flow (vph)             | 8    | 79    | 0     | 18   | 0    | 0    | 124                       | 338  | 5    | 0    | 551   | 5    |
| Turn Type                         | Perm | NA    |       | Perm |      |      | Perm                      | NA   | Perm | Perm | NA    | Perm |
| Protected Phases                  |      | 4     |       |      | 8    |      |                           | 2    |      |      |       | 6    |
| Permitted Phases                  | 4    |       |       | 8    |      |      | 2                         |      | 2    | 6    |       | 6    |
| Actuated Green, G (s)             | 8.6  | 8.6   |       | 8.6  |      |      | 39.2                      | 39.2 | 39.2 |      | 39.2  | 39.2 |
| Effective Green, g (s)            | 8.6  | 8.6   |       | 8.6  |      |      | 39.2                      | 39.2 | 39.2 |      | 39.2  | 39.2 |
| Actuated g/C Ratio                | 0.14 | 0.14  |       | 0.14 |      |      | 0.65                      | 0.65 | 0.65 |      | 0.65  | 0.65 |
| Clearance Time (s)                | 6.3  | 6.3   |       | 6.3  |      |      | 5.9                       | 5.9  | 5.9  |      | 5.9   | 5.9  |
| Vehicle Extension (s)             | 3.0  | 3.0   |       | 3.0  |      |      | 3.0                       | 3.0  | 3.0  |      | 3.0   | 3.0  |
| Lane Grp Cap (vph)                | 202  | 227   |       | 124  |      |      | 510                       | 1217 | 1034 |      | 1217  | 1034 |
| v/s Ratio Prot                    |      | c0.05 |       |      |      |      |                           | 0.18 |      |      | c0.30 |      |
| v/s Ratio Perm                    | 0.01 |       |       | 0.02 |      |      | 0.16                      |      | 0.00 |      |       | 0.00 |
| v/c Ratio                         | 0.04 | 0.35  |       | 0.15 |      |      | 0.24                      | 0.28 | 0.01 |      | 0.45  | 0.01 |
| Uniform Delay, d <sub>1</sub>     | 22.1 | 23.2  |       | 22.5 |      |      | 4.3                       | 4.4  | 3.6  |      | 5.1   | 3.6  |
| Progression Factor                | 1.00 | 1.00  |       | 1.00 |      |      | 1.00                      | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Incremental Delay, d <sub>2</sub> | 0.1  | 0.9   |       | 0.5  |      |      | 1.1                       | 0.6  | 0.0  |      | 1.2   | 0.0  |
| Delay (s)                         | 22.2 | 24.1  |       | 23.0 |      |      | 5.4                       | 5.0  | 3.6  |      | 6.3   | 3.6  |
| Level of Service                  | C    | C     |       | C    |      |      | A                         | A    | A    |      | A     | A    |
| Approach Delay (s)                |      | 24.0  |       |      | 23.0 |      |                           | 5.1  |      |      | 6.3   |      |
| Approach LOS                      |      | C     |       |      | C    |      |                           | A    |      |      | A     |      |
| <b>Intersection Summary</b>       |      |       |       |      |      |      |                           |      |      |      |       |      |
| HCM 2000 Control Delay            |      |       | 10.7  |      |      |      | HCM 2000 Level of Service |      | B    |      |       |      |
| HCM 2000 Volume to Capacity ratio |      |       | 0.43  |      |      |      |                           |      |      |      |       |      |
| Actuated Cycle Length (s)         |      |       | 60.0  |      |      |      | Sum of lost time (s)      |      | 12.2 |      |       |      |
| Intersection Capacity Utilization |      |       | 69.5% |      |      |      | ICU Level of Service      |      | C    |      |       |      |
| Analysis Period (min)             |      |       | 15    |      |      |      |                           |      |      |      |       |      |
| c Critical Lane Group             |      |       |       |      |      |      |                           |      |      |      |       |      |











INTERSECTION 1005: M-72/22/M-22 & M-72  
AM PEAK

ZONE A  
EXISTING

|                                   |  |  |  |  |   |  |
|-----------------------------------|---|---|---|---|--|---|
| Movement                          | EBL   | EBR   | NBL   | NBT   | SBT  | SBR   |
| Lane Configurations               |  |  |  |  | <br> |   |
| Volume (vph)                      | 140   | 422   | 257   | 533   | 779  | 146   |
| Ideal Flow (vphpl)                | 1900  | 1900  | 1900  | 1900  | 1900   | 1900  |
| Lane Width                        | 12  | 12  | 12  | 13  | 12   | 12  |
| Total Lost time (s)               | 12.8  | 5.9   | 5.9   | 5.9   | 5.9  |   |
| Lane Util. Factor                 | 1.00  | 1.00  | 1.00  | 1.00  | 0.95   |   |
| Fr <sub>t</sub>                   | 1.00  | 0.85  | 1.00  | 1.00  | 0.98   |   |
| Fl <sub>t</sub> Protected         | 0.95  | 1.00  | 0.95  | 1.00  | 1.00   |   |
| Satd. Flow (prot)                 | 1770  | 1583  | 1770  | 1925  | 3455   |   |
| Fl <sub>t</sub> Permitted         | 0.95  | 1.00  | 0.95  | 1.00  | 1.00   |   |
| Satd. Flow (perm)                 | 1770  | 1583  | 1770  | 1925  | 3455   |   |
| Peak-hour factor, PHF             | 0.79  | 0.79  | 0.94  | 0.94  | 0.95   | 0.95  |
| Adj. Flow (vph)                   | 177   | 534   | 273   | 567   | 820  | 154   |
| RTOR Reduction (vph)              | 0   | 8   | 0   | 0   | 16   | 0   |
| Lane Group Flow (vph)             | 177   | 526   | 273   | 567   | 958  | 0   |
| Turn Type                         | Prot  | pm+ov   | Prot  | NA  | NA   |   |
| Protected Phases                  | 4   | 5   | 5   | 2   | 6  |   |
| Permitted Phases                  |   | 4   |   |   |  |   |
| Actuated Green, G (s)             | 34.2  | 49.3  | 15.1  | 47.1  | 26.1   |   |
| Effective Green, g (s)            | 34.2  | 49.3  | 15.1  | 47.1  | 26.1   |   |
| Actuated g/C Ratio                | 0.34  | 0.49  | 0.15  | 0.47  | 0.26   |   |
| Clearance Time (s)                | 12.8  | 5.9   | 5.9   | 5.9   | 5.9  |   |
| Lane Grp Cap (vph)                | 605   | 873   | 267   | 906   | 901  |   |
| v/s Ratio Prot                    | 0.10  | c0.09   | c0.15   | 0.29  | c0.28  |   |
| v/s Ratio Perm                    |   | 0.24  |   |   |  |   |
| v/c Ratio                         | 0.29  | 0.60  | 1.02  | 0.63  | 1.06   |   |
| Uniform Delay, d <sub>1</sub>     | 24.1  | 18.3  | 42.5  | 19.8  | 37.0   |   |
| Progression Factor                | 1.00  | 1.00  | 1.00  | 1.00  | 1.00   |   |
| Incremental Delay, d <sub>2</sub> | 1.2   | 3.1   | 61.0  | 3.3   | 48.4   |   |
| Delay (s)                         | 25.3  | 21.4  | 103.4   | 23.1  | 85.4   |   |
| Level of Service                  | C   | C   | F   | C   | F  |   |
| Approach Delay (s)                | 22.3  |   |   | 49.2  | 85.4   |   |
| Approach LOS                      | C   |   |   | D   | F  |   |
| <b>Intersection Summary</b>       |   |   |   |   |  |   |
| HCM 2000 Control Delay            |   |   | 55.6  |   | HCM 2000 Level of Service  | E   |
| HCM 2000 Volume to Capacity ratio |   |   | 0.87  |   |  |   |
| Actuated Cycle Length (s)         |   |   | 100.0   |   | Sum of lost time (s)   | 24.6  |
| Intersection Capacity Utilization |   |   | 69.3%   |   | ICU Level of Service   | C   |
| Analysis Period (min)             |   |   | 15  |   |  |   |
| c Critical Lane Group             |   |   |   |   |  |   |


















INTERSECTION 9001: M-22 & Pico Dr  
AM PEAK

ZONE A  
EXISTING

|                                   |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement                          | EBL   | EBR   | NBL   | NBT   | SBT   | SBR   |
| Lane Configurations               |  |   |  |  |  |   |
| Volume (veh/h)                    | 0   | 7   | 3   | 444   | 815   | 0   |
| Sign Control                      | Stop  |   |   | Free  | Free  |   |
| Grade                             | 0%  |   |   | 0%  | 0%  |   |
| Peak Hour Factor                  | 0.65  | 0.65  | 0.88  | 0.88  | 0.91  | 0.91  |
| Hourly flow rate (vph)            | 0   | 11  | 3   | 505   | 896   | 0   |
| Pedestrians                       |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |
| Median type                       |   |   |   | TWLTL   | TWLTL   |   |
| Median storage (veh)              |   |   |   | 2   | 2   |   |
| Upstream signal (ft)              |   |   |   |   | 1216  |   |
| pX, platoon unblocked             | 0.89  | 0.89  | 0.89  |   |   |   |
| vC, conflicting volume            | 1407  | 896   | 896   |   |   |   |
| vC1, stage 1 conf vol             | 896   |   |   |   |   |   |
| vC2, stage 2 conf vol             | 511   |   |   |   |   |   |
| vCu, unblocked vol                | 1395  | 819   | 819   |   |   |   |
| tC, single (s)                    | 6.4   | 6.2   | 4.1   |   |   |   |
| tC, 2 stage (s)                   | 5.4   |   |   |   |   |   |
| tF (s)                            | 3.5   | 3.3   | 2.2   |   |   |   |
| p0 queue free %                   | 100   | 97  | 100   |   |   |   |
| cM capacity (veh/h)               | 337   | 333   | 718   |   |   |   |
| <b>Direction, Lane #</b>          | <b>EB 1</b>   | <b>NB 1</b>   | <b>NB 2</b>   | <b>SB 1</b>   |   |   |
| Volume Total                      | 11  | 3   | 505   | 896   |   |   |
| Volume Left                       | 0   | 3   | 0   | 0   |   |   |
| Volume Right                      | 11  | 0   | 0   | 0   |   |   |
| cSH                               | 333   | 718   | 1700  | 1700  |   |   |
| Volume to Capacity                | 0.03  | 0.00  | 0.30  | 0.53  |   |   |
| Queue Length 95th (ft)            | 2   | 0   | 0   | 0   |   |   |
| Control Delay (s)                 | 16.2  | 10.0  | 0.0   | 0.0   |   |   |
| Lane LOS                          | C   | B   |   |   |   |   |
| Approach Delay (s)                | 16.2  | 0.1   |   | 0.0   |   |   |
| Approach LOS                      | C   |   |   |   |   |   |
| <b>Intersection Summary</b>       |   |   |   |   |   |   |
| Average Delay                     |   |   | 0.1   |   |   |   |
| Intersection Capacity Utilization |   |   | 52.9%   |   | ICU Level of Service  | A   |
| Analysis Period (min)             |   |   | 15  |   |   |   |

INTERSECTION 9002: M-22 & Grandview Rd/marina entry  
AM PEAK

ZONE A  
EXISTING

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement                          | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations               |   |  |   |   |   |   |  |  |   |  |  |   |
| Volume (veh/h)                    | 22  | 2   | 75  | 0   | 0   | 0   | 24  | 425   | 24  | 1   | 795   | 26  |
| Sign Control                      |   | Stop  |   |   | Stop  |   |   | Free  |   |   | Free  |   |
| Grade                             |   | 0%  |   |   | 0%  |   |   | 0%  |   |   | 0%  |   |
| Peak Hour Factor                  | 0.79  | 0.79  | 0.79  | 0.92  | 0.92  | 0.92  | 0.88  | 0.88  | 0.88  | 0.90  | 0.90  | 0.90  |
| Hourly flow rate (vph)            | 28  | 3   | 95  | 0   | 0   | 0   | 27  | 483   | 27  | 1   | 883   | 29  |
| Pedestrians                       |   |   |   |   |   |   |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |   |   |   |   |   |   |
| Median type                       |   |   |   |   |   |   |   | TWLTL   |   |   | TWLTL   |   |
| Median storage veh                |   |   |   |   |   |   |   | 2   |   |   | 2   |   |
| Upstream signal (ft)              |   |   |   |   |   |   |   |   |   |   |   |   |
| pX, platoon unblocked             |   |   |   |   |   |   |   |   |   |   |   |   |
| vC, conflicting volume            | 1438  | 1465  | 898   | 1533  | 1466  | 497   | 912   |   |   | 510   |   |   |
| vC1, stage 1 conf vol             | 900   | 900   |   | 551   | 551   |   |   |   |   |   |   |   |
| vC2, stage 2 conf vol             | 538   | 565   |   | 982   | 914   |   |   |   |   |   |   |   |
| vCu, unblocked vol                | 1438  | 1465  | 898   | 1533  | 1466  | 497   | 912   |   |   | 510   |   |   |
| tC, single (s)                    | 7.1   | 6.5   | 6.2   | 7.1   | 6.5   | 6.2   | 4.1   |   |   | 4.1   |   |   |
| tC, 2 stage (s)                   | 6.1   | 5.5   |   | 6.1   | 5.5   |   |   |   |   |   |   |   |
| tF (s)                            | 3.5   | 4.0   | 3.3   | 3.5   | 4.0   | 3.3   | 2.2   |   |   | 2.2   |   |   |
| p0 queue free %                   | 90  | 99  | 72  | 100   | 100   | 100   | 96  |   |   | 100   |   |   |
| cM capacity (veh/h)               | 288   | 303   | 338   | 176   | 285   | 573   | 747   |   |   | 1055  |   |   |
| <b>Direction, Lane #</b>          | <b>EB 1</b>   | <b>NB 1</b>   | <b>NB 2</b>   | <b>SB 1</b>   | <b>SB 2</b>   |   |   |   |   |   |   |   |
| Volume Total                      | 125   | 27  | 510   | 1   | 912   |   |   |   |   |   |   |   |
| Volume Left                       | 28  | 27  | 0   | 1   | 0   |   |   |   |   |   |   |   |
| Volume Right                      | 95  | 0   | 27  | 0   | 29  |   |   |   |   |   |   |   |
| cSH                               | 325   | 747   | 1700  | 1055  | 1700  |   |   |   |   |   |   |   |
| Volume to Capacity                | 0.39  | 0.04  | 0.30  | 0.00  | 0.54  |   |   |   |   |   |   |   |
| Queue Length 95th (ft)            | 44  | 3   | 0   | 0   | 0   |   |   |   |   |   |   |   |
| Control Delay (s)                 | 22.9  | 10.0  | 0.0   | 8.4   | 0.0   |   |   |   |   |   |   |   |
| Lane LOS                          | C   | B   |   | A   |   |   |   |   |   |   |   |   |
| Approach Delay (s)                | 22.9  | 0.5   |   | 0.0   |   |   |   |   |   |   |   |   |
| Approach LOS                      | C   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Intersection Summary</b>       |   |   |   |   |   |   |   |   |   |   |   |   |
| Average Delay                     |   |   | 2.0   |   |   |   |   |   |   |   |   |   |
| Intersection Capacity Utilization |   |   | 56.0%   |   | ICU Level of Service  |   |   |   |   | B   |   |   |
| Analysis Period (min)             |   |   | 15  |   |   |   |   |   |   |   |   |   |













INTERSECTION 9003: M-22 & Brewery Creek/museum dr  
AM PEAK

ZONE A  
EXISTING

| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT                  | WBR  | NBL   | NBT  | NBR  | SBL   | SBT  | SBR  |
|-----------------------------------|------|------|-------|------|----------------------|------|-------|------|------|-------|------|------|
| Lane Configurations               |      |      |       |      |                      |      |       |      |      |       |      |      |
| Volume (veh/h)                    | 1    | 0    | 8     | 0    | 0                    | 1    | 8     | 506  | 1    | 1     | 893  | 2    |
| Sign Control                      |      | Stop |       |      | Stop                 |      |       | Free |      |       | Free |      |
| Grade                             |      | 0%   |       |      | 0%                   |      |       | 0%   |      |       | 0%   |      |
| Peak Hour Factor                  | 0.75 | 0.75 | 0.75  | 0.65 | 0.65                 | 0.65 | 0.91  | 0.91 | 0.91 | 0.93  | 0.93 | 0.93 |
| Hourly flow rate (vph)            | 1    | 0    | 11    | 0    | 0                    | 2    | 9     | 556  | 1    | 1     | 960  | 2    |
| Pedestrians                       |      |      |       |      |                      |      |       |      |      |       |      |      |
| Lane Width (ft)                   |      |      |       |      |                      |      |       |      |      |       |      |      |
| Walking Speed (ft/s)              |      |      |       |      |                      |      |       |      |      |       |      |      |
| Percent Blockage                  |      |      |       |      |                      |      |       |      |      |       |      |      |
| Right turn flare (veh)            |      |      |       |      |                      |      |       |      |      |       |      |      |
| Median type                       |      |      |       |      |                      |      | TWLTL |      |      | TWLTL |      |      |
| Median storage (veh)              |      |      |       |      |                      |      | 2     |      |      | 2     |      |      |
| Upstream signal (ft)              |      |      |       |      |                      |      |       |      |      |       |      |      |
| pX, platoon unblocked             |      |      |       |      |                      |      |       |      |      |       |      |      |
| vC, conflicting volume            | 1539 | 1538 | 961   | 1547 | 1539                 | 557  | 962   |      |      | 557   |      |      |
| vC1, stage 1 conf vol             | 963  | 963  |       | 574  | 574                  |      |       |      |      |       |      |      |
| vC2, stage 2 conf vol             | 575  | 575  |       | 973  | 965                  |      |       |      |      |       |      |      |
| vCu, unblocked vol                | 1539 | 1538 | 961   | 1547 | 1539                 | 557  | 962   |      |      | 557   |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2   | 7.1  | 6.5                  | 6.2  | 4.1   |      |      | 4.1   |      |      |
| tC, 2 stage (s)                   | 6.1  | 5.5  |       | 6.1  | 5.5                  |      |       |      |      |       |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3   | 3.5  | 4.0                  | 3.3  | 2.2   |      |      | 2.2   |      |      |
| p0 queue free %                   | 100  | 100  | 97    | 100  | 100                  | 100  | 99    |      |      | 100   |      |      |
| cM capacity (veh/h)               | 267  | 288  | 311   | 252  | 283                  | 530  | 715   |      |      | 1014  |      |      |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | NB 1 | NB 2                 | SB 1 | SB 2  |      |      |       |      |      |
| Volume Total                      | 1    | 11   | 2     | 9    | 557                  | 1    | 962   |      |      |       |      |      |
| Volume Left                       | 1    | 0    | 0     | 9    | 0                    | 1    | 0     |      |      |       |      |      |
| Volume Right                      | 0    | 11   | 2     | 0    | 1                    | 0    | 2     |      |      |       |      |      |
| cSH                               | 267  | 311  | 530   | 715  | 1700                 | 1014 | 1700  |      |      |       |      |      |
| Volume to Capacity                | 0.00 | 0.03 | 0.00  | 0.01 | 0.33                 | 0.00 | 0.57  |      |      |       |      |      |
| Queue Length 95th (ft)            | 0    | 3    | 0     | 1    | 0                    | 0    | 0     |      |      |       |      |      |
| Control Delay (s)                 | 18.6 | 17.0 | 11.8  | 10.1 | 0.0                  | 8.6  | 0.0   |      |      |       |      |      |
| Lane LOS                          | C    | C    | B     | B    |                      | A    |       |      |      |       |      |      |
| Approach Delay (s)                | 17.2 |      | 11.8  | 0.2  |                      | 0.0  |       |      |      |       |      |      |
| Approach LOS                      | C    |      | B     |      |                      |      |       |      |      |       |      |      |
| <b>Intersection Summary</b>       |      |      |       |      |                      |      |       |      |      |       |      |      |
| Average Delay                     |      |      | 0.2   |      |                      |      |       |      |      |       |      |      |
| Intersection Capacity Utilization |      |      | 57.1% |      | ICU Level of Service |      |       |      |      | B     |      |      |
| Analysis Period (min)             |      |      | 15    |      |                      |      |       |      |      |       |      |      |













INTERSECTION 9004: M-22 & Carter Rd  
AM PEAK

ZONE A  
EXISTING

|                                   |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement                          | EBL   | EBR   | NBL   | NBT   | SBT   | SBR   |
| Lane Configurations               |  |   |  |  |  |   |
| Volume (veh/h)                    | 10  | 50  | 25  | 526   | 865   | 21  |
| Sign Control                      | Stop  |   |   | Free  | Free  |   |
| Grade                             | 0%  |   |   | 0%  | 0%  |   |
| Peak Hour Factor                  | 0.88  | 0.88  | 0.93  | 0.93  | 0.95  | 0.95  |
| Hourly flow rate (vph)            | 11  | 57  | 27  | 566   | 911   | 22  |
| Pedestrians                       |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |
| Median type                       |   |   | TWLTL   | TWLTL   |   |   |
| Median storage (veh)              |   |   | 2   | 2   |   |   |
| Upstream signal (ft)              |   |   |   |   |   |   |
| pX, platoon unblocked             |   |   |   |   |   |   |
| vC, conflicting volume            | 1541  | 922   | 933   |   |   |   |
| vC1, stage 1 conf vol             | 922   |   |   |   |   |   |
| vC2, stage 2 conf vol             | 619   |   |   |   |   |   |
| vCu, unblocked vol                | 1541  | 922   | 933   |   |   |   |
| tC, single (s)                    | 6.4   | 6.2   | 4.1   |   |   |   |
| tC, 2 stage (s)                   | 5.4   |   |   |   |   |   |
| tF (s)                            | 3.5   | 3.3   | 2.2   |   |   |   |
| p0 queue free %                   | 96  | 83  | 96  |   |   |   |
| cM capacity (veh/h)               | 322   | 326   | 734   |   |   |   |
| Direction, Lane #                 | EB 1  | NB 1  | NB 2  | SB 1  |   |   |
| Volume Total                      | 68  | 27  | 566   | 933   |   |   |
| Volume Left                       | 11  | 27  | 0   | 0   |   |   |
| Volume Right                      | 57  | 0   | 0   | 22  |   |   |
| cSH                               | 326   | 734   | 1700  | 1700  |   |   |
| Volume to Capacity                | 0.21  | 0.04  | 0.33  | 0.55  |   |   |
| Queue Length 95th (ft)            | 19  | 3   | 0   | 0   |   |   |
| Control Delay (s)                 | 19.0  | 10.1  | 0.0   | 0.0   |   |   |
| Lane LOS                          | C   | B   |   |   |   |   |
| Approach Delay (s)                | 19.0  | 0.5   | 0.0   |   |   |   |
| Approach LOS                      | C   |   |   |   |   |   |
| Intersection Summary              |   |   |   |   |   |   |
| Average Delay                     |   |   | 1.0   |   |   |   |
| Intersection Capacity Utilization |   |   | 57.1%   | ICU Level of Service  | B   |   |
| Analysis Period (min)             |   |   | 15  |   |   |   |

