GVMC

Congestion Management Process

"Keeping Us Moving Efficiently, Reliably, and Safely"

May 2014

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Purpose

The Congestion Management Process (CMP) is intended to be a systematic way of monitoring, measuring and diagnosing the causes of current and future congestion on a region's multi-modal transportation systems; evaluating and recommending alternative strategies to manage or mitigate current and future regional congestion; and monitoring and evaluating the performance of strategies implemented to manage or mitigate congestion.

Background

Federal transportation legislation requires Metropolitan Planning Organizations to develop and implement Congestion Management Systems (CMP) as part of the metropolitan transportation planning process (23 CFR 450.320).

In Transportation Management Areas that are in non-attainment of ozone or carbon monoxide (CO) standards, Federal funds may not be expended for any new project that will significantly increase the carrying capacity for single-occupant vehicles (SOV's) unless the project results from a CMP. For the Grand Rapids area, a significant increase in carrying capacity for SOV's is defined as a project that adds one or more through-travel lanes for a distance in excess of one mile or more on a roadway classified as a Collector or higher on the Federal functional class map for the area.

In the early 1990's MPO staff developed a CMP (then called Congestion Management System CMS) to meet the federal regulations and serve the transportation planning needs of the urban area. The CMP includes an ongoing method to provide information on the performance of the transportation system and on alternative strategies to alleviate congestion and enhance mobility. The CMP emphasizes effective management of existing facilities through use of travel demand and operational management strategies. In cases where these methods are deemed ineffective to resolve the congestion issue of a corridor, capacity enhancing projects may be selected as the preferred alternative.

Congested Defined

Highway congestion is caused when traffic demand approaches or exceeds the available capacity of the highway system. Though this concept is easy to understand, congestion can vary significantly from day to day because traffic demand and available highway capacity are constantly changing. Traffic demands vary significantly by time of day, day of the week, and season of the year, and are also subject to significant fluctuations due to recreational travel, special events, and emergencies (e.g. accidents and evacuations). Available highway capacity, which is often viewed as being fixed, also varies constantly, being frequently reduced by incidents (e.g. crashes and disabled vehicles), work zones, adverse weather, and other causes.

To add even more complexity, the definition of highway congestion also varies significantly from time to time and place to place based on user expectations. An intersection that may seem very congested in a rural community may not even register as an annoyance in a large metropolitan area. A level of congestion that users expect during peak commute periods may be unacceptable if experienced on Sunday morning. Because of this, congestion is difficult to define precisely in a mathematical sense – it actually represents the difference between the highway system performance that users expect and how the system actually performs.

Congestion can also be measured in a number of ways – level of service, speed, travel time, and delay are commonly used measures. However, travelers have indicated that more important than the severity, magnitude, or quantity of congestion is the reliability of the highway system. People in a large metropolitan area may accept that a 20 mile freeway trip takes 40 minutes during the peak period, so long as this predicted travel time is reliable and is not 25 minutes one day and 2 hours the next. This focus on reliability is particularly prevalent in the freight community, where the value of time under certain just-in-time delivery circumstances may exceed $5 per minute.

The ability to identify and measure different types of congestion is key to developing appropriate responses. **Recurring congestion** is defined as the relatively predictable congestion caused by routine traffic volumes operating in a typical environment. **Non-recurring congestion** is defined as unexpected or unusual congestion caused by unpredictable or transient events such as accidents, inclement weather, or construction. For the purposes of this report a third category **Corridor Progression**, has been included that addresses congestion caused within corridors at localized intersections.

<u>Recurring Congestion</u> –

GVMC determines a roadway is congested when the total number of vehicles exceeds the number of vehicles that roadway was designed to safely carry. For instance a 2-lane road in a suburban area may be designed to carry 13,200 vehicles per day. When the count reaches and average volume of 13,201 vehicles per day, that facility is deemed "congested". This does not mean that adding capacity will occur, merely the facility will be flagged as deficient and studied further to determine a means to alleviate that congested situation.