INTERSECTION 9006: BAY ST & M-72  
AM PEAK

ZONE A  
EXISTING

|                                   |    |  |  |    |    |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement                          | EBT   | EBR   | WBL   | WBT   | NBL   | NBR   |
| Lane Configurations               |   |   |   |   |   |   |
| Volume (veh/h)                    | 485   | 54  | 142   | 261   | 33  | 77  |
| Sign Control                      | Free  |   |   | Free  | Stop  |   |
| Grade                             | 0%  |   |   | 0%  | 0%  |   |
| Peak Hour Factor                  | 0.79  | 0.79  | 0.95  | 0.95  | 0.86  | 0.86  |
| Hourly flow rate (vph)            | 614   | 68  | 149   | 275   | 38  | 90  |
| Pedestrians                       |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |
| Median type                       | None  |   |   | None  |   |   |
| Median storage (veh)              |   |   |   |   |   |   |
| Upstream signal (ft)              |   |   |   | 99  |   |   |
| pX, platoon unblocked             |   |   |   |   |   |   |
| vC, conflicting volume            |   |   | 682   |   | 1084  | 341   |
| vC1, stage 1 conf vol             |   |   |   |   |   |   |
| vC2, stage 2 conf vol             |   |   |   |   |   |   |
| vCu, unblocked vol                |   |   | 682   |   | 1084  | 341   |
| tC, single (s)                    |   |   | 4.1   |   | 6.8   | 6.9   |
| tC, 2 stage (s)                   |   |   |   |   |   |   |
| tF (s)                            |   |   | 2.2   |   | 3.5   | 3.3   |
| p0 queue free %                   |   |   | 84  |   | 78  | 86  |
| cM capacity (veh/h)               |   |   | 906   |   | 177   | 655   |
| Direction, Lane #                 | EB 1  | EB 2  | WB 1  | WB 2  | NB 1  |   |
| Volume Total                      | 409   | 273   | 241   | 183   | 128   |   |
| Volume Left                       | 0   | 0   | 149   | 0   | 38  |   |
| Volume Right                      | 0   | 68  | 0   | 0   | 90  |   |
| cSH                               | 1700  | 1700  | 906   | 1700  | 361   |   |
| Volume to Capacity                | 0.24  | 0.16  | 0.16  | 0.11  | 0.35  |   |
| Queue Length 95th (ft)            | 0   | 0   | 15  | 0   | 39  |   |
| Control Delay (s)                 | 0.0   | 0.0   | 6.7   | 0.0   | 20.3  |   |
| Lane LOS                          |   |   |   | A   | C   |   |
| Approach Delay (s)                | 0.0   |   | 3.8   |   | 20.3  |   |
| Approach LOS                      |   |   |   |   | C   |   |
| Intersection Summary              |   |   |   |   |   |   |
| Average Delay                     |   |   | 3.4   |   |   |   |
| Intersection Capacity Utilization |   |   | 43.0%   |   | ICU Level of Service  | A   |
| Analysis Period (min)             |   |   | 15  |   |   |   |

INTERSECTION 1003: M-22 & Cherry Bend Rd/Marina Village Dr  
PM PEAK

ZONE A  
EXISTING

| Movement                          | EBL  | EBT  | EBR   | WBL   | WBT  | WBR  | NBL                       | NBT   | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|-------|-------|------|------|---------------------------|-------|------|------|------|------|
| Lane Configurations               |      |      |       |       |      |      |                           |       |      |      |      |      |
| Volume (vph)                      | 18   | 5    | 236   | 48    | 7    | 4    | 221                       | 532   | 51   | 2    | 489  | 10   |
| Ideal Flow (vphpl)                | 1900 | 1900 | 1900  | 1900  | 1900 | 1900 | 1900                      | 1900  | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)               | 6.3  | 6.3  |       | 6.3   | 6.3  |      | 5.9                       | 5.9   | 5.9  | 5.9  | 5.9  | 5.9  |
| Lane Util. Factor                 | 1.00 | 1.00 |       | 1.00  | 1.00 |      | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Fr <sub>t</sub>                   | 1.00 | 0.85 |       | 1.00  | 0.95 |      | 1.00                      | 1.00  | 0.85 | 1.00 | 1.00 | 0.85 |
| Fl <sub>t</sub> Protected         | 0.95 | 1.00 |       | 0.95  | 1.00 |      | 0.95                      | 1.00  | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot)                 | 1770 | 1590 |       | 1770  | 1763 |      | 1770                      | 1863  | 1583 | 1770 | 1863 | 1583 |
| Fl <sub>t</sub> Permitted         | 0.75 | 1.00 |       | 0.38  | 1.00 |      | 0.44                      | 1.00  | 1.00 | 0.39 | 1.00 | 1.00 |
| Satd. Flow (perm)                 | 1394 | 1590 |       | 716   | 1763 |      | 823                       | 1863  | 1583 | 733  | 1863 | 1583 |
| Peak-hour factor, PHF             | 0.89 | 0.89 | 0.89  | 0.82  | 0.82 | 0.82 | 0.90                      | 0.90  | 0.90 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph)                   | 20   | 6    | 265   | 59    | 9    | 5    | 246                       | 591   | 57   | 2    | 515  | 11   |
| RTOR Reduction (vph)              | 0    | 226  | 0     | 0     | 4    | 0    | 0                         | 0     | 18   | 0    | 0    | 4    |
| Lane Group Flow (vph)             | 20   | 45   | 0     | 59    | 10   | 0    | 246                       | 591   | 39   | 2    | 515  | 7    |
| Turn Type                         | Perm | NA   |       | Perm  | NA   |      | Perm                      | NA    | Perm | Perm | NA   | Perm |
| Protected Phases                  |      | 4    |       |       | 8    |      |                           | 2     |      |      | 6    |      |
| Permitted Phases                  | 4    |      |       | 8     |      |      | 2                         |       | 2    | 6    |      | 6    |
| Actuated Green, G (s)             | 10.4 | 10.4 |       | 10.4  | 10.4 |      | 47.4                      | 47.4  | 47.4 | 47.4 | 47.4 | 47.4 |
| Effective Green, g (s)            | 10.4 | 10.4 |       | 10.4  | 10.4 |      | 47.4                      | 47.4  | 47.4 | 47.4 | 47.4 | 47.4 |
| Actuated g/C Ratio                | 0.15 | 0.15 |       | 0.15  | 0.15 |      | 0.68                      | 0.68  | 0.68 | 0.68 | 0.68 | 0.68 |
| Clearance Time (s)                | 6.3  | 6.3  |       | 6.3   | 6.3  |      | 5.9                       | 5.9   | 5.9  | 5.9  | 5.9  | 5.9  |
| Vehicle Extension (s)             | 3.0  | 3.0  |       | 3.0   | 3.0  |      | 3.0                       | 3.0   | 3.0  | 3.0  | 3.0  | 3.0  |
| Lane Grp Cap (vph)                | 207  | 236  |       | 106   | 261  |      | 557                       | 1261  | 1071 | 496  | 1261 | 1071 |
| v/s Ratio Prot                    |      | 0.03 |       |       | 0.01 |      |                           | c0.32 |      |      | 0.28 |      |
| v/s Ratio Perm                    | 0.01 |      |       | c0.08 |      |      | 0.30                      |       | 0.02 | 0.00 |      | 0.00 |
| v/c Ratio                         | 0.10 | 0.19 |       | 0.56  | 0.04 |      | 0.44                      | 0.47  | 0.04 | 0.00 | 0.41 | 0.01 |
| Uniform Delay, d <sub>1</sub>     | 25.7 | 26.1 |       | 27.7  | 25.5 |      | 5.2                       | 5.3   | 3.7  | 3.7  | 5.0  | 3.7  |
| Progression Factor                | 1.00 | 1.00 |       | 1.00  | 1.00 |      | 1.00                      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d <sub>2</sub> | 0.2  | 0.4  |       | 6.2   | 0.1  |      | 2.5                       | 1.3   | 0.1  | 0.0  | 1.0  | 0.0  |
| Delay (s)                         | 25.9 | 26.5 |       | 33.9  | 25.6 |      | 7.7                       | 6.6   | 3.8  | 3.7  | 6.0  | 3.7  |
| Level of Service                  | C    | C    |       | C     | C    |      | A                         | A     | A    | A    | A    | A    |
| Approach Delay (s)                |      | 26.5 |       |       | 32.3 |      |                           | 6.7   |      |      | 6.0  |      |
| Approach LOS                      |      | C    |       |       | C    |      |                           | A     |      |      | A    |      |
| <b>Intersection Summary</b>       |      |      |       |       |      |      |                           |       |      |      |      |      |
| HCM 2000 Control Delay            |      |      | 10.8  |       |      |      | HCM 2000 Level of Service |       |      | B    |      |      |
| HCM 2000 Volume to Capacity ratio |      |      | 0.48  |       |      |      |                           |       |      |      |      |      |
| Actuated Cycle Length (s)         |      |      | 70.0  |       |      |      | Sum of lost time (s)      |       |      | 12.2 |      |      |
| Intersection Capacity Utilization |      |      | 79.0% |       |      |      | ICU Level of Service      |       |      | D    |      |      |
| Analysis Period (min)             |      |      | 15    |       |      |      |                           |       |      |      |      |      |
| c Critical Lane Group             |      |      |       |       |      |      |                           |       |      |      |      |      |

INTERSECTION 1005: M-72/22/M-22 & M-72  
PM PEAK

ZONE A  
EXISTING



| Movement               | EBL   | EBR   | NBL   | NBT   | SBT  | SBR  |
|------------------------|-------|-------|-------|-------|------|------|
| Lane Configurations    |       |       |       |       |      |      |
| Volume (vph)           | 215   | 342   | 392   | 1018  | 894  | 127  |
| Ideal Flow (vphpl)     | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |
| Lane Width             | 12    | 12    | 12    | 13    | 12   | 12   |
| Total Lost time (s)    | 12.8  | 5.9   | 5.9   | 5.9   | 5.9  |      |
| Lane Util. Factor      | 1.00  | 1.00  | 1.00  | 1.00  | 0.95 |      |
| Frt                    | 1.00  | 0.85  | 1.00  | 1.00  | 0.98 |      |
| Flt Protected          | 0.95  | 1.00  | 0.95  | 1.00  | 1.00 |      |
| Satd. Flow (prot)      | 1770  | 1583  | 1770  | 1925  | 3473 |      |
| Flt Permitted          | 0.95  | 1.00  | 0.95  | 1.00  | 1.00 |      |
| Satd. Flow (perm)      | 1770  | 1583  | 1770  | 1925  | 3473 |      |
| Peak-hour factor, PHF  | 0.94  | 0.94  | 0.92  | 0.92  | 0.95 | 0.95 |
| Adj. Flow (vph)        | 229   | 364   | 426   | 1107  | 941  | 134  |
| RTOR Reduction (vph)   | 0     | 23    | 0     | 0     | 11   | 0    |
| Lane Group Flow (vph)  | 229   | 341   | 426   | 1107  | 1064 | 0    |
| Turn Type              | Prot  | pm+ov | Prot  | NA    | NA   |      |
| Protected Phases       | 4     | 5     | 5     | 2     | 6    |      |
| Permitted Phases       |       | 4     |       |       |      |      |
| Actuated Green, G (s)  | 15.8  | 36.9  | 21.1  | 64.1  | 37.1 |      |
| Effective Green, g (s) | 15.8  | 36.9  | 21.1  | 64.1  | 37.1 |      |
| Actuated g/C Ratio     | 0.16  | 0.37  | 0.21  | 0.65  | 0.38 |      |
| Clearance Time (s)     | 12.8  | 5.9   | 5.9   | 5.9   | 5.9  |      |
| Vehicle Extension (s)  | 3.0   | 3.0   | 3.0   | 3.0   | 3.0  |      |
| Lane Grp Cap (vph)     | 283   | 687   | 378   | 1251  | 1306 |      |
| v/s Ratio Prot         | c0.13 | 0.11  | c0.24 | c0.58 | 0.31 |      |
| v/s Ratio Perm         |       | 0.11  |       |       |      |      |
| v/c Ratio              | 0.81  | 0.50  | 1.13  | 0.88  | 0.81 |      |
| Uniform Delay, d1      | 39.9  | 23.7  | 38.8  | 14.2  | 27.7 |      |
| Progression Factor     | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |      |
| Incremental Delay, d2  | 15.5  | 0.6   | 85.4  | 9.4   | 5.7  |      |
| Delay (s)              | 55.5  | 24.3  | 124.2 | 23.6  | 33.3 |      |
| Level of Service       | E     | C     | F     | C     | C    |      |
| Approach Delay (s)     | 36.3  |       |       | 51.5  | 33.3 |      |
| Approach LOS           | D     |       |       | D     | C    |      |

Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 42.6  | HCM 2000 Level of Service | D    |
| HCM 2000 Volume to Capacity ratio | 0.98  |                           |      |
| Actuated Cycle Length (s)         | 98.6  | Sum of lost time (s)      | 24.6 |
| Intersection Capacity Utilization | 82.9% | ICU Level of Service      | E    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group



INTERSECTION 9001: M-22 & Pico Dr  
PM PEAK


















ZONE A  
EXISTING



| Movement                          | EBL  | EBR  | NBL   | NBT                  | SBT   | SBR  |
|-----------------------------------|------|------|-------|----------------------|-------|------|
| Lane Configurations               |      |      |       |                      |       |      |
| Volume (veh/h)                    | 3    | 11   | 18    | 848                  | 795   | 2    |
| Sign Control                      | Stop |      |       | Free                 | Free  |      |
| Grade                             | 0%   |      |       | 0%                   | 0%    |      |
| Peak Hour Factor                  | 0.65 | 0.65 | 0.95  | 0.95                 | 0.95  | 0.95 |
| Hourly flow rate (vph)            | 5    | 17   | 19    | 893                  | 837   | 2    |
| Pedestrians                       |      |      |       |                      |       |      |
| Lane Width (ft)                   |      |      |       |                      |       |      |
| Walking Speed (ft/s)              |      |      |       |                      |       |      |
| Percent Blockage                  |      |      |       |                      |       |      |
| Right turn flare (veh)            |      |      |       |                      |       |      |
| Median type                       |      |      |       | TWLTL                | TWLTL |      |
| Median storage (veh)              |      |      |       | 2                    | 2     |      |
| Upstream signal (ft)              |      |      |       | 1216                 |       |      |
| pX, platoon unblocked             | 0.90 | 0.90 | 0.90  |                      |       |      |
| vC, conflicting volume            | 1768 | 838  | 839   |                      |       |      |
| vC1, stage 1 conf vol             | 838  |      |       |                      |       |      |
| vC2, stage 2 conf vol             | 931  |      |       |                      |       |      |
| vCu, unblocked vol                | 1797 | 768  | 769   |                      |       |      |
| tC, single (s)                    | 6.4  | 6.2  | 4.1   |                      |       |      |
| tC, 2 stage (s)                   | 5.4  |      |       |                      |       |      |
| tF (s)                            | 3.5  | 3.3  | 2.2   |                      |       |      |
| p0 queue free %                   | 98   | 95   | 98    |                      |       |      |
| cM capacity (veh/h)               | 281  | 363  | 764   |                      |       |      |
| Direction, Lane #                 | EB 1 | NB 1 | NB 2  | SB 1                 |       |      |
| Volume Total                      | 22   | 19   | 893   | 839                  |       |      |
| Volume Left                       | 5    | 19   | 0     | 0                    |       |      |
| Volume Right                      | 17   | 0    | 0     | 2                    |       |      |
| cSH                               | 342  | 764  | 1700  | 1700                 |       |      |
| Volume to Capacity                | 0.06 | 0.02 | 0.53  | 0.49                 |       |      |
| Queue Length 95th (ft)            | 5    | 2    | 0     | 0                    |       |      |
| Control Delay (s)                 | 16.2 | 9.8  | 0.0   | 0.0                  |       |      |
| Lane LOS                          | C    | A    |       |                      |       |      |
| Approach Delay (s)                | 16.2 | 0.2  | 0.0   |                      |       |      |
| Approach LOS                      | C    |      |       |                      |       |      |
| Intersection Summary              |      |      |       |                      |       |      |
| Average Delay                     |      |      | 0.3   |                      |       |      |
| Intersection Capacity Utilization |      |      | 54.6% | ICU Level of Service | A     |      |
| Analysis Period (min)             |      |      | 15    |                      |       |      |

INTERSECTION 9002: M-22 & Grandview Rd/marina entry  
PM PEAK

ZONE A  
EXISTING

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement                          | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations               |   |  |   |   |   |   |  |  |   |  |  |   |
| Volume (veh/h)                    | 21  | 1   | 100   | 0   | 0   | 0   | 122   | 838   | 26  | 5   | 762   | 35  |
| Sign Control                      |   | Stop  |   |   | Stop  |   |   | Free  |   |   | Free  |   |
| Grade                             |   | 0%  |   |   | 0%  |   |   | 0%  |   |   | 0%  |   |
| Peak Hour Factor                  | 0.82  | 0.82  | 0.82  | 0.92  | 0.92  | 0.92  | 0.95  | 0.95  | 0.95  | 0.95  | 0.95  | 0.95  |
| Hourly flow rate (vph)            | 26  | 1   | 122   | 0   | 0   | 0   | 128   | 882   | 27  | 5   | 802   | 37  |
| Pedestrians                       |   |   |   |   |   |   |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |   |   |   |   |   |   |
| Median type                       |   |   |   |   |   |   |   | TWLTL   |   |   | TWLTL   |   |
| Median storage (veh)              |   |   |   |   |   |   |   | 2   |   |   | 2   |   |
| Upstream signal (ft)              |   |   |   |   |   |   |   |   |   |   |   |   |
| pX, platoon unblocked             |   |   |   |   |   |   |   |   |   |   |   |   |
| vC, conflicting volume            | 1970  | 1997  | 821   | 2088  | 2002  | 896   | 839   |   |   | 909   |   |   |
| vC1, stage 1 conf vol             | 831   | 831   |   | 1153  | 1153  |   |   |   |   |   |   |   |
| vC2, stage 2 conf vol             | 1139  | 1166  |   | 935   | 849   |   |   |   |   |   |   |   |
| vCu, unblocked vol                | 1970  | 1997  | 821   | 2088  | 2002  | 896   | 839   |   |   | 909   |   |   |
| tC, single (s)                    | 7.1   | 6.5   | 6.2   | 7.1   | 6.5   | 6.2   | 4.1   |   |   | 4.1   |   |   |
| tC, 2 stage (s)                   | 6.1   | 5.5   |   | 6.1   | 5.5   |   |   |   |   |   |   |   |
| tF (s)                            | 3.5   | 4.0   | 3.3   | 3.5   | 4.0   | 3.3   | 2.2   |   |   | 2.2   |   |   |
| p0 queue free %                   | 85  | 99  | 67  | 100   | 100   | 100   | 84  |   |   | 99  |   |   |
| cM capacity (veh/h)               | 173   | 190   | 375   | 77  | 170   | 339   | 796   |   |   | 749   |   |   |
| <b>Direction, Lane #</b>          | <b>EB 1</b>   | <b>NB 1</b>   | <b>NB 2</b>   | <b>SB 1</b>   | <b>SB 2</b>   |   |   |   |   |   |   |   |
| Volume Total                      | 149   | 128   | 909   | 5   | 839   |   |   |   |   |   |   |   |
| Volume Left                       | 26  | 128   | 0   | 5   | 0   |   |   |   |   |   |   |   |
| Volume Right                      | 122   | 0   | 27  | 0   | 37  |   |   |   |   |   |   |   |
| cSH                               | 310   | 796   | 1700  | 749   | 1700  |   |   |   |   |   |   |   |
| Volume to Capacity                | 0.48  | 0.16  | 0.53  | 0.01  | 0.49  |   |   |   |   |   |   |   |
| Queue Length 95th (ft)            | 62  | 14  | 0   | 1   | 0   |   |   |   |   |   |   |   |
| Control Delay (s)                 | 26.9  | 10.4  | 0.0   | 9.8   | 0.0   |   |   |   |   |   |   |   |
| Lane LOS                          | D   | B   |   | A   |   |   |   |   |   |   |   |   |
| Approach Delay (s)                | 26.9  | 1.3   |   | 0.1   |   |   |   |   |   |   |   |   |
| Approach LOS                      | D   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Intersection Summary</b>       |   |   |   |   |   |   |   |   |   |   |   |   |
| Average Delay                     |   |   | 2.7   |   |   |   |   |   |   |   |   |   |
| Intersection Capacity Utilization |   |   | 66.4%   |   | ICU Level of Service  |   |   |   |   | C   |   |   |
| Analysis Period (min)             |   |   | 15  |   |   |   |   |   |   |   |   |   |

INTERSECTION 9003: M-22 & Brewery Creek/museum dr  
PM PEAK

ZONE A  
EXISTING

| Movement                          | EBL         | EBT         | EBR         | WBL         | WBT                  | WBR         | NBL         | NBT   | NBR  | SBL  | SBT   | SBR  |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|-------------|-------------|-------|------|------|-------|------|
| Lane Configurations               |             |             |             |             |                      |             |             |       |      |      |       |      |
| Volume (veh/h)                    | 1           | 0           | 20          | 11          | 0                    | 6           | 13          | 1013  | 29   | 10   | 900   | 2    |
| Sign Control                      |             | Stop        |             |             | Stop                 |             |             | Free  |      |      | Free  |      |
| Grade                             |             | 0%          |             |             | 0%                   |             |             | 0%    |      |      | 0%    |      |
| Peak Hour Factor                  | 0.65        | 0.65        | 0.65        | 0.71        | 0.71                 | 0.71        | 0.95        | 0.95  | 0.95 | 0.95 | 0.95  | 0.95 |
| Hourly flow rate (vph)            | 2           | 0           | 31          | 15          | 0                    | 8           | 14          | 1066  | 31   | 11   | 947   | 2    |
| Pedestrians                       |             |             |             |             |                      |             |             |       |      |      |       |      |
| Lane Width (ft)                   |             |             |             |             |                      |             |             |       |      |      |       |      |
| Walking Speed (ft/s)              |             |             |             |             |                      |             |             |       |      |      |       |      |
| Percent Blockage                  |             |             |             |             |                      |             |             |       |      |      |       |      |
| Right turn flare (veh)            |             |             |             |             |                      |             |             |       |      |      |       |      |
| Median type                       |             |             |             |             |                      |             |             | TWLTL |      |      | TWLTL |      |
| Median storage veh                |             |             |             |             |                      |             |             | 2     |      |      | 2     |      |
| Upstream signal (ft)              |             |             |             |             |                      |             |             |       |      |      |       |      |
| pX, platoon unblocked             |             |             |             |             |                      |             |             |       |      |      |       |      |
| vC, conflicting volume            | 2072        | 2094        | 948         | 2108        | 2079                 | 1082        | 949         |       |      | 1097 |       |      |
| vC1, stage 1 conf vol             | 969         | 969         |             | 1109        | 1109                 |             |             |       |      |      |       |      |
| vC2, stage 2 conf vol             | 1102        | 1124        |             | 999         | 971                  |             |             |       |      |      |       |      |
| vCu, unblocked vol                | 2072        | 2094        | 948         | 2108        | 2079                 | 1082        | 949         |       |      | 1097 |       |      |
| tC, single (s)                    | 7.1         | 6.5         | 6.2         | 7.1         | 6.5                  | 6.2         | 4.1         |       |      | 4.1  |       |      |
| tC, 2 stage (s)                   | 6.1         | 5.5         |             | 6.1         | 5.5                  |             |             |       |      |      |       |      |
| tF (s)                            | 3.5         | 4.0         | 3.3         | 3.5         | 4.0                  | 3.3         | 2.2         |       |      | 2.2  |       |      |
| p0 queue free %                   | 99          | 100         | 90          | 91          | 100                  | 97          | 98          |       |      | 98   |       |      |
| cM capacity (veh/h)               | 181         | 205         | 316         | 172         | 208                  | 265         | 723         |       |      | 636  |       |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>EB 2</b> | <b>WB 1</b> | <b>NB 1</b> | <b>NB 2</b>          | <b>SB 1</b> | <b>SB 2</b> |       |      |      |       |      |
| Volume Total                      | 2           | 31          | 24          | 14          | 1097                 | 11          | 949         |       |      |      |       |      |
| Volume Left                       | 2           | 0           | 15          | 14          | 0                    | 11          | 0           |       |      |      |       |      |
| Volume Right                      | 0           | 31          | 8           | 0           | 31                   | 0           | 2           |       |      |      |       |      |
| cSH                               | 181         | 316         | 196         | 723         | 1700                 | 636         | 1700        |       |      |      |       |      |
| Volume to Capacity                | 0.01        | 0.10        | 0.12        | 0.02        | 0.65                 | 0.02        | 0.56        |       |      |      |       |      |
| Queue Length 95th (ft)            | 1           | 8           | 10          | 1           | 0                    | 1           | 0           |       |      |      |       |      |
| Control Delay (s)                 | 25.0        | 17.6        | 25.9        | 10.1        | 0.0                  | 10.8        | 0.0         |       |      |      |       |      |
| Lane LOS                          | D           | C           | D           | B           |                      | B           |             |       |      |      |       |      |
| Approach Delay (s)                | 18.0        |             | 25.9        | 0.1         |                      | 0.1         |             |       |      |      |       |      |
| Approach LOS                      | C           |             | D           |             |                      |             |             |       |      |      |       |      |
| <b>Intersection Summary</b>       |             |             |             |             |                      |             |             |       |      |      |       |      |
| Average Delay                     |             |             | 0.7         |             |                      |             |             |       |      |      |       |      |
| Intersection Capacity Utilization |             |             | 69.4%       |             | ICU Level of Service |             |             |       |      | C    |       |      |
| Analysis Period (min)             |             |             | 15          |             |                      |             |             |       |      |      |       |      |

INTERSECTION 9004: M-22 & Carter Rd  
PM PEAK







ZONE A  
EXISTING



| Movement                          | EBL  | EBR  | NBL   | NBT                  | SBT  | SBR  |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Lane Configurations               |      |      |       |                      |      |      |
| Volume (veh/h)                    | 55   | 10   | 65    | 1090                 | 940  | 25   |
| Sign Control                      | Stop |      |       | Free                 | Free |      |
| Grade                             | 0%   |      |       | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.68 | 0.68 | 0.95  | 0.95                 | 0.95 | 0.95 |
| Hourly flow rate (vph)            | 81   | 15   | 68    | 1147                 | 989  | 26   |
| Pedestrians                       |      |      |       |                      |      |      |
| Lane Width (ft)                   |      |      |       |                      |      |      |
| Walking Speed (ft/s)              |      |      |       |                      |      |      |
| Percent Blockage                  |      |      |       |                      |      |      |
| Right turn flare (veh)            |      |      |       |                      |      |      |
| Median type                       |      |      | TWLTL | TWLTL                |      |      |
| Median storage (veh)              |      |      | 2     | 2                    |      |      |
| Upstream signal (ft)              |      |      |       |                      |      |      |
| pX, platoon unblocked             |      |      |       |                      |      |      |
| vC, conflicting volume            | 2287 | 1003 | 1016  |                      |      |      |
| vC1, stage 1 conf vol             | 1003 |      |       |                      |      |      |
| vC2, stage 2 conf vol             | 1284 |      |       |                      |      |      |
| vCu, unblocked vol                | 2287 | 1003 | 1016  |                      |      |      |
| tC, single (s)                    | 6.4  | 6.2  | 4.1   |                      |      |      |
| tC, 2 stage (s)                   | 5.4  |      |       |                      |      |      |
| tF (s)                            | 3.5  | 3.3  | 2.2   |                      |      |      |
| p0 queue free %                   | 58   | 95   | 90    |                      |      |      |
| cM capacity (veh/h)               | 192  | 294  | 683   |                      |      |      |
| Direction, Lane #                 | EB 1 | NB 1 | NB 2  | SB 1                 |      |      |
| Volume Total                      | 96   | 68   | 1147  | 1016                 |      |      |
| Volume Left                       | 81   | 68   | 0     | 0                    |      |      |
| Volume Right                      | 15   | 0    | 0     | 26                   |      |      |
| cSH                               | 203  | 683  | 1700  | 1700                 |      |      |
| Volume to Capacity                | 0.47 | 0.10 | 0.67  | 0.60                 |      |      |
| Queue Length 95th (ft)            | 57   | 8    | 0     | 0                    |      |      |
| Control Delay (s)                 | 37.6 | 10.9 | 0.0   | 0.0                  |      |      |
| Lane LOS                          | E    | B    |       |                      |      |      |
| Approach Delay (s)                | 37.6 | 0.6  | 0.0   |                      |      |      |
| Approach LOS                      | E    |      |       |                      |      |      |
| Intersection Summary              |      |      |       |                      |      |      |
| Average Delay                     |      |      | 1.9   |                      |      |      |
| Intersection Capacity Utilization |      |      | 67.7% | ICU Level of Service | C    |      |
| Analysis Period (min)             |      |      | 15    |                      |      |      |

INTERSECTION 9006: Bay St & M-72  
PM PEAK

ZONE A  
EXISTING

|                                   |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement                          | EBT   | EBR   | WBL   | WBT   | NBL   | NBR   |
| Lane Configurations               | ↑↑  |   |   | ↑↑  | ↑↑  |   |
| Volume (veh/h)                    | 453   | 80  | 96  | 421   | 52  | 112   |
| Sign Control                      | Free  |   |   | Free  | Stop  |   |
| Grade                             | 0%  |   |   | 0%  | 0%  |   |
| Peak Hour Factor                  | 0.87  | 0.87  | 0.91  | 0.91  | 0.85  | 0.85  |
| Hourly flow rate (vph)            | 521   | 92  | 105   | 463   | 61  | 132   |
| Pedestrians                       |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |
| Median type                       | None  |   |   | None  |   |   |
| Median storage (veh)              |   |   |   |   |   |   |
| Upstream signal (ft)              |   |   |   | 96  |   |   |
| pX, platoon unblocked             |   |   |   |   |   |   |
| vC, conflicting volume            |   |   | 613   | 1009  |   | 306   |
| vC1, stage 1 conf vol             |   |   |   |   |   |   |
| vC2, stage 2 conf vol             |   |   |   |   |   |   |
| vCu, unblocked vol                |   |   | 613   | 1009  |   | 306   |
| tC, single (s)                    |   |   | 4.1   | 6.8   |   | 6.9   |
| tC, 2 stage (s)                   |   |   |   |   |   |   |
| tF (s)                            |   |   | 2.2   | 3.5   |   | 3.3   |
| p0 queue free %                   |   |   | 89  | 71  |   | 81  |
| cM capacity (veh/h)               |   |   | 963   | 211   |   | 690   |
| Direction, Lane #                 | EB 1  | EB 2  | WB 1  | WB 2  | NB 1  |   |
| Volume Total                      | 347   | 266   | 260   | 308   | 193   |   |
| Volume Left                       | 0   | 0   | 105   | 0   | 61  |   |
| Volume Right                      | 0   | 92  | 0   | 0   | 132   |   |
| cSH                               | 1700  | 1700  | 963   | 1700  | 401   |   |
| Volume to Capacity                | 0.20  | 0.16  | 0.11  | 0.18  | 0.48  |   |
| Queue Length 95th (ft)            | 0   | 0   | 9   | 0   | 63  |   |
| Control Delay (s)                 | 0.0   | 0.0   | 4.4   | 0.0   | 22.0  |   |
| Lane LOS                          | A   |   |   | C   |   |   |
| Approach Delay (s)                | 0.0   |   | 2.0   |   | 22.0  |   |
| Approach LOS                      |   |   |   | C   |   |   |
| Intersection Summary              |   |   |   |   |   |   |
| Average Delay                     |   |   | 3.9   |   |   |   |
| Intersection Capacity Utilization |   |   | 49.3%   |   | ICU Level of Service A  |   |
| Analysis Period (min)             | 15  |   |   |   |   |   |



**QUEUING REPORT**  
**AM PEAK**

**ZONE A**  
**EXISTING**

**Intersection: 1003: M-22 & Cherry Bend Rd/Marina Village Dr**

| Movement              | EB  | EB  | WB | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|----|-----|-----|-----|-----|-----|
| Directions Served     | L   | TR  | L  | L   | T   | R   | T   | R   |
| Maximum Queue (ft)    | 34  | 174 | 50 | 98  | 108 | 11  | 146 | 7   |
| Average Queue (ft)    | 5   | 89  | 11 | 32  | 34  | 1   | 66  | 0   |
| 95th Queue (ft)       | 25  | 151 | 36 | 70  | 87  | 5   | 127 | 3   |
| Link Distance (ft)    |     | 761 |    |     | 732 |     | 826 |     |
| Upstream Blk Time (%) |     |     |    |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |    |     |     |     |     |     |
| Storage Bay Dist (ft) | 135 |     | 75 | 130 |     | 130 |     | 250 |
| Storage Blk Time (%)  |     | 2   | 0  | 0   | 0   |     | 0   |     |
| Queuing Penalty (veh) |     | 0   | 0  | 0   | 0   |     | 0   |     |

**Intersection: 1005: M-72/22/M-22 & M-72**

| Movement              | EB  | EB | NB   | NB   | SB  | SB  |
|-----------------------|-----|----|------|------|-----|-----|
| Directions Served     | L   | R  | L    | T    | T   | TR  |
| Maximum Queue (ft)    | 52  | 77 | 963  | 973  | 339 | 353 |
| Average Queue (ft)    | 27  | 36 | 893  | 801  | 297 | 307 |
| 95th Queue (ft)       | 42  | 58 | 1110 | 1295 | 352 | 363 |
| Link Distance (ft)    | 27  | 27 | 929  | 929  | 309 | 309 |
| Upstream Blk Time (%) | 39  | 27 | 77   | 69   | 15  | 20  |
| Queuing Penalty (veh) | 116 | 79 | 0    | 0    | 71  | 94  |
| Storage Bay Dist (ft) |     |    |      |      |     |     |
| Storage Blk Time (%)  |     |    |      |      |     |     |
| Queuing Penalty (veh) |     |    |      |      |     |     |

**Intersection: 9001: M-22 & Pico Dr**

| Movement              | EB  | NB |
|-----------------------|-----|----|
| Directions Served     | LR  | L  |
| Maximum Queue (ft)    | 29  | 30 |
| Average Queue (ft)    | 5   | 1  |
| 95th Queue (ft)       | 22  | 12 |
| Link Distance (ft)    | 400 |    |
| Upstream Blk Time (%) |     |    |
| Queuing Penalty (veh) |     |    |
| Storage Bay Dist (ft) |     | 50 |
| Storage Blk Time (%)  |     | 0  |
| Queuing Penalty (veh) |     | 0  |

**QUEUING REPORT  
AM PEAK**

**ZONE A  
EXISTING**

**Intersection: 9002: M-22 & Grandview Rd/marina entry**

| Movement              | EB  | NB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LTR | L   | TR  |
| Maximum Queue (ft)    | 130 | 44  | 15  |
| Average Queue (ft)    | 46  | 11  | 1   |
| 95th Queue (ft)       | 97  | 36  | 9   |
| Link Distance (ft)    | 709 |     | 139 |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) |     | 100 |     |
| Storage Blk Time (%)  |     |     | 0   |
| Queuing Penalty (veh) |     |     | 0   |

**Intersection: 9003: M-22 & Brewery Creek/museum dr**

| Movement              | EB  | EB  | WB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | L   | TR  | LTR | L   | L   |
| Maximum Queue (ft)    | 6   | 34  | 26  | 27  | 5   |
| Average Queue (ft)    | 0   | 6   | 2   | 4   | 0   |
| 95th Queue (ft)       | 4   | 25  | 13  | 18  | 4   |
| Link Distance (ft)    | 481 | 481 | 121 |     |     |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 100 | 100 |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

**Intersection: 9004: M-22 & Carter Rd**

| Movement              | EB   | NB  |
|-----------------------|------|-----|
| Directions Served     | LR   | L   |
| Maximum Queue (ft)    | 77   | 46  |
| Average Queue (ft)    | 30   | 9   |
| 95th Queue (ft)       | 56   | 33  |
| Link Distance (ft)    | 1346 |     |
| Upstream Blk Time (%) |      |     |
| Queuing Penalty (veh) |      |     |
| Storage Bay Dist (ft) |      | 100 |
| Storage Blk Time (%)  |      |     |
| Queuing Penalty (veh) |      |     |

QUEUING REPORT  
AM PEAK

ZONE A  
EXISTING

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Intersection: 9006: BAY ST & M-72

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| Movement              | EB  | EB  | WB | NB  |
|-----------------------|-----|-----|----|-----|
| Directions Served     | T   | TR  | LT | LR  |
| Maximum Queue (ft)    | 117 | 283 | 52 | 209 |
| Average Queue (ft)    | 40  | 95  | 31 | 81  |
| 95th Queue (ft)       | 93  | 196 | 42 | 174 |
| Link Distance (ft)    | 663 | 663 | 27 | 282 |
| Upstream Blk Time (%) |     |     | 10 | 1   |
| Queuing Penalty (veh) |     |     | 21 | 0   |
| Storage Bay Dist (ft) |     |     |    |     |
| Storage Blk Time (%)  |     |     |    |     |
| Queuing Penalty (veh) |     |     |    |     |

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Zone Summary

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Zone wide Queuing Penalty: 383

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**QUEUING REPORT  
PM PEAK**

**ZONE A  
EXISTING**

**Intersection: 1003: M-22 & Cherry Bend Rd/Marina Village Dr**

| Movement              | EB  | EB  | WB | WB  | NB  | NB  | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | TR  | L  | TR  | L   | T   | R   | L   | T   | R   |
| Maximum Queue (ft)    | 43  | 164 | 83 | 38  | 146 | 217 | 23  | 15  | 157 | 8   |
| Average Queue (ft)    | 15  | 74  | 36 | 8   | 60  | 75  | 4   | 1   | 63  | 1   |
| 95th Queue (ft)       | 42  | 133 | 69 | 31  | 117 | 160 | 15  | 9   | 126 | 4   |
| Link Distance (ft)    |     | 761 |    | 209 |     | 732 |     |     | 826 |     |
| Upstream Blk Time (%) |     |     |    |     |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |    |     |     |     |     |     |     |     |
| Storage Bay Dist (ft) | 135 |     | 75 |     | 130 |     | 130 | 205 |     | 250 |
| Storage Blk Time (%)  |     | 1   | 2  |     | 1   | 1   |     |     | 0   |     |
| Queuing Penalty (veh) |     | 0   | 0  |     | 6   | 2   |     |     | 0   |     |

**Intersection: 1005: M-72/22/M-22 & M-72**

| Movement              | EB  | EB | NB   | NB   | SB  | SB  |
|-----------------------|-----|----|------|------|-----|-----|
| Directions Served     | L   | R  | L    | T    | T   | TR  |
| Maximum Queue (ft)    | 54  | 59 | 956  | 983  | 312 | 316 |
| Average Queue (ft)    | 31  | 32 | 871  | 810  | 215 | 224 |
| 95th Queue (ft)       | 43  | 48 | 1107 | 1228 | 291 | 309 |
| Link Distance (ft)    | 27  | 27 | 929  | 929  | 309 | 309 |
| Upstream Blk Time (%) | 74  | 30 | 50   | 51   | 0   | 0   |
| Queuing Penalty (veh) | 212 | 86 | 0    | 0    | 0   | 2   |
| Storage Bay Dist (ft) |     |    |      |      |     |     |
| Storage Blk Time (%)  |     |    |      |      |     |     |
| Queuing Penalty (veh) |     |    |      |      |     |     |

**Intersection: 9001: M-22 & Pico Dr**

| Movement              | EB  | NB | NB  |
|-----------------------|-----|----|-----|
| Directions Served     | LR  | L  | T   |
| Maximum Queue (ft)    | 47  | 38 | 6   |
| Average Queue (ft)    | 12  | 10 | 0   |
| 95th Queue (ft)       | 37  | 34 | 5   |
| Link Distance (ft)    | 400 |    | 139 |
| Upstream Blk Time (%) |     |    |     |
| Queuing Penalty (veh) |     |    |     |
| Storage Bay Dist (ft) |     | 50 |     |
| Storage Blk Time (%)  |     | 0  |     |
| Queuing Penalty (veh) |     | 1  |     |

**QUEUING REPORT  
PM PEAK**

**ZONE A  
EXISTING**

**Intersection: 9002: M-22 & Grandview Rd/marina entry**

| Movement              | EB  | NB  | SB | SB  |
|-----------------------|-----|-----|----|-----|
| Directions Served     | LTR | L   | L  | TR  |
| Maximum Queue (ft)    | 159 | 76  | 26 | 26  |
| Average Queue (ft)    | 62  | 35  | 2  | 2   |
| 95th Queue (ft)       | 120 | 62  | 15 | 13  |
| Link Distance (ft)    | 709 |     |    | 139 |
| Upstream Blk Time (%) |     |     |    |     |
| Queuing Penalty (veh) |     |     |    |     |
| Storage Bay Dist (ft) |     | 100 | 50 |     |
| Storage Blk Time (%)  |     | 0   | 0  | 0   |
| Queuing Penalty (veh) |     | 0   | 0  | 0   |

**Intersection: 9003: M-22 & Brewery Creek/museum dr**

| Movement              | EB  | EB  | WB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | L   | TR  | LTR | L   | L   |
| Maximum Queue (ft)    | 21  | 39  | 65  | 32  | 28  |
| Average Queue (ft)    | 1   | 14  | 18  | 6   | 4   |
| 95th Queue (ft)       | 10  | 36  | 50  | 25  | 20  |
| Link Distance (ft)    | 481 | 481 | 121 |     |     |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 100 | 100 |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

**Intersection: 9004: M-22 & Carter Rd**

| Movement              | EB   | NB  | SB   |
|-----------------------|------|-----|------|
| Directions Served     | LR   | L   | TR   |
| Maximum Queue (ft)    | 221  | 74  | 4    |
| Average Queue (ft)    | 96   | 24  | 0    |
| 95th Queue (ft)       | 231  | 55  | 3    |
| Link Distance (ft)    | 1346 |     | 1243 |
| Upstream Blk Time (%) |      |     |      |
| Queuing Penalty (veh) |      |     |      |
| Storage Bay Dist (ft) |      | 100 |      |
| Storage Blk Time (%)  |      | 0   |      |
| Queuing Penalty (veh) |      | 1   |      |



QUEUING REPORT  
PM PEAK

ZONE A  
EXISTING

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Intersection: 9006: BAY ST & M-72

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| Movement              | EB  | EB  | WB | NB  |
|-----------------------|-----|-----|----|-----|
| Directions Served     | T   | TR  | LT | LR  |
| Maximum Queue (ft)    | 209 | 214 | 44 | 309 |
| Average Queue (ft)    | 105 | 80  | 24 | 283 |
| 95th Queue (ft)       | 176 | 165 | 46 | 350 |
| Link Distance (ft)    | 663 | 663 | 27 | 282 |
| Upstream Blk Time (%) |     |     | 7  | 88  |
| Queuing Penalty (veh) |     |     | 19 | 0   |
| Storage Bay Dist (ft) |     |     |    |     |
| Storage Blk Time (%)  |     |     |    |     |
| Queuing Penalty (veh) |     |     |    |     |

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Zone Summary

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Zone wide Queuing Penalty: 329

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INTERSECTION 1005: M-72/22/M-22 & M-72  
AM PEAK