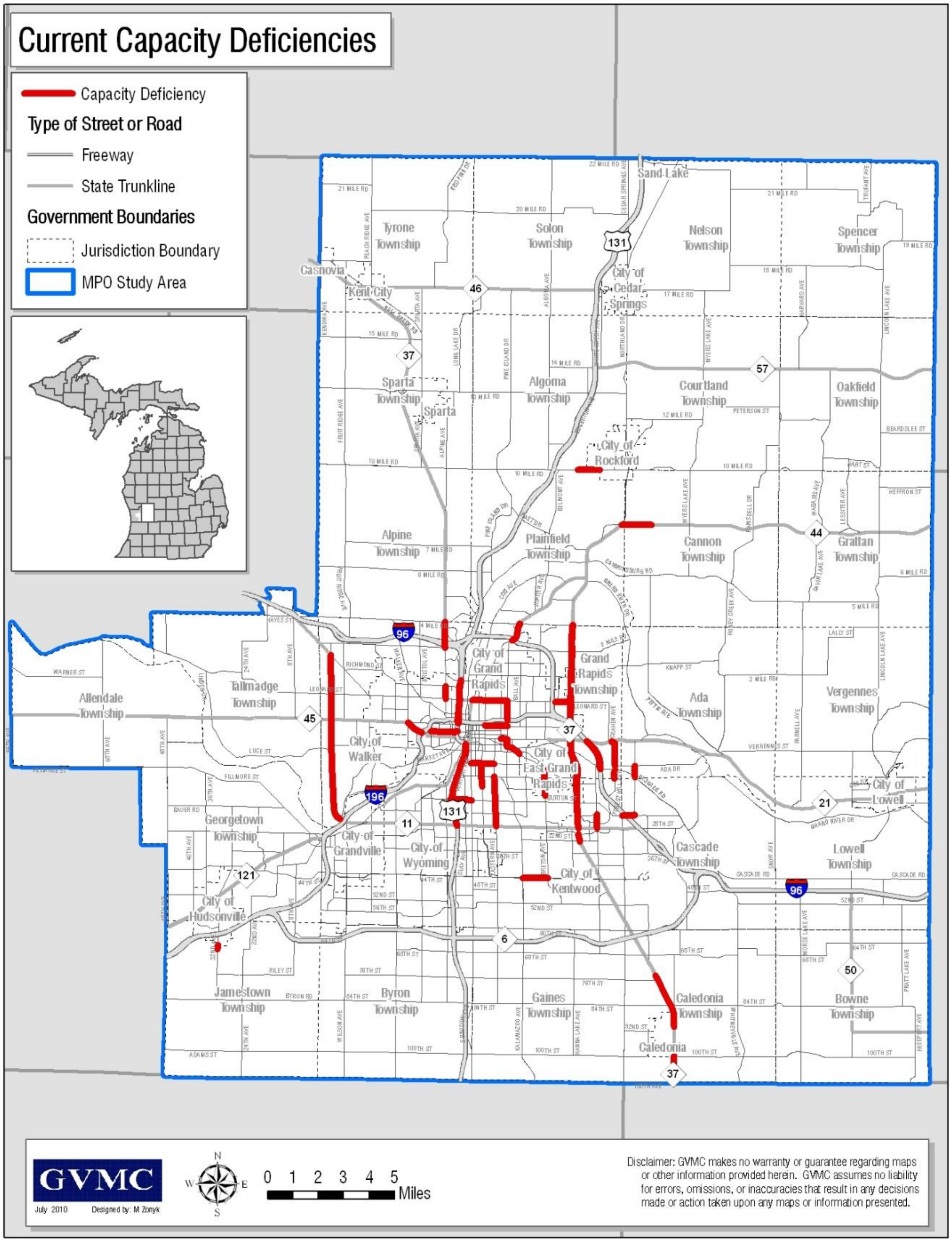
In most situations, a remedy somewhat less than added capacity is selected as the preferred alternative. This represents a change of focus from past years when a widening project may have been the only solution considered. GVMC is taking this conservative approach in a effort to provide a transportation infrastructure that is as sustainable as possible and still meets the demands of the traveling public.