ZONE A  
EXISTING MITIGATED



| Movement               | EBL  | EBR   | NBL  | NBT  | SBT   | SBR  |
|------------------------|------|-------|------|------|-------|------|
| Lane Configurations    |      |       |      |      |       |      |
| Volume (vph)           | 140  | 422   | 257  | 533  | 779   | 146  |
| Ideal Flow (vphpl)     | 1900 | 1900  | 1900 | 1900 | 1900  | 1900 |
| Lane Width             | 12   | 12    | 12   | 13   | 12    | 12   |
| Total Lost time (s)    | 12.8 | 5.9   | 5.9  | 5.9  | 5.9   |      |
| Lane Util. Factor      | 1.00 | 1.00  | 0.97 | 1.00 | 0.95  |      |
| Frt                    | 1.00 | 0.85  | 1.00 | 1.00 | 0.98  |      |
| Flt Protected          | 0.95 | 1.00  | 0.95 | 1.00 | 1.00  |      |
| Satd. Flow (prot)      | 1805 | 1583  | 3433 | 1925 | 3455  |      |
| Flt Permitted          | 0.95 | 1.00  | 0.95 | 1.00 | 1.00  |      |
| Satd. Flow (perm)      | 1805 | 1583  | 3433 | 1925 | 3455  |      |
| Peak-hour factor, PHF  | 0.79 | 0.79  | 0.94 | 0.94 | 0.95  | 0.95 |
| Adj. Flow (vph)        | 177  | 534   | 273  | 567  | 820   | 154  |
| RTOR Reduction (vph)   | 0    | 17    | 0    | 0    | 15    | 0    |
| Lane Group Flow (vph)  | 177  | 517   | 273  | 567  | 959   | 0    |
| Heavy Vehicles (%)     | 0%   | 2%    | 2%   | 2%   | 2%    | 2%   |
| Turn Type              | Prot | pm+ov | Prot | NA   | NA    |      |
| Protected Phases       | 4    | 5     | 5    | 2    | 6     |      |
| Permitted Phases       |      | 4     |      |      |       |      |
| Actuated Green, G (s)  | 21.2 | 44.3  | 23.1 | 60.1 | 31.1  |      |
| Effective Green, g (s) | 21.2 | 44.3  | 23.1 | 60.1 | 31.1  |      |
| Actuated g/C Ratio     | 0.21 | 0.44  | 0.23 | 0.60 | 0.31  |      |
| Clearance Time (s)     | 12.8 | 5.9   | 5.9  | 5.9  | 5.9   |      |
| Lane Grp Cap (vph)     | 382  | 794   | 793  | 1156 | 1074  |      |
| v/s Ratio Prot         | 0.10 | c0.15 | 0.08 | 0.29 | c0.28 |      |
| v/s Ratio Perm         |      | 0.18  |      |      |       |      |
| v/c Ratio              | 0.46 | 0.65  | 0.34 | 0.49 | 0.89  |      |
| Uniform Delay, d1      | 34.4 | 21.8  | 32.1 | 11.3 | 32.9  |      |
| Progression Factor     | 1.00 | 1.00  | 1.00 | 1.00 | 1.00  |      |
| Incremental Delay, d2  | 4.0  | 4.1   | 1.2  | 1.5  | 11.3  |      |
| Delay (s)              | 38.4 | 25.9  | 33.3 | 12.8 | 44.2  |      |
| Level of Service       | D    | C     | C    | B    | D     |      |
| Approach Delay (s)     | 29.0 |       |      | 19.4 | 44.2  |      |
| Approach LOS           | C    |       |      | B    | D     |      |














Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 31.7  | HCM 2000 Level of Service | C    |
| HCM 2000 Volume to Capacity ratio | 0.80  |                           |      |
| Actuated Cycle Length (s)         | 100.0 | Sum of lost time (s)      | 24.6 |
| Intersection Capacity Utilization | 62.4% | ICU Level of Service      | B    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group

INTERSECTION 1005: M-72/22/M-22 & M-72  
PM PEAK

ZONE A  
EXISTING W/ MITIGATION

|                                   |  |  |   |  |   |  |
|-----------------------------------|---|---|--|---|--|---|
| Movement                          | EBL   | EBR   | NBL  | NBT   | SBT  | SBR   |
| Lane Configurations               |  |  | <br> |  | <br> |   |
| Volume (vph)                      | 215   | 342   | 392  | 1018  | 894  | 127   |
| Ideal Flow (vphpl)                | 1900  | 1900  | 1900   | 1900  | 1900   | 1900  |
| Lane Width                        | 12  | 12  | 12   | 13  | 12   | 12  |
| Total Lost time (s)               | 12.8  | 5.9   | 5.9  | 5.9   | 5.9  |   |
| Lane Util. Factor                 | 1.00  | 1.00  | 0.97   | 1.00  | 0.95   |   |
| Fr <sub>t</sub>                   | 1.00  | 0.85  | 1.00   | 1.00  | 0.98   |   |
| Fl <sub>t</sub> Protected         | 0.95  | 1.00  | 0.95   | 1.00  | 1.00   |   |
| Satd. Flow (prot)                 | 1770  | 1583  | 3433   | 1925  | 3473   |   |
| Fl <sub>t</sub> Permitted         | 0.95  | 1.00  | 0.95   | 1.00  | 1.00   |   |
| Satd. Flow (perm)                 | 1770  | 1583  | 3433   | 1925  | 3473   |   |
| Peak-hour factor, PHF             | 0.94  | 0.94  | 0.92   | 0.92  | 0.95   | 0.95  |
| Adj. Flow (vph)                   | 229   | 364   | 426  | 1107  | 941  | 134   |
| RTOR Reduction (vph)              | 0   | 22  | 0  | 0   | 11   | 0   |
| Lane Group Flow (vph)             | 229   | 342   | 426  | 1107  | 1064   | 0   |
| Turn Type                         | Prot  | pm+ov   | Prot   | NA  | NA   |   |
| Protected Phases                  | 4   | 5   | 5  | 2   | 6  |   |
| Permitted Phases                  |   | 4   |  |   |  |   |
| Actuated Green, G (s)             | 19.2  | 38.3  | 19.1   | 62.1  | 37.1   |   |
| Effective Green, g (s)            | 19.2  | 38.3  | 19.1   | 62.1  | 37.1   |   |
| Actuated g/C Ratio                | 0.19  | 0.38  | 0.19   | 0.62  | 0.37   |   |
| Clearance Time (s)                | 12.8  | 5.9   | 5.9  | 5.9   | 5.9  |   |
| Lane Grp Cap (vph)                | 339   | 699   | 655  | 1195  | 1288   |   |
| v/s Ratio Prot                    | c0.13   | 0.09  | 0.12   | c0.58   | 0.31   |   |
| v/s Ratio Perm                    |   | 0.12  |  |   |  |   |
| v/c Ratio                         | 0.68  | 0.49  | 0.65   | 0.93  | 0.83   |   |
| Uniform Delay, d <sub>1</sub>     | 37.5  | 23.4  | 37.4   | 16.9  | 28.5   |   |
| Progression Factor                | 1.00  | 1.00  | 1.00   | 1.00  | 1.00   |   |
| Incremental Delay, d <sub>2</sub> | 10.3  | 2.4   | 5.0  | 13.5  | 6.1  |   |
| Delay (s)                         | 47.8  | 25.9  | 42.3   | 30.4  | 34.7   |   |
| Level of Service                  | D   | C   | D  | C   | C  |   |
| Approach Delay (s)                | 34.3  |   |  | 33.7  | 34.7   |   |
| Approach LOS                      | C   |   |  | C   | C  |   |
| <b>Intersection Summary</b>       |   |   |  |   |  |   |
| HCM 2000 Control Delay            |   |   | 34.1   |   | HCM 2000 Level of Service  | C   |
| HCM 2000 Volume to Capacity ratio |   |   | 0.93   |   |  |   |
| Actuated Cycle Length (s)         |   |   | 100.0  |   | Sum of lost time (s)   | 24.6  |
| Intersection Capacity Utilization |   |   | 81.1%  |   | ICU Level of Service   | D   |
| Analysis Period (min)             |   |   | 15   |   |  |   |
| c Critical Lane Group             |   |   |  |   |  |   |

QUEUING REPORT  
AM PEAK

ZONE A  
EXISTING MITIGATED

Intersection: 1005: M-72/22/M-22 & M-72

| Movement              | EB  | EB | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|----|-----|-----|-----|-----|-----|
| Directions Served     | L   | R  | L   | L   | T   | T   | TR  |
| Maximum Queue (ft)    | 40  | 84 | 498 | 451 | 250 | 323 | 334 |
| Average Queue (ft)    | 28  | 36 | 303 | 261 | 127 | 225 | 232 |
| 95th Queue (ft)       | 36  | 58 | 512 | 476 | 219 | 317 | 334 |
| Link Distance (ft)    | 21  | 21 | 929 | 929 | 929 | 310 | 310 |
| Upstream Blk Time (%) | 56  | 30 |     |     |     | 1   | 2   |
| Queuing Penalty (veh) | 164 | 88 |     |     |     | 3   | 7   |
| Storage Bay Dist (ft) |     |    |     |     |     |     |     |
| Storage Blk Time (%)  |     |    |     |     |     |     |     |
| Queuing Penalty (veh) |     |    |     |     |     |     |     |

QUEUING REPORT  
PM PEAK

ZONE A  
EXISTING W/ MITIGATION

Intersection: 1005: M-72/22/M-22 & M-72

| Movement              | EB  | EB | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|----|-----|-----|-----|-----|-----|
| Directions Served     | L   | R  | L   | L   | T   | T   | TR  |
| Maximum Queue (ft)    | 43  | 56 | 255 | 469 | 769 | 318 | 315 |
| Average Queue (ft)    | 28  | 34 | 155 | 227 | 418 | 216 | 220 |
| 95th Queue (ft)       | 36  | 47 | 244 | 446 | 842 | 292 | 300 |
| Link Distance (ft)    | 21  | 21 |     |     | 929 | 310 | 310 |
| Upstream Blk Time (%) | 66  | 32 |     |     | 3   | 0   | 0   |
| Queuing Penalty (veh) | 190 | 91 |     |     | 0   | 1   | 1   |
| Storage Bay Dist (ft) |     |    | 300 | 300 |     |     |     |
| Storage Blk Time (%)  |     |    | 0   | 0   | 13  |     |     |
| Queuing Penalty (veh) |     |    | 0   | 5   | 52  |     |     |



**DETAILED SYNCHRO ANALYSIS  
OF  
PROJECTED 2026 CONDITIONS**



INTERSECTION 1003: M-22 & Cherry Bend Rd/Marina Village Dr  
AM PEAK

ZONE A  
2026 FUTURE



| Movement               | EBL  | EBT   | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT   | SBR  |
|------------------------|------|-------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations    | ↖    | ↗     |      | ↖    | ↗    |      | ↖    | ↗    | ↖    | ↗    | ↖     | ↗    |
| Traffic Volume (vph)   | 8    | 3     | 386  | 14   | 0    | 0    | 149  | 388  | 8    | 0    | 607   | 8    |
| Future Volume (vph)    | 8    | 3     | 386  | 14   | 0    | 0    | 149  | 388  | 8    | 0    | 607   | 8    |
| Ideal Flow (vphpl)     | 1900 | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900  | 1900 |
| Total Lost time (s)    | 6.3  | 6.3   |      | 6.3  |      |      | 5.9  | 5.9  | 5.9  |      | 5.9   | 5.9  |
| Lane Util. Factor      | 1.00 | 1.00  |      | 1.00 |      |      | 1.00 | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Frt                    | 1.00 | 0.85  |      | 1.00 |      |      | 1.00 | 1.00 | 0.85 |      | 1.00  | 0.85 |
| Flt Protected          | 0.95 | 1.00  |      | 0.95 |      |      | 0.95 | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Satd. Flow (prot)      | 1770 | 1585  |      | 1770 |      |      | 1770 | 1863 | 1583 |      | 1863  | 1583 |
| Flt Permitted          | 0.76 | 1.00  |      | 0.37 |      |      | 0.32 | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Satd. Flow (perm)      | 1410 | 1585  |      | 684  |      |      | 598  | 1863 | 1583 |      | 1863  | 1583 |
| Peak-hour factor, PHF  | 0.89 | 0.89  | 0.89 | 0.65 | 0.65 | 0.65 | 0.87 | 0.87 | 0.87 | 0.90 | 0.90  | 0.90 |
| Adj. Flow (vph)        | 9    | 3     | 434  | 22   | 0    | 0    | 171  | 446  | 9    | 0    | 674   | 9    |
| RTOR Reduction (vph)   | 0    | 207   | 0    | 0    | 0    | 0    | 0    | 0    | 3    | 0    | 0     | 3    |
| Lane Group Flow (vph)  | 9    | 230   | 0    | 22   | 0    | 0    | 171  | 446  | 6    | 0    | 674   | 6    |
| Turn Type              | Perm | NA    |      | Perm |      |      | Perm | NA   | Perm | Perm | NA    | Perm |
| Protected Phases       |      | 4     |      |      | 8    |      |      | 2    |      | 6    |       | 6    |
| Permitted Phases       | 4    |       |      | 8    |      |      | 2    |      | 2    | 6    |       | 6    |
| Actuated Green, G (s)  | 10.9 | 10.9  |      | 10.9 |      |      | 36.9 | 36.9 | 36.9 |      | 36.9  | 36.9 |
| Effective Green, g (s) | 10.9 | 10.9  |      | 10.9 |      |      | 36.9 | 36.9 | 36.9 |      | 36.9  | 36.9 |
| Actuated g/C Ratio     | 0.18 | 0.18  |      | 0.18 |      |      | 0.61 | 0.61 | 0.61 |      | 0.61  | 0.61 |
| Clearance Time (s)     | 6.3  | 6.3   |      | 6.3  |      |      | 5.9  | 5.9  | 5.9  |      | 5.9   | 5.9  |
| Vehicle Extension (s)  | 3.0  | 3.0   |      | 3.0  |      |      | 3.0  | 3.0  | 3.0  |      | 3.0   | 3.0  |
| Lane Grp Cap (vph)     | 256  | 287   |      | 124  |      |      | 367  | 1145 | 973  |      | 1145  | 973  |
| v/s Ratio Prot         |      | c0.15 |      |      |      |      |      | 0.24 |      |      | c0.36 |      |
| v/s Ratio Perm         | 0.01 |       |      | 0.03 |      |      | 0.29 |      | 0.00 |      |       | 0.00 |
| v/c Ratio              | 0.04 | 0.80  |      | 0.18 |      |      | 0.47 | 0.39 | 0.01 |      | 0.59  | 0.01 |
| Uniform Delay, d1      | 20.2 | 23.5  |      | 20.8 |      |      | 6.2  | 5.8  | 4.5  |      | 7.0   | 4.5  |
| Progression Factor     | 1.00 | 1.00  |      | 1.00 |      |      | 1.00 | 1.00 | 1.00 |      | 1.00  | 1.00 |
| Incremental Delay, d2  | 0.1  | 14.8  |      | 0.7  |      |      | 4.2  | 1.0  | 0.0  |      | 2.2   | 0.0  |
| Delay (s)              | 20.3 | 38.3  |      | 21.4 |      |      | 10.4 | 6.8  | 4.5  |      | 9.2   | 4.5  |
| Level of Service       | C    | D     |      | C    |      |      | B    | A    | A    |      | A     | A    |
| Approach Delay (s)     |      | 37.9  |      |      | 21.4 |      |      | 7.8  |      |      | 9.1   |      |
| Approach LOS           |      | D     |      |      | C    |      |      | A    |      |      | A     |      |

Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 16.0  | HCM 2000 Level of Service | B    |
| HCM 2000 Volume to Capacity ratio | 0.64  |                           |      |
| Actuated Cycle Length (s)         | 60.0  | Sum of lost time (s)      | 12.2 |
| Intersection Capacity Utilization | 79.4% | ICU Level of Service      | D    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group

INTERSECTION 1005: M-72/22/M-22 & M-72  
AM PEAK

ZONE A  
2026 FUTURE



| Movement               | EBL  | EBR   | NBL   | NBT  | SBT   | SBR  |
|------------------------|------|-------|-------|------|-------|------|
| Lane Configurations    |      |       |       |      |       |      |
| Traffic Volume (vph)   | 171  | 492   | 299   | 666  | 996   | 189  |
| Future Volume (vph)    | 171  | 492   | 299   | 666  | 996   | 189  |
| Ideal Flow (vphpl)     | 1900 | 1900  | 1900  | 1900 | 1900  | 1900 |
| Lane Width             | 12   | 12    | 12    | 13   | 12    | 12   |
| Total Lost time (s)    | 12.8 | 5.9   | 5.9   | 5.9  | 5.9   |      |
| Lane Util. Factor      | 1.00 | 1.00  | 1.00  | 1.00 | 0.95  |      |
| Frt                    | 1.00 | 0.85  | 1.00  | 1.00 | 0.98  |      |
| Flt Protected          | 0.95 | 1.00  | 0.95  | 1.00 | 1.00  |      |
| Satd. Flow (prot)      | 1770 | 1583  | 1770  | 1925 | 3454  |      |
| Flt Permitted          | 0.95 | 1.00  | 0.95  | 1.00 | 1.00  |      |
| Satd. Flow (perm)      | 1770 | 1583  | 1770  | 1925 | 3454  |      |
| Peak-hour factor, PHF  | 0.79 | 0.79  | 0.94  | 0.94 | 0.95  | 0.95 |
| Adj. Flow (vph)        | 216  | 623   | 318   | 709  | 1048  | 199  |
| RTOR Reduction (vph)   | 0    | 2     | 0     | 0    | 16    | 0    |
| Lane Group Flow (vph)  | 216  | 621   | 318   | 709  | 1231  | 0    |
| Turn Type              | Prot | pm+ov | Prot  | NA   | NA    |      |
| Protected Phases       | 4    | 5     | 5     | 2    | 6     |      |
| Permitted Phases       |      | 4     |       |      |       |      |
| Actuated Green, G (s)  | 34.2 | 49.3  | 15.1  | 47.1 | 26.1  |      |
| Effective Green, g (s) | 34.2 | 49.3  | 15.1  | 47.1 | 26.1  |      |
| Actuated g/C Ratio     | 0.34 | 0.49  | 0.15  | 0.47 | 0.26  |      |
| Clearance Time (s)     | 12.8 | 5.9   | 5.9   | 5.9  | 5.9   |      |
| Lane Grp Cap (vph)     | 605  | 873   | 267   | 906  | 901   |      |
| v/s Ratio Prot         | 0.12 | c0.11 | c0.18 | 0.37 | c0.36 |      |
| v/s Ratio Perm         |      | 0.28  |       |      |       |      |
| v/c Ratio              | 0.36 | 0.71  | 1.19  | 0.78 | 1.37  |      |
| Uniform Delay, d1      | 24.7 | 19.8  | 42.5  | 22.2 | 37.0  |      |
| Progression Factor     | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  |      |
| Incremental Delay, d2  | 1.6  | 4.9   | 116.9 | 6.7  | 172.2 |      |
| Delay (s)              | 26.3 | 24.7  | 159.3 | 28.9 | 209.1 |      |
| Level of Service       | C    | C     | F     | C    | F     |      |
| Approach Delay (s)     | 25.1 |       |       | 69.3 | 209.1 |      |
| Approach LOS           | C    |       |       | E    | F     |      |

Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 113.4 | HCM 2000 Level of Service | F    |
| HCM 2000 Volume to Capacity ratio | 1.06  |                           |      |
| Actuated Cycle Length (s)         | 100.0 | Sum of lost time (s)      | 24.6 |
| Intersection Capacity Utilization | 80.1% | ICU Level of Service      | D    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group

INTERSECTION 9002: M-22 & Grandview Rd/marina entry  
AM PEAK

ZONE A  
2026 FUTURE



| Movement                          | EBL         | EBT         | EBR         | WBL         | WBT                  | WBR  | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|------|-------|------|------|-------|------|
| Lane Configurations               |             | ↔           |             |             |                      |      | ↔    | ↔     |      | ↔    | ↔     |      |
| Traffic Volume (veh/h)            | 26          | 2           | 89          | 2           | 0                    | 0    | 28   | 567   | 28   | 1    | 975   | 30   |
| Future Volume (Veh/h)             | 26          | 2           | 89          | 2           | 0                    | 0    | 28   | 567   | 28   | 1    | 975   | 30   |
| Sign Control                      |             | Stop        |             |             | Stop                 |      |      | Free  |      |      | Free  |      |
| Grade                             |             | 0%          |             |             | 0%                   |      |      | 0%    |      |      | 0%    |      |
| Peak Hour Factor                  | 0.79        | 0.79        | 0.79        | 0.92        | 0.92                 | 0.92 | 0.88 | 0.88  | 0.88 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)            | 33          | 3           | 113         | 2           | 0                    | 0    | 32   | 644   | 32   | 1    | 1083  | 33   |
| Pedestrians                       |             |             |             |             |                      |      |      |       |      |      |       |      |
| Lane Width (ft)                   |             |             |             |             |                      |      |      |       |      |      |       |      |
| Walking Speed (ft/s)              |             |             |             |             |                      |      |      |       |      |      |       |      |
| Percent Blockage                  |             |             |             |             |                      |      |      |       |      |      |       |      |
| Right turn flare (veh)            |             |             |             |             |                      |      |      |       |      |      |       |      |
| Median type                       |             |             |             |             |                      |      |      | TWLTL |      |      | TWLTL |      |
| Median storage veh                |             |             |             |             |                      |      |      | 2     |      |      | 2     |      |
| Upstream signal (ft)              |             |             |             |             |                      |      |      |       |      |      |       |      |
| pX, platoon unblocked             |             |             |             |             |                      |      |      |       |      |      |       |      |
| vC, conflicting volume            | 1810        | 1842        | 1100        | 1924        | 1842                 | 660  | 1116 |       |      | 676  |       |      |
| vC1, stage 1 conf vol             | 1102        | 1102        |             | 724         | 724                  |      |      |       |      |      |       |      |
| vC2, stage 2 conf vol             | 708         | 740         |             | 1200        | 1118                 |      |      |       |      |      |       |      |
| vCu, unblocked vol                | 1810        | 1842        | 1100        | 1924        | 1842                 | 660  | 1116 |       |      | 676  |       |      |
| tC, single (s)                    | 7.1         | 6.5         | 6.2         | 7.1         | 6.5                  | 6.2  | 4.1  |       |      | 4.1  |       |      |
| tC, 2 stage (s)                   | 6.1         | 5.5         |             | 6.1         | 5.5                  |      |      |       |      |      |       |      |
| tF (s)                            | 3.5         | 4.0         | 3.3         | 3.5         | 4.0                  | 3.3  | 2.2  |       |      | 2.2  |       |      |
| p0 queue free %                   | 85          | 99          | 56          | 98          | 100                  | 100  | 95   |       |      | 100  |       |      |
| cM capacity (veh/h)               | 217         | 237         | 258         | 90          | 217                  | 463  | 626  |       |      | 915  |       |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>NB 1</b> | <b>NB 2</b> | <b>SB 1</b> | <b>SB 2</b>          |      |      |       |      |      |       |      |
| Volume Total                      | 149         | 32          | 676         | 1           | 1116                 |      |      |       |      |      |       |      |
| Volume Left                       | 33          | 32          | 0           | 1           | 0                    |      |      |       |      |      |       |      |
| Volume Right                      | 113         | 0           | 32          | 0           | 33                   |      |      |       |      |      |       |      |
| cSH                               | 247         | 626         | 1700        | 915         | 1700                 |      |      |       |      |      |       |      |
| Volume to Capacity                | 0.60        | 0.05        | 0.40        | 0.00        | 0.66                 |      |      |       |      |      |       |      |
| Queue Length 95th (ft)            | 88          | 4           | 0           | 0           | 0                    |      |      |       |      |      |       |      |
| Control Delay (s)                 | 39.4        | 11.1        | 0.0         | 8.9         | 0.0                  |      |      |       |      |      |       |      |
| Lane LOS                          | E           | B           |             | A           |                      |      |      |       |      |      |       |      |
| Approach Delay (s)                | 39.4        | 0.5         |             | 0.0         |                      |      |      |       |      |      |       |      |
| Approach LOS                      | E           |             |             |             |                      |      |      |       |      |      |       |      |
| <b>Intersection Summary</b>       |             |             |             |             |                      |      |      |       |      |      |       |      |
| Average Delay                     |             |             |             | Err         |                      |      |      |       |      |      |       |      |
| Intersection Capacity Utilization |             |             |             | Err%        | ICU Level of Service |      |      |       |      | H    |       |      |
| Analysis Period (min)             |             |             |             | 15          |                      |      |      |       |      |      |       |      |

INTERSECTION 9003: M-22 & Brewery Creek/museum dr  
AM PEAK

ZONE A  
2026 FUTURE



| Movement               | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations    |      |      |      |      |      |      |      |      |      |      |      |      |
| Traffic Volume (veh/h) | 48   | 0    | 66   | 0    | 0    | 1    | 45   | 614  | 1    | 1    | 1059 | 31   |
| Future Volume (Veh/h)  | 48   | 0    | 66   | 0    | 0    | 1    | 45   | 614  | 1    | 1    | 1059 | 31   |
| Sign Control           |      | Stop |      |      | Stop |      |      | Free |      |      | Free |      |
| Grade                  |      | 0%   |      |      | 0%   |      |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor       | 0.75 | 0.75 | 0.75 | 0.65 | 0.65 | 0.65 | 0.91 | 0.91 | 0.91 | 0.93 | 0.93 | 0.93 |
| Hourly flow rate (vph) | 64   | 0    | 88   | 0    | 0    | 2    | 49   | 675  | 1    | 1    | 1139 | 33   |
| Pedestrians            |      |      |      |      |      |      |      |      |      |      |      |      |
| Lane Width (ft)        |      |      |      |      |      |      |      |      |      |      |      |      |
| Walking Speed (ft/s)   |      |      |      |      |      |      |      |      |      |      |      |      |
| Percent Blockage       |      |      |      |      |      |      |      |      |      |      |      |      |
| Right turn flare (veh) |      |      |      |      |      |      |      |      |      |      |      |      |
| Median type            |      |      |      |      |      |      |      |      |      |      |      |      |
| Median storage veh     |      |      |      |      |      |      |      |      |      |      |      |      |
| Upstream signal (ft)   |      |      |      |      |      |      |      |      |      |      |      |      |
| pX, platoon unblocked  |      |      |      |      |      |      |      |      |      |      |      |      |
| vC, conflicting volume | 1932 | 1932 | 1156 | 2002 | 1948 | 676  | 1172 |      |      | 676  |      |      |
| vC1, stage 1 conf vol  | 1158 | 1158 |      | 774  | 774  |      |      |      |      |      |      |      |
| vC2, stage 2 conf vol  | 775  | 774  |      | 1229 | 1174 |      |      |      |      |      |      |      |
| vCu, unblocked vol     | 1932 | 1932 | 1156 | 2002 | 1948 | 676  | 1172 |      |      | 676  |      |      |
| tC, single (s)         | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)        | 6.1  | 5.5  |      | 6.1  | 5.5  |      |      |      |      |      |      |      |
| tF (s)                 | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %        | 67   | 100  | 63   | 100  | 100  | 100  | 92   |      |      | 100  |      |      |
| cM capacity (veh/h)    | 197  | 221  | 239  | 85   | 189  | 454  | 596  |      |      | 915  |      |      |

| Direction, Lane #      | EB 1 | EB 2 | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|------------------------|------|------|------|------|------|------|------|
| Volume Total           | 64   | 88   | 2    | 49   | 676  | 1    | 1172 |
| Volume Left            | 64   | 0    | 0    | 49   | 0    | 1    | 0    |
| Volume Right           | 0    | 88   | 2    | 0    | 1    | 0    | 33   |
| cSH                    | 197  | 239  | 454  | 596  | 1700 | 915  | 1700 |
| Volume to Capacity     | 0.33 | 0.37 | 0.00 | 0.08 | 0.40 | 0.00 | 0.69 |
| Queue Length 95th (ft) | 33   | 40   | 0    | 7    | 0    | 0    | 0    |
| Control Delay (s)      | 31.8 | 28.5 | 13.0 | 11.6 | 0.0  | 8.9  | 0.0  |
| Lane LOS               | D    | D    | B    | B    |      | A    |      |
| Approach Delay (s)     | 29.9 |      | 13.0 | 0.8  |      | 0.0  |      |
| Approach LOS           | D    |      | B    |      |      |      |      |

| Intersection Summary              |       |     |                        |
|-----------------------------------|-------|-----|------------------------|
| Average Delay                     |       | 2.5 |                        |
| Intersection Capacity Utilization | 73.6% |     | ICU Level of Service D |
| Analysis Period (min)             | 15    |     |                        |



INTERSECTION 9004: M-22 & Carter Rd  
AM PEAK

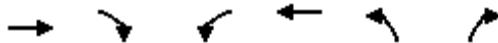
ZONE A  
2026 FUTURE



| Movement                          | EBL  | EBR  | NBL   | NBT                  | SBT  | SBR  |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Lane Configurations               |      |      |       |                      |      |      |
| Traffic Volume (veh/h)            | 12   | 58   | 29    | 666                  | 1117 | 24   |
| Future Volume (Veh/h)             | 12   | 58   | 29    | 666                  | 1117 | 24   |
| Sign Control                      | Stop |      |       | Free                 | Free |      |
| Grade                             | 0%   |      |       | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.88 | 0.88 | 0.93  | 0.93                 | 0.95 | 0.95 |
| Hourly flow rate (vph)            | 14   | 66   | 31    | 716                  | 1176 | 25   |
| Pedestrians                       |      |      |       |                      |      |      |
| Lane Width (ft)                   |      |      |       |                      |      |      |
| Walking Speed (ft/s)              |      |      |       |                      |      |      |
| Percent Blockage                  |      |      |       |                      |      |      |
| Right turn flare (veh)            |      |      |       |                      |      |      |
| Median type                       |      |      |       |                      |      |      |
| TWLTL TWLTL                       |      |      |       |                      |      |      |
| Median storage veh                |      |      |       |                      |      |      |
| 2 2                               |      |      |       |                      |      |      |
| Upstream signal (ft)              |      |      |       |                      |      |      |
| pX, platoon unblocked             |      |      |       |                      |      |      |
| vC, conflicting volume            | 1966 | 1188 | 1201  |                      |      |      |
| vC1, stage 1 conf vol             | 1188 |      |       |                      |      |      |
| vC2, stage 2 conf vol             | 778  |      |       |                      |      |      |
| vCu, unblocked vol                | 1966 | 1188 | 1201  |                      |      |      |
| tC, single (s)                    | 6.4  | 6.2  | 4.1   |                      |      |      |
| tC, 2 stage (s)                   | 5.4  |      |       |                      |      |      |
| tF (s)                            | 3.5  | 3.3  | 2.2   |                      |      |      |
| p0 queue free %                   | 94   | 71   | 95    |                      |      |      |
| cM capacity (veh/h)               | 240  | 228  | 581   |                      |      |      |
| Direction, Lane #                 | EB 1 | NB 1 | NB 2  | SB 1                 |      |      |
| Volume Total                      | 80   | 31   | 716   | 1201                 |      |      |
| Volume Left                       | 14   | 31   | 0     | 0                    |      |      |
| Volume Right                      | 66   | 0    | 0     | 25                   |      |      |
| cSH                               | 230  | 581  | 1700  | 1700                 |      |      |
| Volume to Capacity                | 0.35 | 0.05 | 0.42  | 0.71                 |      |      |
| Queue Length 95th (ft)            | 37   | 4    | 0     | 0                    |      |      |
| Control Delay (s)                 | 28.8 | 11.5 | 0.0   | 0.0                  |      |      |
| Lane LOS                          | D    | B    |       |                      |      |      |
| Approach Delay (s)                | 28.8 | 0.5  |       | 0.0                  |      |      |
| Approach LOS                      | D    |      |       |                      |      |      |
| Intersection Summary              |      |      |       |                      |      |      |
| Average Delay                     |      |      | 1.3   |                      |      |      |
| Intersection Capacity Utilization |      |      | 71.2% | ICU Level of Service | C    |      |
| Analysis Period (min)             |      |      | 15    |                      |      |      |

INTERSECTION 9006: BAY ST & M-72  
AM PEAK

ZONE A  
2026 FUTURE



| Movement                          | EBT  | EBR  | WBL   | WBT                  | NBL  | NBR  |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Lane Configurations               | ↑↑   |      |       | ↑↑                   | ↘    | ↗    |
| Traffic Volume (veh/h)            | 573  | 63   | 165   | 323                  | 38   | 90   |
| Future Volume (Veh/h)             | 573  | 63   | 165   | 323                  | 38   | 90   |
| Sign Control                      | Free |      |       | Free                 | Stop |      |
| Grade                             | 0%   |      |       | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.79 | 0.79 | 0.95  | 0.95                 | 0.86 | 0.86 |
| Hourly flow rate (vph)            | 725  | 80   | 174   | 340                  | 44   | 105  |
| Pedestrians                       |      |      |       |                      |      |      |
| Lane Width (ft)                   |      |      |       |                      |      |      |
| Walking Speed (ft/s)              |      |      |       |                      |      |      |
| Percent Blockage                  |      |      |       |                      |      |      |
| Right turn flare (veh)            |      |      |       |                      |      | 4    |
| Median type                       | None |      | None  |                      |      |      |
| Median storage (veh)              |      |      |       |                      |      |      |
| Upstream signal (ft)              | 99   |      |       |                      |      |      |
| pX, platoon unblocked             |      |      |       |                      |      |      |
| vC, conflicting volume            |      |      | 805   |                      | 1283 | 402  |
| vC1, stage 1 conf vol             |      |      |       |                      |      |      |
| vC2, stage 2 conf vol             |      |      |       |                      |      |      |
| vCu, unblocked vol                |      |      | 805   |                      | 1283 | 402  |
| tC, single (s)                    |      |      | 4.1   |                      | 6.8  | 6.9  |
| tC, 2 stage (s)                   |      |      |       |                      |      |      |
| tF (s)                            |      |      | 2.2   |                      | 3.5  | 3.3  |
| p0 queue free %                   |      |      | 79    |                      | 64   | 82   |
| cM capacity (veh/h)               |      |      | 815   |                      | 123  | 597  |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | WB 2                 | NB 1 |      |
| Volume Total                      | 483  | 322  | 287   | 227                  | 149  |      |
| Volume Left                       | 0    | 0    | 174   | 0                    | 44   |      |
| Volume Right                      | 0    | 80   | 0     | 0                    | 105  |      |
| cSH                               | 1700 | 1700 | 815   | 1700                 | 418  |      |
| Volume to Capacity                | 0.28 | 0.19 | 0.21  | 0.13                 | 0.36 |      |
| Queue Length 95th (ft)            | 0    | 0    | 20    | 0                    | 40   |      |
| Control Delay (s)                 | 0.0  | 0.0  | 7.4   | 0.0                  | 23.3 |      |
| Lane LOS                          | A    |      |       | C                    |      |      |
| Approach Delay (s)                | 0.0  |      | 4.1   |                      | 23.3 |      |
| Approach LOS                      |      |      |       |                      |      | C    |
| Intersection Summary              |      |      |       |                      |      |      |
| Average Delay                     |      |      | 3.8   |                      |      |      |
| Intersection Capacity Utilization |      |      | 44.9% | ICU Level of Service | A    |      |
| Analysis Period (min)             |      |      | 15    |                      |      |      |

INTERSECTION 1003: M-22 & Cherry Bend Rd/Marina Village Dr  
PM PEAK

ZONE A  
2026 FUTURE



| Movement               | EBL  | EBT  | EBR  | WBL   | WBT  | WBR  | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
|------------------------|------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations    |      |      |      |       |      |      |       |      |      |      |      |      |
| Traffic Volume (vph)   | 21   | 6    | 329  | 56    | 8    | 5    | 300   | 711  | 59   | 2    | 679  | 12   |
| Future Volume (vph)    | 21   | 6    | 329  | 56    | 8    | 5    | 300   | 711  | 59   | 2    | 679  | 12   |
| Ideal Flow (vphpl)     | 1900 | 1900 | 1900 | 1900  | 1900 | 1900 | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s)    | 6.3  | 6.3  |      | 6.3   | 6.3  |      | 5.9   | 5.9  | 5.9  | 5.9  | 5.9  | 5.9  |
| Lane Util. Factor      | 1.00 | 1.00 |      | 1.00  | 1.00 |      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt                    | 1.00 | 0.85 |      | 1.00  | 0.94 |      | 1.00  | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected          | 0.95 | 1.00 |      | 0.95  | 1.00 |      | 0.95  | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot)      | 1770 | 1589 |      | 1770  | 1758 |      | 1770  | 1863 | 1583 | 1770 | 1863 | 1583 |
| Flt Permitted          | 0.75 | 1.00 |      | 0.34  | 1.00 |      | 0.31  | 1.00 | 1.00 | 0.26 | 1.00 | 1.00 |
| Satd. Flow (perm)      | 1392 | 1589 |      | 626   | 1758 |      | 573   | 1863 | 1583 | 490  | 1863 | 1583 |
| Peak-hour factor, PHF  | 0.89 | 0.89 | 0.89 | 0.82  | 0.82 | 0.82 | 0.90  | 0.90 | 0.90 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph)        | 24   | 7    | 370  | 68    | 10   | 6    | 333   | 790  | 66   | 2    | 715  | 13   |
| RTOR Reduction (vph)   | 0    | 206  | 0    | 0     | 5    | 0    | 0     | 0    | 23   | 0    | 0    | 4    |
| Lane Group Flow (vph)  | 24   | 171  | 0    | 68    | 11   | 0    | 333   | 790  | 43   | 2    | 715  | 9    |
| Turn Type              | Perm | NA   |      | Perm  | NA   |      | Perm  | NA   | Perm | Perm | NA   | Perm |
| Protected Phases       |      | 4    |      |       | 8    |      |       | 2    |      | 6    |      | 6    |
| Permitted Phases       | 4    |      |      | 8     |      |      | 2     |      | 2    | 6    |      | 6    |
| Actuated Green, G (s)  | 11.9 | 11.9 |      | 11.9  | 11.9 |      | 45.9  | 45.9 | 45.9 | 45.9 | 45.9 | 45.9 |
| Effective Green, g (s) | 11.9 | 11.9 |      | 11.9  | 11.9 |      | 45.9  | 45.9 | 45.9 | 45.9 | 45.9 | 45.9 |
| Actuated g/C Ratio     | 0.17 | 0.17 |      | 0.17  | 0.17 |      | 0.66  | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |
| Clearance Time (s)     | 6.3  | 6.3  |      | 6.3   | 6.3  |      | 5.9   | 5.9  | 5.9  | 5.9  | 5.9  | 5.9  |
| Vehicle Extension (s)  | 3.0  | 3.0  |      | 3.0   | 3.0  |      | 3.0   | 3.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Lane Grp Cap (vph)     | 236  | 270  |      | 106   | 298  |      | 375   | 1221 | 1037 | 321  | 1221 | 1037 |
| v/s Ratio Prot         |      | 0.11 |      |       | 0.01 |      |       | 0.42 |      |      | 0.38 |      |
| v/s Ratio Perm         | 0.02 |      |      | c0.11 |      |      | c0.58 |      | 0.03 | 0.00 |      | 0.01 |
| v/c Ratio              | 0.10 | 0.63 |      | 0.64  | 0.04 |      | 0.89  | 0.65 | 0.04 | 0.01 | 0.59 | 0.01 |
| Uniform Delay, d1      | 24.5 | 27.0 |      | 27.1  | 24.3 |      | 9.9   | 7.2  | 4.3  | 4.2  | 6.7  | 4.2  |
| Progression Factor     | 1.00 | 1.00 |      | 1.00  | 1.00 |      | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2  | 0.2  | 4.8  |      | 12.5  | 0.1  |      | 25.3  | 2.7  | 0.1  | 0.0  | 2.1  | 0.0  |
| Delay (s)              | 24.7 | 31.8 |      | 39.6  | 24.3 |      | 35.3  | 9.9  | 4.3  | 4.2  | 8.8  | 4.2  |
| Level of Service       | C    | C    |      | D     | C    |      | D     | A    | A    | A    | A    | A    |
| Approach Delay (s)     |      | 31.4 |      |       | 36.7 |      |       | 16.7 |      |      | 8.7  |      |
| Approach LOS           |      | C    |      |       | D    |      |       | B    |      |      | A    |      |

Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 17.4  | HCM 2000 Level of Service | B    |
| HCM 2000 Volume to Capacity ratio | 0.84  |                           |      |
| Actuated Cycle Length (s)         | 70.0  | Sum of lost time (s)      | 12.2 |
| Intersection Capacity Utilization | 99.2% | ICU Level of Service      | F    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group

INTERSECTION 1005: M-72/22/M-22 & M-72  
PM PEAK

ZONE A  
2026 FUTURE



| Movement               | EBL   | EBR   | NBL   | NBT   | SBT  | SBR  |
|------------------------|-------|-------|-------|-------|------|------|
| Lane Configurations    |       |       |       |       |      |      |
| Traffic Volume (vph)   | 289   | 398   | 457   | 1355  | 1194 | 184  |
| Future Volume (vph)    | 289   | 398   | 457   | 1355  | 1194 | 184  |
| Ideal Flow (vphpl)     | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |
| Lane Width             | 12    | 12    | 12    | 13    | 12   | 12   |
| Total Lost time (s)    | 12.8  | 5.9   | 5.9   | 5.9   | 5.9  |      |
| Lane Util. Factor      | 1.00  | 1.00  | 1.00  | 1.00  | 0.95 |      |
| Frt                    | 1.00  | 0.85  | 1.00  | 1.00  | 0.98 |      |
| Flt Protected          | 0.95  | 1.00  | 0.95  | 1.00  | 1.00 |      |
| Satd. Flow (prot)      | 1770  | 1583  | 1770  | 1925  | 3468 |      |
| Flt Permitted          | 0.95  | 1.00  | 0.95  | 1.00  | 1.00 |      |
| Satd. Flow (perm)      | 1770  | 1583  | 1770  | 1925  | 3468 |      |
| Peak-hour factor, PHF  | 0.94  | 0.94  | 0.92  | 0.92  | 0.95 | 0.95 |
| Adj. Flow (vph)        | 307   | 423   | 497   | 1473  | 1257 | 194  |
| RTOR Reduction (vph)   | 0     | 6     | 0     | 0     | 12   | 0    |
| Lane Group Flow (vph)  | 307   | 417   | 497   | 1473  | 1439 | 0    |
| Turn Type              | Prot  | pm+ov | Prot  | NA    | NA   |      |
| Protected Phases       | 4     | 5     | 5     | 2     | 6    |      |
| Permitted Phases       |       | 4     |       |       |      |      |
| Actuated Green, G (s)  | 17.2  | 38.3  | 21.1  | 64.1  | 37.1 |      |
| Effective Green, g (s) | 17.2  | 38.3  | 21.1  | 64.1  | 37.1 |      |
| Actuated g/C Ratio     | 0.17  | 0.38  | 0.21  | 0.64  | 0.37 |      |
| Clearance Time (s)     | 12.8  | 5.9   | 5.9   | 5.9   | 5.9  |      |
| Lane Grp Cap (vph)     | 304   | 699   | 373   | 1233  | 1286 |      |
| v/s Ratio Prot         | c0.17 | 0.13  | 0.28  | c0.77 | 0.41 |      |
| v/s Ratio Perm         |       | 0.14  |       |       |      |      |
| v/c Ratio              | 1.01  | 0.60  | 1.33  | 1.19  | 1.12 |      |
| Uniform Delay, d1      | 41.4  | 24.7  | 39.5  | 18.0  | 31.4 |      |
| Progression Factor     | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |      |
| Incremental Delay, d2  | 54.1  | 3.7   | 166.9 | 95.8  | 64.5 |      |
| Delay (s)              | 95.5  | 28.4  | 206.4 | 113.7 | 95.9 |      |
| Level of Service       | F     | C     | F     | F     | F    |      |
| Approach Delay (s)     | 56.6  |       |       | 137.1 | 95.9 |      |
| Approach LOS           | E     |       |       | F     | F    |      |



