Future (2035) Volume is determined using a travel demand model built on the TransCAD platform. Information regarding projected population and employment statistics are fed into the model. TransCAD uses this information to project traffic volumes/demand on each of the federal aid facilities in the region. Additional information on the model can be obtained in the GVMC Model Calibration Report available at gvmc.org.

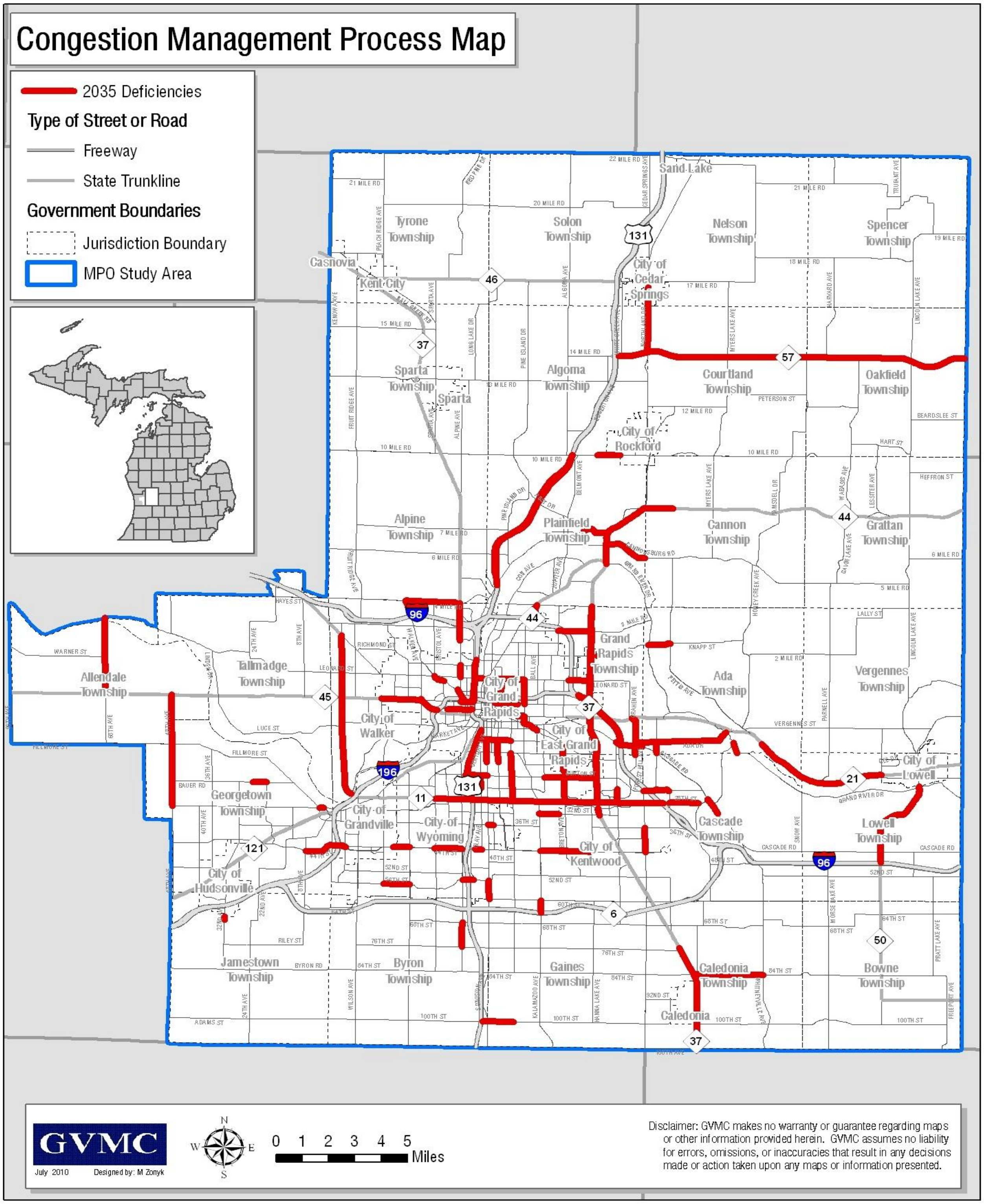
Staff processes the model output and develops a list of facilities that are expected to be deficient by the year 2035. This list is the basis for programming corridor related capacity deficiencies on the network that are included in the 2035 Long Range Transportation Plan. This deficiency list is then analyzed using the cafeteria options listed in Appendix A to determine the most efficient sustainable options for alleviating the congested conditions projected to occur in the future.