Intersection Summary

|                                   |        |                           |      |
|-----------------------------------|--------|---------------------------|------|
| HCM 2000 Control Delay            | 108.6  | HCM 2000 Level of Service | F    |
| HCM 2000 Volume to Capacity ratio | 1.24   |                           |      |
| Actuated Cycle Length (s)         | 100.0  | Sum of lost time (s)      | 24.6 |
| Intersection Capacity Utilization | 102.9% | ICU Level of Service      | G    |
| Analysis Period (min)             | 15     |                           |      |

c Critical Lane Group

INTERSECTION 9002: M-22 & Grandview Rd/marina entry  
PM PEAK

ZONE A  
2026 FUTURE

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement                          | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations               |   |  |   |   |   |   |  |  |   |  |  |  |
| Traffic Volume (veh/h)            | 24  | 1   | 112   | 8   | 0   | 13  | 142   | 1100  | 30  | 6   | 1050  | 41  |
| Future Volume (Veh/h)             | 24  | 1   | 112   | 8   | 0   | 13  | 142   | 1100  | 30  | 6   | 1050  | 41  |
| Sign Control                      |   | Stop  |   |   | Stop  |   |   | Free  |   |   | Free  |   |
| Grade                             |   | 0%  |   |   | 0%  |   |   | 0%  |   |   | 0%  |   |
| Peak Hour Factor                  | 0.82  | 0.82  | 0.82  | 0.92  | 0.92  | 0.92  | 0.95  | 0.95  | 0.95  | 0.95  | 0.95  | 0.95  |
| Hourly flow rate (vph)            | 29  | 1   | 137   | 9   | 0   | 14  | 149   | 1158  | 32  | 6   | 1105  | 43  |
| Pedestrians                       |   |   |   |   |   |   |   |   |   |   |   |   |
| Lane Width (ft)                   |   |   |   |   |   |   |   |   |   |   |   |   |
| Walking Speed (ft/s)              |   |   |   |   |   |   |   |   |   |   |   |   |
| Percent Blockage                  |   |   |   |   |   |   |   |   |   |   |   |   |
| Right turn flare (veh)            |   |   |   |   |   |   |   |   |   |   |   |   |
| Median type                       |   |   |   |   |   |   |   | TWLTL   |   |   | TWLTL   |   |
| Median storage veh                |   |   |   |   |   |   |   | 2   |   |   | 2   |   |
| Upstream signal (ft)              |   |   |   |   |   |   |   |   |   |   |   |   |
| pX, platoon unblocked             |   |   |   |   |   |   |   |   |   |   |   |   |
| vC, conflicting volume            | 2608  | 2626  | 1126  | 2726  | 2632  | 1174  | 1148  |   |   | 1190  |   |   |
| vC1, stage 1 conf vol             | 1138  | 1138  |   | 1472  | 1472  |   |   |   |   |   |   |   |
| vC2, stage 2 conf vol             | 1470  | 1488  |   | 1254  | 1160  |   |   |   |   |   |   |   |
| vCu, unblocked vol                | 2608  | 2626  | 1126  | 2726  | 2632  | 1174  | 1148  |   |   | 1190  |   |   |
| tC, single (s)                    | 7.1   | 6.5   | 6.2   | 7.1   | 6.5   | 6.2   | 4.1   |   |   | 4.1   |   |   |
| tC, 2 stage (s)                   | 6.1   | 5.5   |   | 6.1   | 5.5   |   |   |   |   |   |   |   |
| tF (s)                            | 3.5   | 4.0   | 3.3   | 3.5   | 4.0   | 3.3   | 2.2   |   |   | 2.2   |   |   |
| p0 queue free %                   | 69  | 99  | 45  | 0   | 100   | 94  | 76  |   |   | 99  |   |   |
| cM capacity (veh/h)               | 94  | 118   | 249   | 5   | 90  | 234   | 609   |   |   | 587   |   |   |
| <b>Direction, Lane #</b>          | <b>EB 1</b>   | <b>NB 1</b>   | <b>NB 2</b>   | <b>SB 1</b>   | <b>SB 2</b>   |   |   |   |   |   |   |   |
| Volume Total                      | 167   | 149   | 1190  | 6   | 1148  |   |   |   |   |   |   |   |
| Volume Left                       | 29  | 149   | 0   | 6   | 0   |   |   |   |   |   |   |   |
| Volume Right                      | 137   | 0   | 32  | 0   | 43  |   |   |   |   |   |   |   |
| cSH                               | 193   | 609   | 1700  | 587   | 1700  |   |   |   |   |   |   |   |
| Volume to Capacity                | 0.87  | 0.24  | 0.70  | 0.01  | 0.68  |   |   |   |   |   |   |   |
| Queue Length 95th (ft)            | 162   | 24  | 0   | 1   | 0   |   |   |   |   |   |   |   |
| Control Delay (s)                 | 84.1  | 12.8  | 0.0   | 11.2  | 0.0   |   |   |   |   |   |   |   |
| Lane LOS                          | F   | B   |   | B   |   |   |   |   |   |   |   |   |
| Approach Delay (s)                | 84.1  | 1.4   |   | 0.1   |   |   |   |   |   |   |   |   |
| Approach LOS                      | F   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Intersection Summary</b>       |   |   |   |   |   |   |   |   |   |   |   |   |
| Average Delay                     |   |   |   | Err   |   |   |   |   |   |   |   |   |
| Intersection Capacity Utilization |   |   |   | Err%  | ICU Level of Service  |   |   |   |   | H   |   |   |
| Analysis Period (min)             |   |   |   | 15  |   |   |   |   |   |   |   |   |

INTERSECTION 9003: M-22 & Brewery Creek/museum dr  
PM PEAK

ZONE A  
2026 FUTURE



| Movement               | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL   | NBT  | NBR  | SBL   | SBT  | SBR  |
|------------------------|------|------|------|------|------|------|-------|------|------|-------|------|------|
| Lane Configurations    |      |      |      |      |      |      |       |      |      |       |      |      |
| Traffic Volume (veh/h) | 137  | 0    | 191  | 13   | 0    | 7    | 193   | 1179 | 34   | 12    | 1064 | 149  |
| Future Volume (Veh/h)  | 137  | 0    | 191  | 13   | 0    | 7    | 193   | 1179 | 34   | 12    | 1064 | 149  |
| Sign Control           |      | Stop |      |      | Stop |      |       | Free |      |       | Free |      |
| Grade                  |      | 0%   |      |      | 0%   |      |       | 0%   |      |       | 0%   |      |
| Peak Hour Factor       | 0.65 | 0.65 | 0.65 | 0.71 | 0.71 | 0.71 | 0.95  | 0.95 | 0.95 | 0.95  | 0.95 | 0.95 |
| Hourly flow rate (vph) | 211  | 0    | 294  | 18   | 0    | 10   | 203   | 1241 | 36   | 13    | 1120 | 157  |
| Pedestrians            |      |      |      |      |      |      |       |      |      |       |      |      |
| Lane Width (ft)        |      |      |      |      |      |      |       |      |      |       |      |      |
| Walking Speed (ft/s)   |      |      |      |      |      |      |       |      |      |       |      |      |
| Percent Blockage       |      |      |      |      |      |      |       |      |      |       |      |      |
| Right turn flare (veh) |      |      |      |      |      |      |       |      |      |       |      |      |
| Median type            |      |      |      |      |      |      | TWLTL |      |      | TWLTL |      |      |
| Median storage veh     |      |      |      |      |      |      | 2     |      |      | 2     |      |      |
| Upstream signal (ft)   |      |      |      |      |      |      |       |      |      |       |      |      |
| pX, platoon unblocked  |      |      |      |      |      |      |       |      |      |       |      |      |
| vC, conflicting volume | 2803 | 2829 | 1120 | 3105 | 2968 | 1259 | 1277  |      |      | 1277  |      |      |
| vC1, stage 1 conf vol  | 1146 | 1146 |      | 1665 | 1665 |      |       |      |      |       |      |      |
| vC2, stage 2 conf vol  | 1657 | 1683 |      | 1440 | 1303 |      |       |      |      |       |      |      |
| vCu, unblocked vol     | 2803 | 2829 | 1120 | 3105 | 2968 | 1259 | 1277  |      |      | 1277  |      |      |
| tC, single (s)         | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  | 4.1   |      |      | 4.1   |      |      |
| tC, 2 stage (s)        | 6.1  | 5.5  |      | 6.1  | 5.5  |      |       |      |      |       |      |      |
| tF (s)                 | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  | 2.2   |      |      | 2.2   |      |      |
| p0 queue free %        | 0    | 100  | 0    | 0    | 100  | 95   | 63    |      |      | 98    |      |      |
| cM capacity (veh/h)    | 57   | 75   | 251  | 0    | 21   | 208  | 544   |      |      | 544   |      |      |

| Direction, Lane #      | EB 1   | EB 2  | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
|------------------------|--------|-------|------|------|------|------|------|------|
| Volume Total           | 211    | 294   | 28   | 203  | 1277 | 13   | 1120 | 157  |
| Volume Left            | 211    | 0     | 18   | 203  | 0    | 13   | 0    | 0    |
| Volume Right           | 0      | 294   | 10   | 0    | 36   | 0    | 0    | 157  |
| cSH                    | 57     | 251   | 0    | 544  | 1700 | 544  | 1700 | 1700 |
| Volume to Capacity     | 3.70   | 1.17  | Err  | 0.37 | 0.75 | 0.02 | 0.66 | 0.09 |
| Queue Length 95th (ft) | Err    | 338   | Err  | 43   | 0    | 2    | 0    | 0    |
| Control Delay (s)      | Err    | 152.6 | Err  | 15.5 | 0.0  | 11.8 | 0.0  | 0.0  |
| Lane LOS               | F      | F     | F    | C    |      | B    |      |      |
| Approach Delay (s)     | 4266.6 |       | Err  | 2.1  |      | 0.1  |      |      |
| Approach LOS           | F      |       | F    |      |      |      |      |      |

| Intersection Summary              |       |                      |
|-----------------------------------|-------|----------------------|
| Average Delay                     |       | Err                  |
| Intersection Capacity Utilization | 90.0% | ICU Level of Service |
| Analysis Period (min)             | 15    | E                    |



**INTERSECTION 9004: M-22 & Carter Rd**  
**PM PEAK**

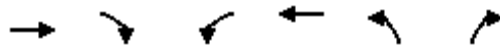
**ZONE A**  
**2026 FUTURE**



| Movement                          | EBL         | EBR         | NBL         | NBT                  | SBT  | SBR  |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations               |             |             |             |                      |      |      |
| Traffic Volume (veh/h)            | 12          | 64          | 76          | 1478                 | 1283 | 29   |
| Future Volume (Veh/h)             | 12          | 64          | 76          | 1478                 | 1283 | 29   |
| Sign Control                      | Stop        |             |             | Free                 | Free |      |
| Grade                             | 0%          |             |             | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.68        | 0.68        | 0.95        | 0.95                 | 0.95 | 0.95 |
| Hourly flow rate (vph)            | 18          | 94          | 80          | 1556                 | 1351 | 31   |
| <b>Pedestrians</b>                |             |             |             |                      |      |      |
| Lane Width (ft)                   |             |             |             |                      |      |      |
| Walking Speed (ft/s)              |             |             |             |                      |      |      |
| Percent Blockage                  |             |             |             |                      |      |      |
| Right turn flare (veh)            |             |             |             |                      |      |      |
| Median type                       |             |             | TWLTL       | TWLTL                |      |      |
| Median storage (veh)              |             |             | 2           | 2                    |      |      |
| Upstream signal (ft)              |             |             |             |                      |      |      |
| pX, platoon unblocked             |             |             |             |                      |      |      |
| vC, conflicting volume            | 3082        | 1366        | 1382        |                      |      |      |
| vC1, stage 1 conf vol             | 1366        |             |             |                      |      |      |
| vC2, stage 2 conf vol             | 1716        |             |             |                      |      |      |
| vCu, unblocked vol                | 3082        | 1366        | 1382        |                      |      |      |
| tC, single (s)                    | 6.4         | 6.2         | 4.1         |                      |      |      |
| tC, 2 stage (s)                   | 5.4         |             |             |                      |      |      |
| tF (s)                            | 3.5         | 3.3         | 2.2         |                      |      |      |
| p0 queue free %                   | 84          | 48          | 84          |                      |      |      |
| cM capacity (veh/h)               | 111         | 180         | 496         |                      |      |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>NB 1</b> | <b>NB 2</b> | <b>SB 1</b>          |      |      |
| Volume Total                      | 112         | 80          | 1556        | 1382                 |      |      |
| Volume Left                       | 18          | 80          | 0           | 0                    |      |      |
| Volume Right                      | 94          | 0           | 0           | 31                   |      |      |
| cSH                               | 164         | 496         | 1700        | 1700                 |      |      |
| Volume to Capacity                | 0.68        | 0.16        | 0.92        | 0.81                 |      |      |
| Queue Length 95th (ft)            | 100         | 14          | 0           | 0                    |      |      |
| Control Delay (s)                 | 64.6        | 13.7        | 0.0         | 0.0                  |      |      |
| Lane LOS                          | F           | B           |             |                      |      |      |
| Approach Delay (s)                | 64.6        | 0.7         |             |                      |      |      |
| Approach LOS                      | F           |             |             |                      |      |      |
| <b>Intersection Summary</b>       |             |             |             |                      |      |      |
| Average Delay                     |             |             | 2.7         |                      |      |      |
| Intersection Capacity Utilization |             |             | 89.1%       | ICU Level of Service | E    |      |
| Analysis Period (min)             |             |             | 15          |                      |      |      |

INTERSECTION 9006: BAY ST & M-72  
PM PEAK

ZONE A  
2026 FUTURE



| Movement                          | EBT  | EBR  | WBL   | WBT                  | NBL  | NBR  |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Lane Configurations               | ↑↑   |      |       | ↑↑                   | ↗    | ↗    |
| Traffic Volume (veh/h)            | 557  | 93   | 115   | 526                  | 61   | 130  |
| Future Volume (Veh/h)             | 557  | 93   | 115   | 526                  | 61   | 130  |
| Sign Control                      | Free |      |       | Free                 | Stop |      |
| Grade                             | 0%   |      |       | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.94 | 0.94 | 0.92  | 0.92                 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 593  | 99   | 125   | 572                  | 66   | 141  |
| Pedestrians                       |      |      |       |                      |      |      |
| Lane Width (ft)                   |      |      |       |                      |      |      |
| Walking Speed (ft/s)              |      |      |       |                      |      |      |
| Percent Blockage                  |      |      |       |                      |      |      |
| Right turn flare (veh)            |      |      |       |                      |      | 4    |
| Median type                       | None |      | None  |                      |      |      |
| Median storage (veh)              |      |      |       |                      |      |      |
| Upstream signal (ft)              | 99   |      |       |                      |      |      |
| pX, platoon unblocked             |      |      |       |                      |      |      |
| vC, conflicting volume            |      |      | 692   |                      | 1178 | 346  |
| vC1, stage 1 conf vol             |      |      |       |                      |      |      |
| vC2, stage 2 conf vol             |      |      |       |                      |      |      |
| vCu, unblocked vol                |      |      | 692   |                      | 1178 | 346  |
| tC, single (s)                    |      |      | 4.1   |                      | 6.8  | 6.9  |
| tC, 2 stage (s)                   |      |      |       |                      |      |      |
| tF (s)                            |      |      | 2.2   |                      | 3.5  | 3.3  |
| p0 queue free %                   |      |      | 86    |                      | 58   | 78   |
| cM capacity (veh/h)               |      |      | 899   |                      | 158  | 650  |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | WB 2                 | NB 1 |      |
| Volume Total                      | 395  | 297  | 316   | 381                  | 207  |      |
| Volume Left                       | 0    | 0    | 125   | 0                    | 66   |      |
| Volume Right                      | 0    | 99   | 0     | 0                    | 141  |      |
| cSH                               | 1700 | 1700 | 899   | 1700                 | 496  |      |
| Volume to Capacity                | 0.23 | 0.17 | 0.14  | 0.22                 | 0.42 |      |
| Queue Length 95th (ft)            | 0    | 0    | 12    | 0                    | 51   |      |
| Control Delay (s)                 | 0.0  | 0.0  | 4.7   | 0.0                  | 22.0 |      |
| Lane LOS                          |      |      | A     | C                    |      |      |
| Approach Delay (s)                | 0.0  |      | 2.1   |                      | 22.0 |      |
| Approach LOS                      |      |      |       |                      |      | C    |
| Intersection Summary              |      |      |       |                      |      |      |
| Average Delay                     |      |      | 3.8   |                      |      |      |
| Intersection Capacity Utilization |      |      | 49.6% | ICU Level of Service | A    |      |
| Analysis Period (min)             | 15   |      |       |                      |      |      |

INTERSECTION 9003: M-22 & Brewery Creek/museum dr  
PM PEAK

ZONE A  
2026 FUTURE w/ IMPROVEMENTS



| Movement               | EBL   | EBT  | EBR  | WBL  | WBT  | WBR  | NBL   | NBT   | NBR  | SBL  | SBT   | SBR  |
|------------------------|-------|------|------|------|------|------|-------|-------|------|------|-------|------|
| Lane Configurations    |       |      |      |      |      |      |       |       |      |      |       |      |
| Traffic Volume (vph)   | 137   | 0    | 191  | 13   | 0    | 7    | 193   | 1179  | 34   | 12   | 1064  | 149  |
| Future Volume (vph)    | 137   | 0    | 191  | 13   | 0    | 7    | 193   | 1179  | 34   | 12   | 1064  | 149  |
| Ideal Flow (vphpl)     | 1900  | 1900 | 1900 | 1900 | 1900 | 1900 | 1900  | 1900  | 1900 | 1900 | 1900  | 1900 |
| Total Lost time (s)    | 6.3   | 6.3  |      | 6.3  | 6.3  |      | 4.0   | 5.9   | 5.9  | 5.9  | 5.9   | 5.9  |
| Lane Util. Factor      | 1.00  | 1.00 |      | 1.00 | 1.00 |      | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00 |
| Frt                    | 1.00  | 0.85 |      | 1.00 | 0.85 |      | 1.00  | 1.00  | 0.85 | 1.00 | 1.00  | 0.85 |
| Flt Protected          | 0.95  | 1.00 |      | 0.95 | 1.00 |      | 0.95  | 1.00  | 1.00 | 0.95 | 1.00  | 1.00 |
| Satd. Flow (prot)      | 1770  | 1583 |      | 1770 | 1583 |      | 1770  | 1863  | 1583 | 1770 | 1863  | 1583 |
| Flt Permitted          | 0.75  | 1.00 |      | 0.37 | 1.00 |      | 0.08  | 1.00  | 1.00 | 0.08 | 1.00  | 1.00 |
| Satd. Flow (perm)      | 1399  | 1583 |      | 696  | 1583 |      | 146   | 1863  | 1583 | 158  | 1863  | 1583 |
| Peak-hour factor, PHF  | 0.65  | 0.65 | 0.65 | 0.71 | 0.71 | 0.71 | 0.95  | 0.95  | 0.95 | 0.95 | 0.95  | 0.95 |
| Adj. Flow (vph)        | 211   | 0    | 294  | 18   | 0    | 10   | 203   | 1241  | 36   | 13   | 1120  | 157  |
| RTOR Reduction (vph)   | 0     | 173  | 0    | 0    | 9    | 0    | 0     | 0     | 10   | 0    | 0     | 41   |
| Lane Group Flow (vph)  | 211   | 121  | 0    | 18   | 1    | 0    | 203   | 1241  | 26   | 13   | 1120  | 116  |
| Turn Type              | Perm  | NA   |      | Perm | NA   |      | pm+pt | NA    | Perm | Perm | NA    | Perm |
| Protected Phases       |       | 4    |      |      | 8    |      | 5     | 2     |      |      | 6     |      |
| Permitted Phases       | 4     |      |      | 8    |      |      | 2     |       | 2    | 6    |       | 6    |
| Actuated Green, G (s)  | 10.7  | 10.7 |      | 10.7 | 10.7 |      | 57.1  | 57.1  | 57.1 | 47.1 | 47.1  | 47.1 |
| Effective Green, g (s) | 10.7  | 10.7 |      | 10.7 | 10.7 |      | 57.1  | 57.1  | 57.1 | 47.1 | 47.1  | 47.1 |
| Actuated g/C Ratio     | 0.13  | 0.13 |      | 0.13 | 0.13 |      | 0.71  | 0.71  | 0.71 | 0.59 | 0.59  | 0.59 |
| Clearance Time (s)     | 6.3   | 6.3  |      | 6.3  | 6.3  |      | 4.0   | 5.9   | 5.9  | 5.9  | 5.9   | 5.9  |
| Vehicle Extension (s)  | 3.0   | 3.0  |      | 3.0  | 3.0  |      | 3.0   | 3.0   | 3.0  | 3.0  | 3.0   | 3.0  |
| Lane Grp Cap (vph)     | 187   | 211  |      | 93   | 211  |      | 226   | 1329  | 1129 | 93   | 1096  | 931  |
| v/s Ratio Prot         |       | 0.08 |      |      | 0.00 |      | 0.07  | c0.67 |      |      | c0.60 |      |
| v/s Ratio Perm         | c0.15 |      |      | 0.03 |      |      | 0.57  |       | 0.02 | 0.08 |       | 0.07 |
| v/c Ratio              | 1.13  | 0.57 |      | 0.19 | 0.01 |      | 0.90  | 0.93  | 0.02 | 0.14 | 1.02  | 0.12 |
| Uniform Delay, d1      | 34.6  | 32.5 |      | 30.8 | 30.0 |      | 23.9  | 9.8   | 3.3  | 7.4  | 16.4  | 7.3  |
| Progression Factor     | 1.00  | 1.00 |      | 1.00 | 1.00 |      | 1.00  | 1.00  | 1.00 | 1.00 | 1.00  | 1.00 |
| Incremental Delay, d2  | 104.5 | 3.7  |      | 1.0  | 0.0  |      | 33.5  | 13.2  | 0.0  | 3.1  | 32.8  | 0.3  |
| Delay (s)              | 139.2 | 36.2 |      | 31.8 | 30.1 |      | 57.4  | 23.1  | 3.4  | 10.5 | 49.3  | 7.6  |
| Level of Service       | F     | D    |      | C    | C    |      | E     | C     | A    | B    | D     | A    |
| Approach Delay (s)     |       | 79.2 |      |      | 31.2 |      |       | 27.3  |      |      | 43.8  |      |
| Approach LOS           |       | E    |      |      | C    |      |       | C     |      |      | D     |      |

Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 41.7  | HCM 2000 Level of Service | D    |
| HCM 2000 Volume to Capacity ratio | 1.05  |                           |      |
| Actuated Cycle Length (s)         | 80.0  | Sum of lost time (s)      | 16.2 |
| Intersection Capacity Utilization | 99.7% | ICU Level of Service      | F    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group

INTERSECTION 1005: M-72/22/M-22 & M-72  
PM PEAK

ZONE A  
2026 FUTURE w/ IMPROVEMENTS



| Movement               | EBL   | EBR   | NBL   | NBT  | SBT   | SBR  |
|------------------------|-------|-------|-------|------|-------|------|
| Lane Configurations    |       |       |       |      |       |      |
| Traffic Volume (vph)   | 289   | 398   | 457   | 1355 | 1194  | 184  |
| Future Volume (vph)    | 289   | 398   | 457   | 1355 | 1194  | 184  |
| Ideal Flow (vphpl)     | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 |
| Lane Width             | 12    | 12    | 12    | 13   | 12    | 12   |
| Total Lost time (s)    | 12.8  | 5.9   | 5.9   | 5.9  | 5.9   |      |
| Lane Util. Factor      | 1.00  | 1.00  | 0.97  | 0.95 | 0.95  |      |
| Frt                    | 1.00  | 0.85  | 1.00  | 1.00 | 0.98  |      |
| Flt Protected          | 0.95  | 1.00  | 0.95  | 1.00 | 1.00  |      |
| Satd. Flow (prot)      | 1770  | 1583  | 3433  | 3657 | 3468  |      |
| Flt Permitted          | 0.95  | 1.00  | 0.95  | 1.00 | 1.00  |      |
| Satd. Flow (perm)      | 1770  | 1583  | 3433  | 3657 | 3468  |      |
| Peak-hour factor, PHF  | 0.94  | 0.94  | 0.92  | 0.92 | 0.95  | 0.95 |
| Adj. Flow (vph)        | 307   | 423   | 497   | 1473 | 1257  | 194  |
| RTOR Reduction (vph)   | 0     | 11    | 0     | 0    | 12    | 0    |
| Lane Group Flow (vph)  | 307   | 412   | 497   | 1473 | 1439  | 0    |
| Turn Type              | Prot  | pm+ov | Prot  | NA   | NA    |      |
| Protected Phases       | 4     | 5     | 5     | 2    | 6     |      |
| Permitted Phases       |       | 4     |       |      |       |      |
| Actuated Green, G (s)  | 17.2  | 34.3  | 17.1  | 64.1 | 41.1  |      |
| Effective Green, g (s) | 17.2  | 34.3  | 17.1  | 64.1 | 41.1  |      |
| Actuated g/C Ratio     | 0.17  | 0.34  | 0.17  | 0.64 | 0.41  |      |
| Clearance Time (s)     | 12.8  | 5.9   | 5.9   | 5.9  | 5.9   |      |
| Lane Grp Cap (vph)     | 304   | 636   | 587   | 2344 | 1425  |      |
| v/s Ratio Prot         | c0.17 | 0.11  | c0.14 | 0.40 | c0.41 |      |
| v/s Ratio Perm         |       | 0.15  |       |      |       |      |
| v/c Ratio              | 1.01  | 0.65  | 0.85  | 0.63 | 1.01  |      |
| Uniform Delay, d1      | 41.4  | 27.7  | 40.2  | 10.8 | 29.4  |      |
| Progression Factor     | 1.00  | 1.00  | 1.00  | 1.00 | 1.00  |      |
| Incremental Delay, d2  | 54.1  | 5.0   | 14.1  | 1.3  | 26.2  |      |
| Delay (s)              | 95.5  | 32.8  | 54.2  | 12.1 | 55.7  |      |
| Level of Service       | F     | C     | D     | B    | E     |      |
| Approach Delay (s)     | 59.2  |       |       | 22.7 | 55.7  |      |
| Approach LOS           | E     |       |       | C    | E     |      |

Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 40.6  | HCM 2000 Level of Service | D    |
| HCM 2000 Volume to Capacity ratio | 0.97  |                           |      |
| Actuated Cycle Length (s)         | 100.0 | Sum of lost time (s)      | 24.6 |
| Intersection Capacity Utilization | 88.4% | ICU Level of Service      | E    |
| Analysis Period (min)             | 15    |                           |      |

c Critical Lane Group

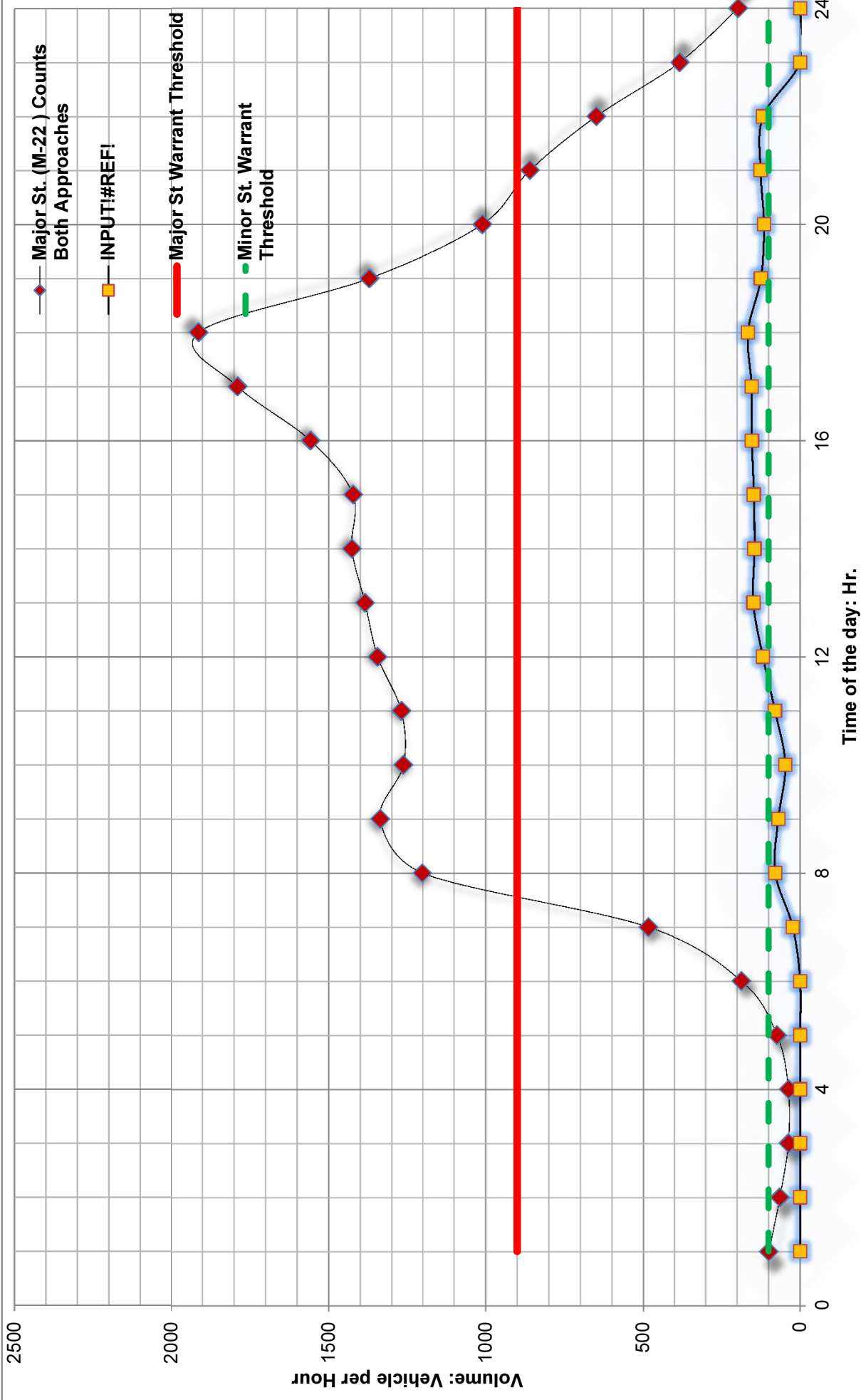
## Summary of Warrants

|                         |                       |               |     |
|-------------------------|-----------------------|---------------|-----|
| Spot Number:            | na                    |               |     |
| Major Street:           | M-22                  | Minor Street: | 0   |
| Intersection:           | M-22 at Brewery Creek |               |     |
| City/Twp:               | Elmwood Twp           |               |     |
| Date Performed:         | 1/0/1900              | Performed By: | PAE |
| Date Volumes Collected: | 2026 Projected        |               |     |

| Warrant  | Condition               | Is Warrant Met |
|--|-------------------------|----------------|
| <b>Data Validation Error</b>                         |                         | <b>NO</b>      |
| #REF!  |                         |                |
| <b>WARRANT 1: Eight-Hour Vehicular Volume</b>        |                         | <b>YES</b>     |
|  | Condition A             | <b>NO</b>      |
|  | Condition B             | <b>YES</b>     |
|  | Condition A&B           | N/A            |
| <b>WARRANT 2: Four-Hour Vehicular Volume</b>         | (100%)                  | <b>YES</b>     |
| <b>WARRANT 3: Peak-Hour Vehicular Volume</b>         | (100%)                  | <b>YES</b>     |
|  | Condition A             | N/A            |
|  | Condition B             | <b>YES</b>     |
| <b>WARRANT 4: Pedestrian Volume</b>                  | (70%)                   | <b>NO</b>      |
|  | Four Hour               | <b>NO</b>      |
|  | Peak Hour               | <b>NO</b>      |
|  | (Threshold) <b>HAWK</b> | <b>NO</b>      |
|  | (Threshold) <b>RRFB</b> | <b>NO</b>      |
| <b>WARRANT 5: School Crossing</b>                    |                         | <b>NO</b>      |
| <b>WARRANT 6: Coordinated Signal System</b>          |                         | <b>NO</b>      |
| <b>WARRANT 7: Crash Experience</b>                   |                         | <b>NO</b>      |
|  | Condition A             | <b>NO</b>      |
|  | Condition B             | <b>NO</b>      |
| <b>WARRANT 8: Roadway Network</b>                    |                         | <b>NO</b>      |
| <b>WARRANT 9: Intersection Near a Grade Crossing</b> |                         | <b>#N/A</b>    |

**Issue to Be Addressed by Signalization:**

side street egress



**FIGURE 1: WARRANT**

**1B** IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...  
 1- DUE TO SPEED? NO  
 2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: na  
M-22 @ Brewery Creek  
 NO. OF LANES ON MAJOR 2  
 NO. OF LANES ON MINOR 2  
 ST.?

Number of Hours that met the Warrant: 9  
 Does this intersection meet Warrant 1B for signal installation? YES



# AGENDA

## **M-22/Greilickville Subarea Corridor Analysis**

Stakeholder Meeting

Wednesday, March 2, 2016 6:30-8:00 pm

Elmwood Township Hall

---

1. Introductions
2. Setting the Stage - Subarea Plan
3. Why a traffic study?
4. Recap of Study Objectives
5. Existing Conditions Analysis Findings (June 2015 Database)
6. Existing Conditions - August 2015 Observations
7. Preliminary Access Management Recommendations
8. Preliminary 2025 Future Conditions Analyses Findings & Recommendations
9. Alternative Alignment?
10. Questions/Answers
11. Next Steps/Schedule



### Contacts:

|                   |                 |  |
|-------------------|-----------------|--|
| Progressive AE:   | Pete LaMourie   | (616) 361-2664, lamourie@progressiveae.com     |
| Elmwood Township: | Jack Kelly      | (231) 946-0921, supervisor@elmwoodtownship.net |
| Beckett-Raeder:   | John Iacoangeli | (734) 239-6602, jri@bria2.com                  |





# M-22 Corridor Traffic Study Preliminary Summary

March 2, 2016



# AGENDA

## **M-22/Greilickville Subarea Corridor Analysis**

Stakeholder Meeting

Wednesday, March 2, 2016 6:30-8:00 pm

Elmwood Township Hall

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10. Questions/Answers
11. Next Steps/Schedule



# **Community Master Plan**

*September 1999*

- **Key focus areas**
  - 1) Greilickville,**
  - 2) The M-22 Corridor,**
  - 3) the Timberlee Resort area, and**
  - 4) the rural portion of the Township.**

# Waterfront District Plan

January 2012

- **Examine the waterfront highway corridor and develop a set of recommendations to *transform the area by encouraging new development, improving pedestrian safety, and creating a more village like atmosphere for the area.***
- **Prepare a site plan for the township marina property along M-22 that illustrates improvements to boater facilities, *clearer use patterns for visitors and boaters, and integration of the facilities into the adjacent park and community.***

# Greilickville Sub Area Plan

November 2012

- ***A redevelopment master plan*** which is community-driven
- ***A realistic vision*** for the corridor which can be brought to fruition over time.
- ***A strategy for implementation*** with specific measurable benchmarks.
- **A basis for future zoning decisions.**
- **A guide for shaping future private and public development by setting *priorities for future investments in recreational and/ or road infrastructure improvements.***



# Community Survey

*February 2014*

- **74% Year-round residents; 49% over 65 years of age**
- **Elmwood Township should advocate for non-motorized infrastructure (bike lanes, sidewalks, crosswalks) along M-22**
- **34% would like to see Brewery Creek used for mixed development**
- **Residents would like commercial focused on M-22 between M-72 and Cherry Bend Road**
- **75% agreed that Elmwood Township's growth and development is heading the right direction**

# Updates

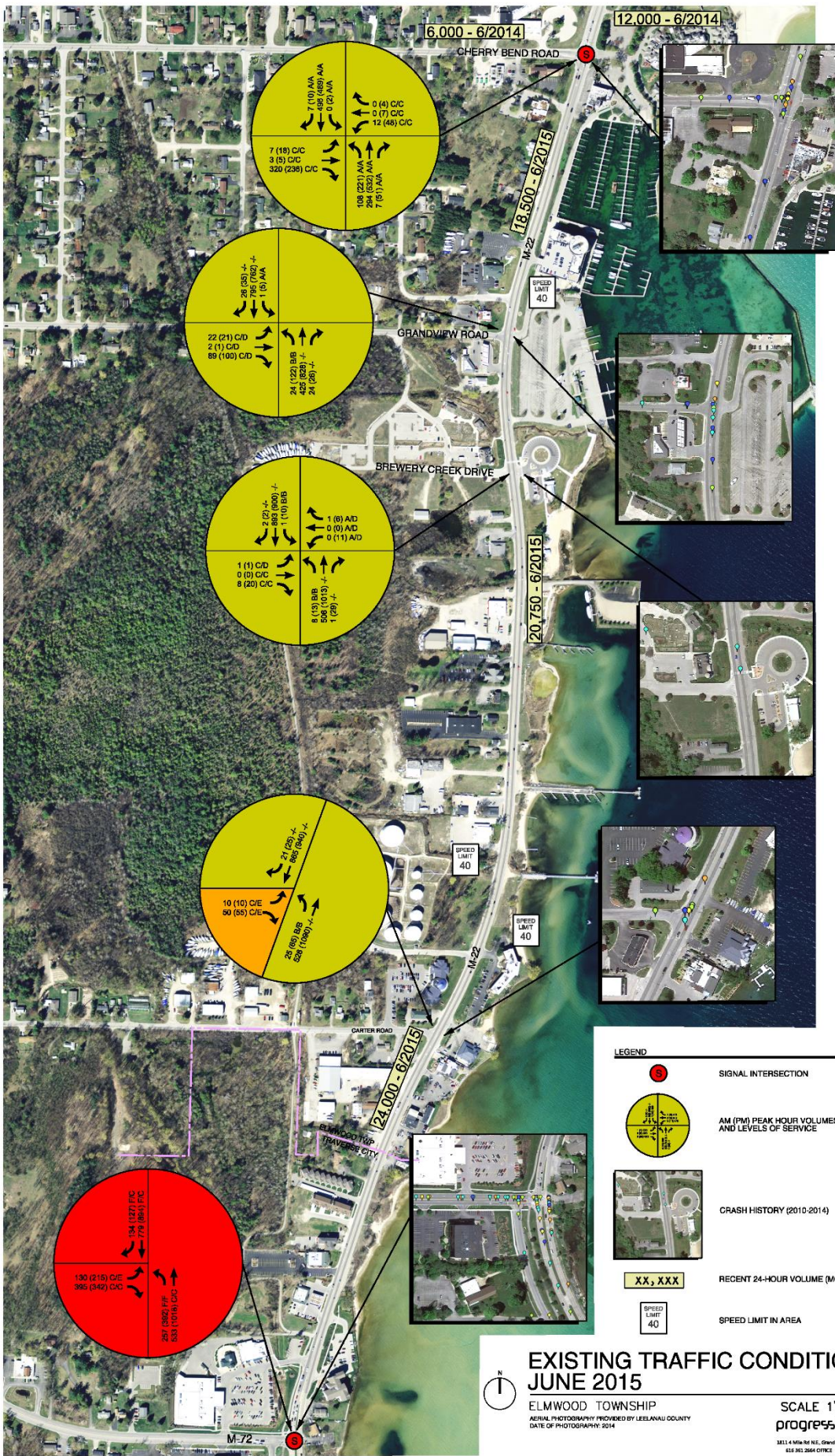
*March 2016*

- **Adopted a Planned Development (PD) provision in the zoning ordinance to encourage mixed use redevelopment per the Sub Area Plan**
- **Redevelopment of the Norris Elementary School – Grand Traverse Regional Arts Center (PD)**
- **Acquisition of the TCPL coal dock by Rotary Charities**
- **Redevelopment of Rotary Camps and Services Campus**
- **Preliminary engineering at the marina**
- **The Leelanau Flats (Moorings) Residential project**

# **M-22 Traffic Study - Background and Tasks**

- **Study scope defined by Elmwood Township, MDOT, and others**
- **Chose June baseline to reflect busy but not peak summer conditions**
- **Identify/confirm existing conditions and issues**
- **Identify retrofit access management improvement opportunities**
- **Project future traffic volumes and related traffic conditions**
- **Identify potential future transportation/roadway improvements**
  - **Township Marina/Park subarea**
  - **M-72/M-22 subarea**





**LEGEND**

SIGNAL INTERSECTION

AM (PM) PEAK HOUR VOLUMES AND LEVELS OF SERVICE

CRASH HISTORY (2010-2014)

XX, XXX RECENT 24-HOUR VOLUME (MO./YR.)

SPEED LIMIT 40 SPEED LIMIT IN AREA

**EXISTING TRAFFIC CONDITIONS  
JUNE 2015**

ELMWOOD TOWNSHIP  
AERIAL PHOTOGRAPHY PROVIDED BY LEELENAU COUNTY  
DATE OF PHOTOGRAPHY: 2014

SCALE 1" = 200'  
progressive|ae

3811 4 Mile Rd NE, Grand Rapids, MI 49535  
616.361.2664 OFFICE 616.361.3489 FAX  
www.progressiveae.com



# August 2015 Observations

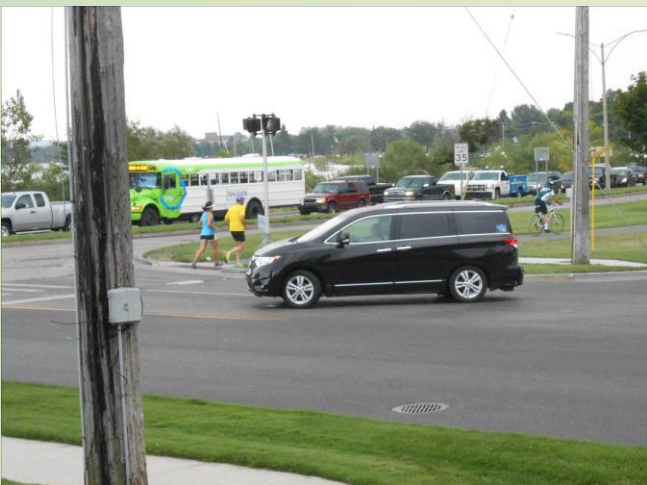
## Grandview Rd. area



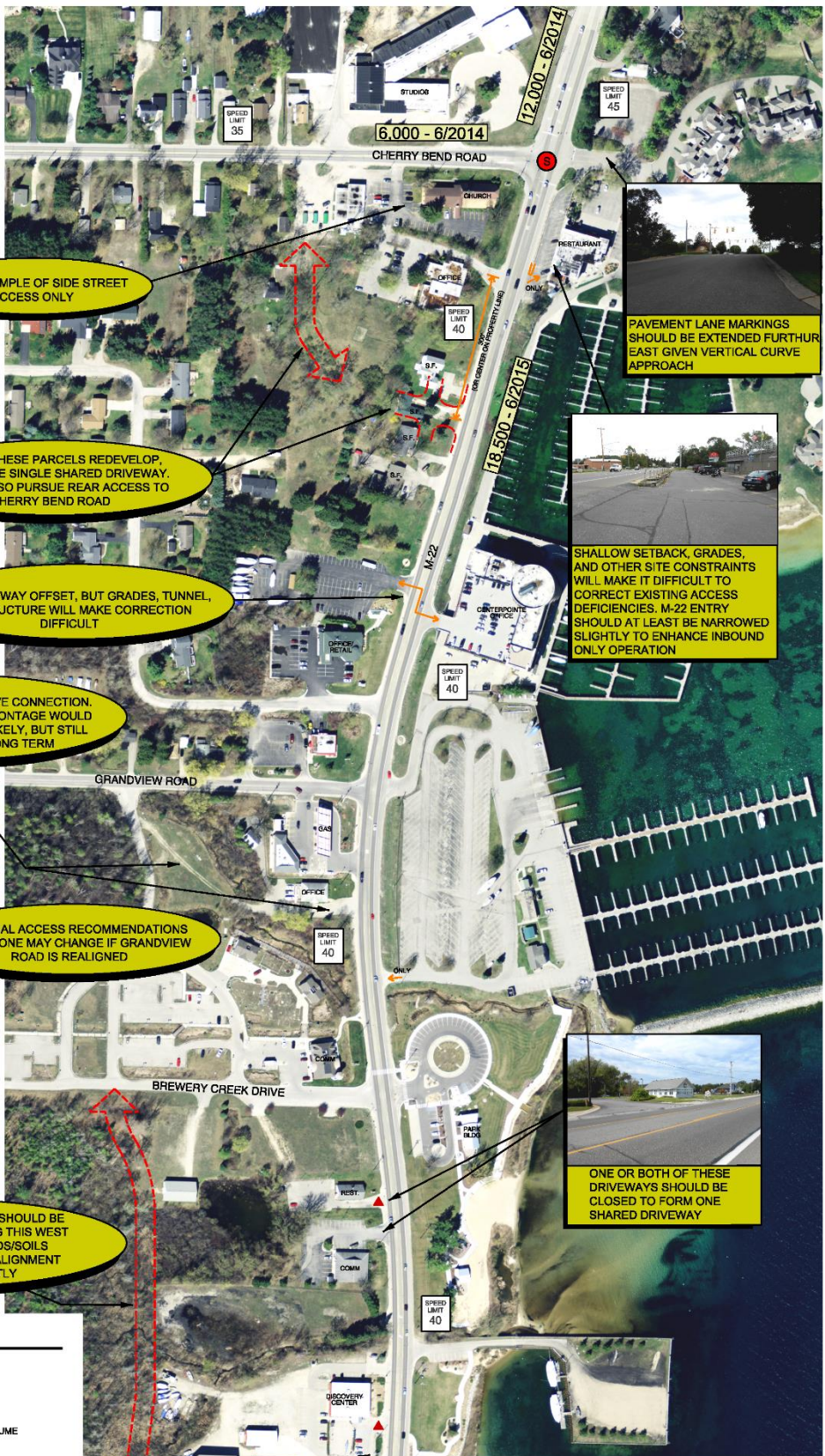


# August 2015 Observations

M-72/M-22 area







GOOD EXAMPLE OF SIDE STREET ACCESS ONLY

IF/WHEN THESE PARCELS REDEVELOP, SHOULD USE SINGLE SHARED DRIVEWAY. SHOULD ALSO PURSUE REAR ACCESS TO CHERRY BEND ROAD

POOR DRIVEWAY OFFSET, BUT GRADES, TUNNEL, AND STRUCTURE WILL MAKE CORRECTION DIFFICULT

INTERESTING REAR SERVICE DRIVE CONNECTION. GRADE DIFFERENCES ON M-22 FRONTAGE WOULD MAKE ACCESS CLOSURE LESS LIKELY, BUT STILL SHOULD BE PURSUED IN LONG TERM