A map on each of the next 2 pages depicts the current and future deficiencies as identified through the CMP.

Map of Current Deficiencies



Map of Projected 2035 Deficiencies



Corridor Progression/Operations

In many instances the roadway facility has not exceeded its designed capacity yet congestion will be experienced. Most times this congestion is caused by delay experienced at signalized intersections. Individual road segments can operate as they were designed, only to have a poorly timed signals cause unnecessary delay to the traveling public. Since 2007, GVMC has maintained a program to track travel time on major corridors to determine the level of congestion on the corridor level caused by sources other than roadway capacity. The resulting data forms the basis of the GVMC Travel Time Index (TTI). Many factors can impact the findings of the TTI data. Since the beginning of this program travel demand has increased as the region has begun to recover from the economic downturn that began in 2008. This increase in demand has put added pressure on troubled intersections. At this time the data that has been gathered through this program is inconclusive regarding changes in travel times due to individual intersection delay.

While corridor progression is vital to keeping people and goods moving efficiently, individual intersections may need upgrades both geometric and technological to maximize efficiency. With nearly 600 signalized intersections in the region, and the lack of a comprehensive inventory it is difficult to establish a complete determination of need. In lieu of an inventory, GVMC will strive to maximize efficiencies along these corridors of significance. Through focused investment, these key corridors can be upgraded and will move people and goods as efficiently as possible. A list of identified deficient intersections within corridors of significance is listed in Appendix C.

The primary operational cost for the system as it is presented here is signalized intersections. There are three primary costs that have traditionally been funded through the MPO, upgrades of the physical signals including the heads, controller boxes, detectors etc., communications upgrades, and optimizing the signals to work in unison, moving people and goods throughout the area as efficiently as possible. Upgrades and communications investments are done on the entire federal aid system. The optimization efforts are focused on key transportation corridors throughout the region.

There is no proven template for determining need for this area of the transportation system. For this reason staff will use the current funding levels as the basis for future needs projections.

Signal/Corridor Upgrades

As is the case with the entire transportation system, signal equipment wears out or becomes obsolete and needs replacement/upgrading. There are several hundred signalized intersections on the federal aid system in the area. The reliability of this equipment is crucial to the continued and efficient operation of the transportation system. Typically one or two corridors can be upgraded in a year's time. Over the period of 15-20 years most of the major corridors can be retrofit with the latest technology.

A map depicting intersections that experience congestion related delay is on page 9. These intersections should be considered for further review and funding as solutions become known.

Communications Upgrades

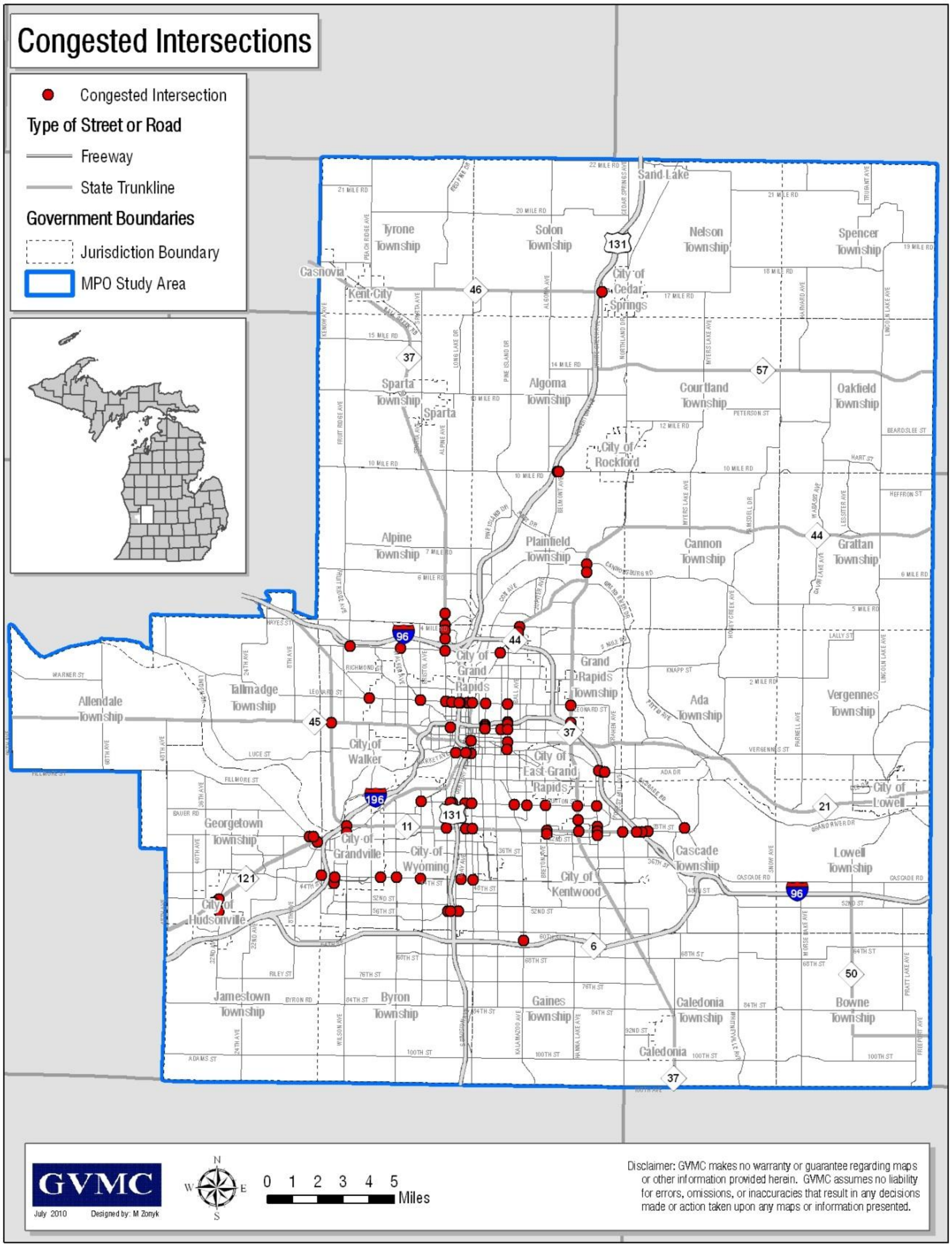
The ability for the individual intersection controllers to communicate with other controllers and a centralized control center is important to maintaining traffic flows in the region. Technology is being deployed that will allow for improved signal timing and real time operation of the signal system in times of planned and unplanned events that are outside the normal operating conditions of the system. These communications upgrades will make the system more responsive to real time demand.