POTENTIAL ACCESS RECOMMENDATIONS IN THIS ZONE MAY CHANGE IF GRANDVIEW ROAD IS REALIGNED

REAR SERVICE DRIVE SYSTEM SHOULD BE STRONGLY CONSIDERED ALONG THIS WEST SIDE IF POTENTIAL WETLANDS/SOILS ISSUES CAN BE ADDRESSED. ALIGNMENT CAN VARY SIGNIFICANTLY

PAVEMENT LANE MARKINGS SHOULD BE EXTENDED FURTHER EAST GIVEN VERTICAL CURVE APPROACH

SHALLOW SETBACK, GRADES, AND OTHER SITE CONSTRAINTS WILL MAKE IT DIFFICULT TO CORRECT EXISTING ACCESS DEFICIENCIES. M-22 ENTRY SHOULD AT LEAST BE NARROWED SLIGHTLY TO ENHANCE INBOUND ONLY OPERATION

ONE OR BOTH OF THESE DRIVEWAYS SHOULD BE CLOSED TO FORM ONE SHARED DRIVEWAY

**LEGEND**

- SPEED LIMIT IN AREA
- AVERAGE DAILY TRAFFIC VOLUME
- SIGNAL OR FLASHING BEACON
- RECOMMENDED DRIVEWAY CLOSURE
- RECOMMENDED NEW/RELOCATED DRIVEWAY
- RECOMMENDED CROSS ACCESS
- RECOMMENDED SERVICE DRIVE (ALIGNMENT CAN VARY)

**M-22 CORRIDOR STUDY  
PRELIMINARY ACCESS  
MANAGEMENT RECOMMENDATIONS  
MAP 1**



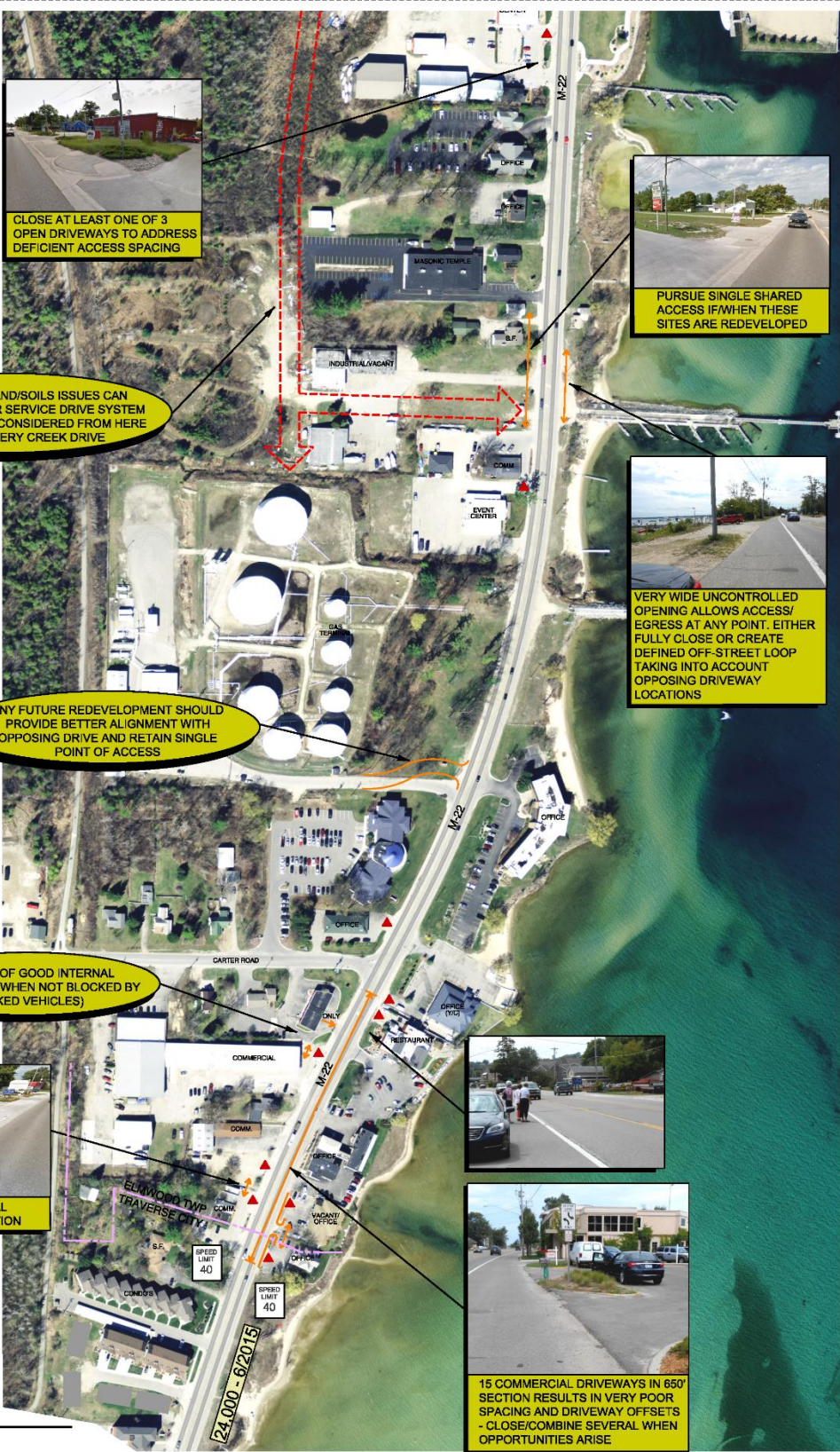
ELMWOOD TOWNSHIP  
AERIAL PHOTOGRAPHY PROVIDED BY LESLANU COUNTY  
DATE OF PHOTOGRAPHY: 2014

SCALE 1"=100'  
progressive **pa**e

1611 1 Mile Rd NE, Grand Rapids, MI 49501  
918.261.2664 OFFICE 918.261.3489 FAX  
www.progressivepa.com

SOURCE: AERIAL PHOTOGRAPHY





IF POTENTIAL WETLAND/SOILS ISSUES CAN BE ADDRESSED, A REAR SERVICE DRIVE SYSTEM SHOULD BE STRONGLY CONSIDERED FROM HERE NORTH TO BREWERY CREEK DRIVE








ANY FUTURE REDEVELOPMENT SHOULD PROVIDE BETTER ALIGNMENT WITH OPPOSING DRIVE AND RETAIN SINGLE POINT OF ACCESS

EXAMPLE OF GOOD INTERNAL CONNECTION (WHEN NOT BLOCKED BY PARKED VEHICLES)

IMPROVE INTERNAL GRAVEL CONNECTION

15 COMMERCIAL DRIVEWAYS IN 650' SECTION RESULTS IN VERY POOR SPACING AND DRIVEWAY OFFSETS - CLOSE/COMBINE SEVERAL WHEN OPPORTUNITIES ARISE

LEGEND

-  SPEED LIMIT 40
-  XX, XXX AVERAGE DAILY TRAFFIC VOLUME
-  SIGNAL OR FLASHING BEACON
-  RECOMMENDED DRIVEWAY CLOSURE
-  RECOMMENDED NEW/RELOCATED DRIVEWAY
-  RECOMMENDED CROSS ACCESS
-  RECOMMENDED SERVICE DRIVE (ALIGNMENT CAN VARY)

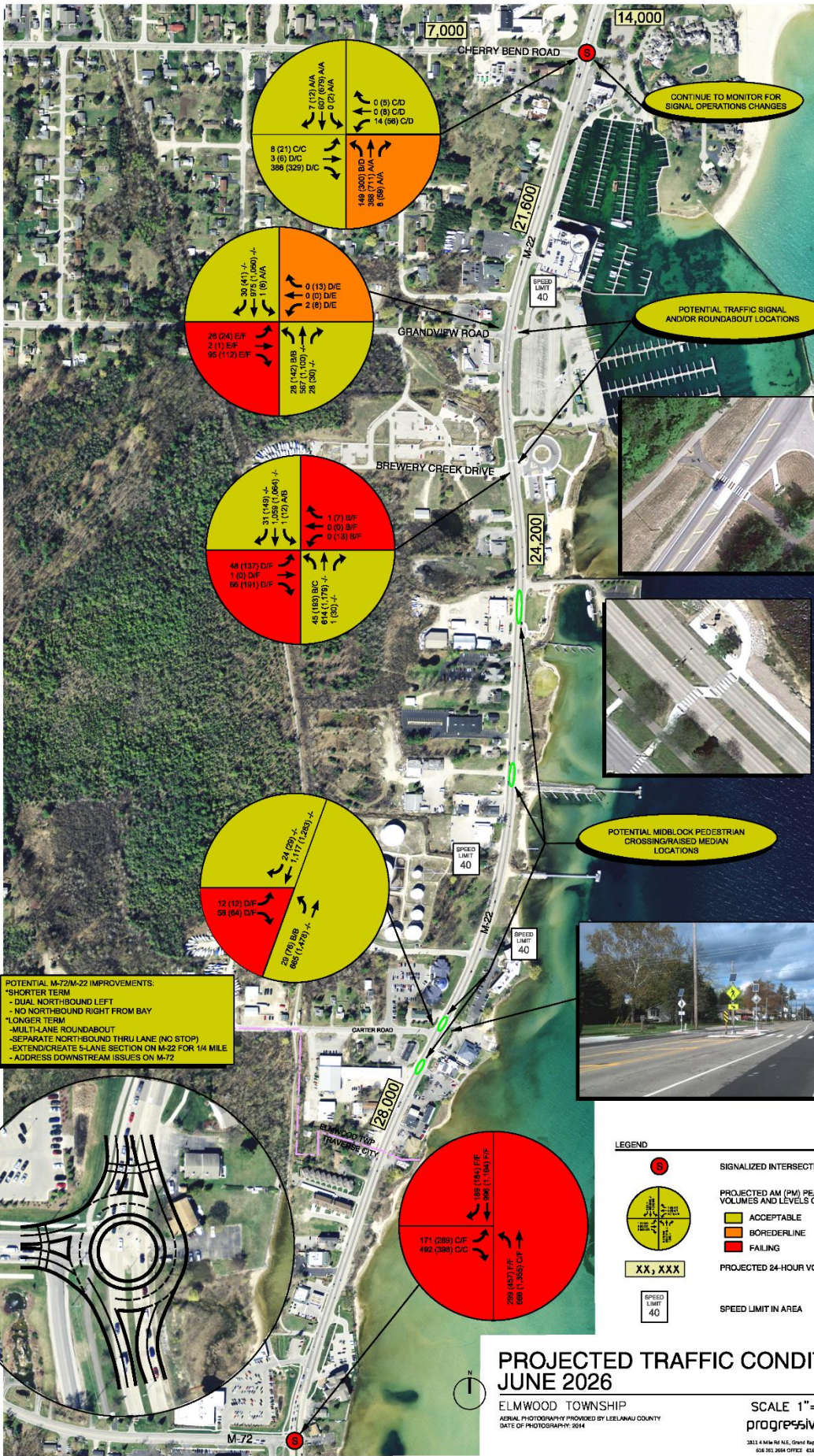
# M-22 CORRIDOR STUDY PRELIMINARY ACCESS MANAGEMENT RECOMMENDATIONS MAP 2

ELMWOOD TOWNSHIP  
AERIAL PHOTOGRAPHY PROVIDED BY LESLANAU COUNTY  
DATE OF PHOTOGRAPHY: 2014

SCALE 1"=100'  
progressive  ae  
1611 4 Mile Rd NE, Grand Rapids, MI 49521  
616.261.2644 OFFICE 616.261.3493 FAX  
www.progressiveae.com

SOURCE: AERIAL PHOTOGRAPHY





**POTENTIAL M-72/M-22 IMPROVEMENTS:**  
 - SHORTER TERM  
 - DUAL NORTHBOUND LEFT  
 - NO NORTHBOUND RIGHT FROM BAY  
 - LONGER TERM  
 - MULT-LANE ROUNDABOUT  
 - SEPARATE NORTHBOUND THRU LANE (NO STOP)  
 - EXTEND/CREATE 5-LANE SECTION ON M-22 FOR 14 MILE  
 - ADDRESS DOWNSTREAM ISSUES ON M-72

**LEGEND**

- SIGNALIZED INTERSECTION
- PROJECTED AM (PM) PEAK HOUR VOLUMES AND LEVELS OF SERVICE
- ACCEPTABLE
- BORDERLINE
- FAILING
- PROJECTED 24-HOUR VOLUME
- SPEED LIMIT IN AREA

# PROJECTED TRAFFIC CONDITIONS JUNE 2026

ELMWOOD TOWNSHIP  
 AERIAL PHOTOGRAPHY PROVIDED BY LEELENAU COUNTY  
 DATE OF PHOTOGRAPHY: 2014

SCALE 1"=200'  
 progressive

3811 4 Mile Rd NE, Grand Rapids, MI 49515  
 616.361.2654 OFFICE 616.361.5463 FAX  
 www.progressive-mi.com



# Preliminary Conclusions

- **M-22 is reaching traffic saturation point for a 3-lane roadway such that new signals or single lane roundabouts will not function “acceptably.”**
- **Other means of intermittent pedestrian crossings will need to be pursued in the short-term, like short midblock raised medians as shown**
- **No simple solutions to egress issues in Township marina area**
- **Any improvements will likely require significant percentage from local funding**
- **Need to continue to push/pursue multi-modal improvements**
- **M-72/M-22 does/will need significant improvements – MDOT to study further**

**Additional Thoughts?**



**Questions?**



# Next Steps

- ✓ Pursue discussions with MDOT and road agencies regarding potential improvements
- ✓ Refine best near-term solution for Township marina/park subarea
- ✓ Finalize analyses and complete study report
- ✓ Present at public meeting

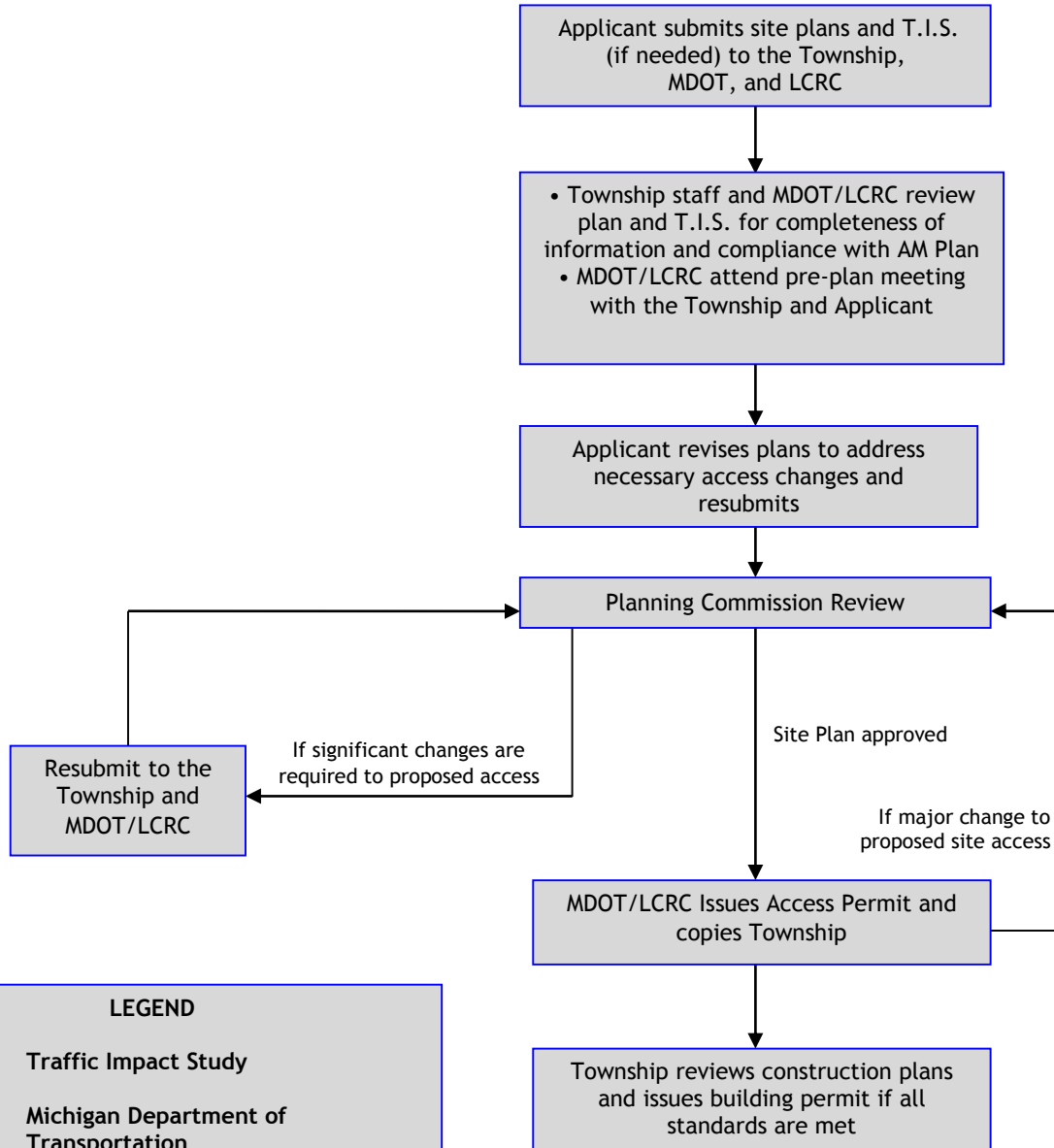


**M-22 Corridor Traffic Study**  
 Redevelopment Calculations

| Parcel Number                            | 004-028-104-00 | 004-028-105-00 | Brewery Creek | 004-033-069-00 | 004-033-090-01 | 004-033-096-00 | Gray Parcel | Total   |
|--|----------------|----------------|---------------|----------------|----------------|----------------|-------------|---------|
| Acreage                                  | 1.445          | 2.067          | 10            | 3.091          | 7.516          | 10.27          | 1.873       |         |
| Square Footage                           | 62,944         | 90,039         | 435,600       | 134,644        | 327,397        | 447,361        | 81,588      |         |
| % Reduction (Site)                       | 0.00%          | 0.00%          | 25.00%        | 10.00%         | 35.00%         | 100.00%        | 10.00%      |         |
| % Reduction (Internal Circulation)       | 15.00%         | 15.00%         | 25.00%        | 15.00%         | 15.00%         | 0.00%          | 15.00%      |         |
| Net Development SqFt                     | 53,503         | 76,533         | 217,800       | 100,983        | 163,698        | -              | 61,191      |         |
| Floor Area Ratio (FAR 1.0)               | 53,503         | 76,533         | 217,800       | 100,983        | 163,698        | -              | 61,191      |         |
| Level 1                                  | 17,834         | 25,511         | 72,600        | 33,661         | 54,566         | -              | 20,397      |         |
| Level 2                                  | 17,834         | 25,511         | 72,600        | 33,661         | 54,566         | -              | 20,397      |         |
| Level 3                                  | 17,834         | 25,511         | 72,600        | 33,661         | 54,566         | -              | 20,397      |         |
| Level 1 (Retail / Office)                | 17,834         | 25,511         | 72,600        | -              | -              | -              | 20,397      | 136,342 |
| Level 1 (Residential; 1,500 sqft per du) |                |                |               | 22             | 36             |                |             | 59      |
| Level 2 (Residential; 1,500 sqft per du) | 12             | 17             | 48            | 22             | 36             |                | 14          | 150     |
| Level 3 (Residential; 1,500 sqft per du) | 12             | 17             | 48            | 22             | 36             |                | 14          | 150     |

**M-22 Subarea AMP**  
**Recommended Access Approval Procedure (sample)**  
 for Site Plans, Special Land Uses,  
 Subdivisions and Site Condominiums

---



| LEGEND |  |
|--------|--|
| T.I.S. | = Traffic Impact Study   |
| MDOT   | = Michigan Department of Transportation<br>Traverse City TSC<br>2084 US-31 South, Suite B<br>Traverse City, MI 49684<br>231.941.1986 |
| LCRC   | = Leelanau County Road Commission<br>10550 E Eckerle Rd<br>Suttons Bay, MI 49682<br>231.271.3993                                     |

**Note:** This chart illustrates the preferred process to insure coordinated agency reviews on access-related issues. The site plan review process may also involve other standards and agencies that will influence the approval process.