Corridor Progression/ Signal Optimization

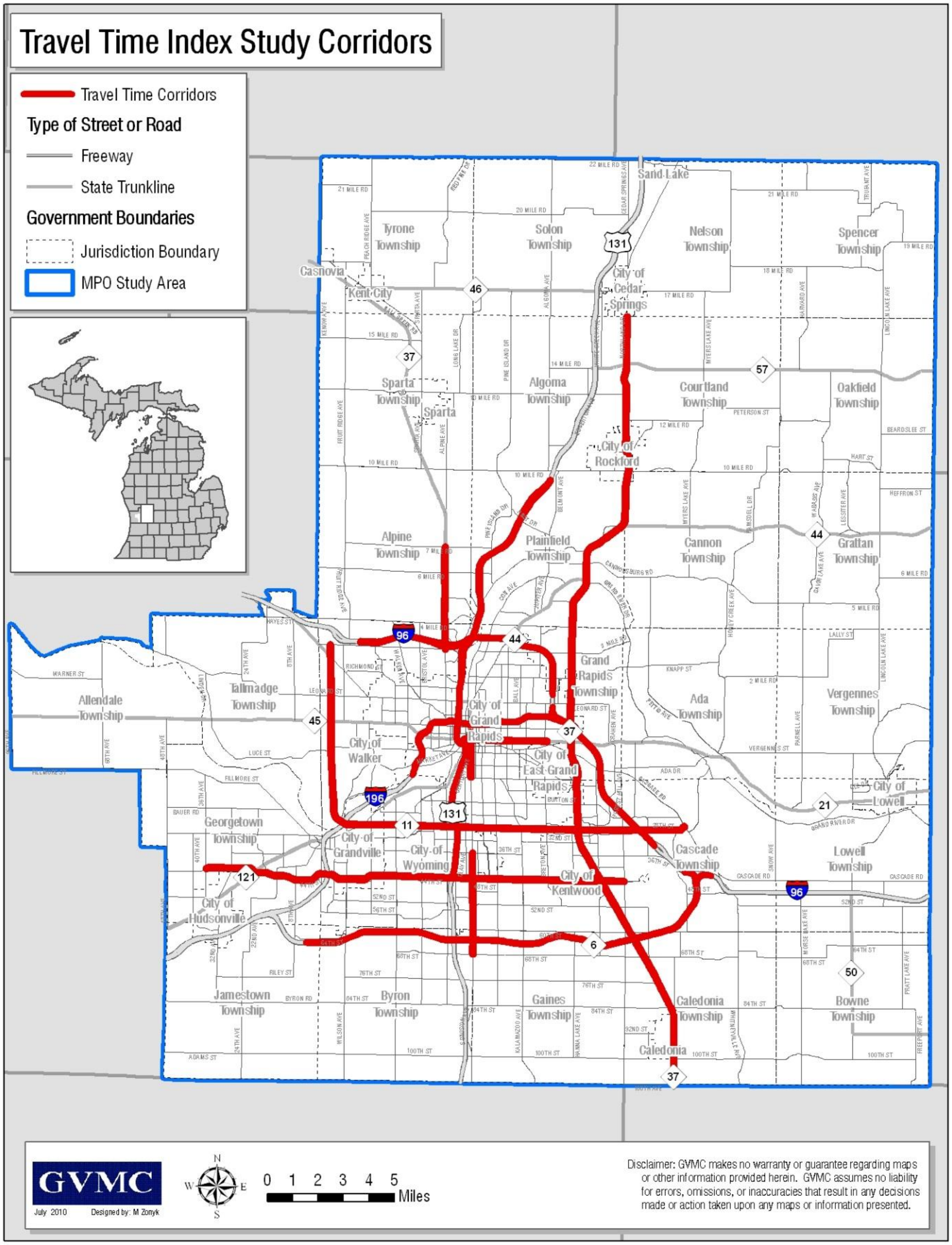
The third piece in the transportation operations puzzle is Corridor Progression/Signal Optimization. This process determines an optimized signal timing plan that utilizes all available technology and data to allow the corridor to operate as efficiently as possible and allow for maximum capacity, possibly eliminating the need for costly added through lanes. GVMC has supported these efforts for nearly a decade. As travel patterns change over time, these efforts will need to continue to maintain the maximum efficiency of the system.

GVMC monitors corridors of significance semi-annually through the use of a Travel Time Index (TTI) effort. The monitored corridors are shown on page 11. More information regarding this process is contained in Appendix F.

<u>Congested Intersections</u>



Monitored Corridors



Non-recurring Congestion

Non-recurring congestion includes the development and deployment of strategies designed to mitigate traffic congestion due to non-recurring causes, such as crashes, disabled vehicles, work zones, adverse weather events, and planned special events. Approximately half of all congestion is caused by temporary disruptions that take away part of the roadway from use – or "nonrecurring" congestion.

The three main causes of nonrecurring congestion are: incidents ranging from a flat tire to an overturned hazardous material truck (25 percent of congestion), work zones (10 percent of congestion), and weather (15 percent of congestion). Nonrecurring events dramatically reduce the available capacity and reliability of the entire transportation system. This is the type of congestion that surprises the traveling public. We plan for a trip of 20 minutes and we experience a trip of 40 minutes. Travelers and shippers are especially sensitive to the unanticipated disruptions to tightly scheduled personal activities and manufacturing distribution procedures.

Aggressive management of temporary disruptions, such as **incidents, work zones, weather,** and **special events** can reduce the impacts of these disruptions and return the system to "full capacity."

In recent years a great deal of time and funding has been dedicated to this form of congestion. The deployment of Intelligent Transportation Systems (ITS) that includes cameras and automated detection on the freeways and main arterials has greatly advanced the areas capabilities when it comes to detecting and responding to non-recurring congestion.

Another tool in addressing non-recurring congestion is the implementation of a courtesy patrol. To improve the safety and efficiency of the freeway system, many cities and states have implemented a Freeway Service Patrol (FSP). Although the name, hours of service, operational procedures, and equipment may vary from one location to the next, the goal remains the same: to clear incidents as quickly as possible and reduce the likelihood of congestion and secondary incidents. The services provided vary depending on the situation, and typically range from providing assistance to emergency responders at the scene of a crash, to changing a flat tire or providing gas to a stranded motorist.

In 2007, MDOT completed a feasibility study to determine if a service of this nature was warranted for the GVMC area. The findings of that report indicate that an initial overall return on investment could be as high as 5:1 with a very conservative service in place. The complete report can be found in Appendix D.

CMP Characteristics

The 2010 GVMC Congestion Management Process consists of 8 major characteristics. These characteristics include:

CMP Characteristics
1. Develop Congestion Management Objectives
2. Identify Area of Application
3. Define Network of Interest
4. Develop Performance Measures
5. Institute System Performance Monitoring Plan
6. Identify/Evaluate Strategies
7. Implement Strategies/Improvements
8. Monitor Effectiveness

1. <u>Congestion Management Objectives</u>

Historically GVMC has traditionally relied on measures that related to capital improvements such as volume to capacity (V/C) and level of service (LOS). This revision of the CMP does not completely abandon that traditional approach. Current and future V/C and LOS are measures that GVMC will continue to monitor. This new GVMC CMP places a new emphasis on operations oriented measures.

Operations oriented measures are intended to focus on the experience of the system users. This approach is able to address non-recurring congestion where the traditional approach could not. This shift in focus allows for a transition from facility oriented measures such as traffic counts and speed, to trip related, user oriented measures such as mobility. GVMC and its member transportation facility providers will strive to improve system performance by enhancing Mobility, Reliability, Productivity and Safety.

The following are objectives designed to address many types of congestion on many types of facilities:

Objective 1 – Improve transportation system productivity by addressing capacity deficient miles on the federal aid system by funding improvements that provide sufficient capacity for the movement of people and goods throughout the region. Capacity is defined as 24 hour highway capacity or daily seats available on transit.

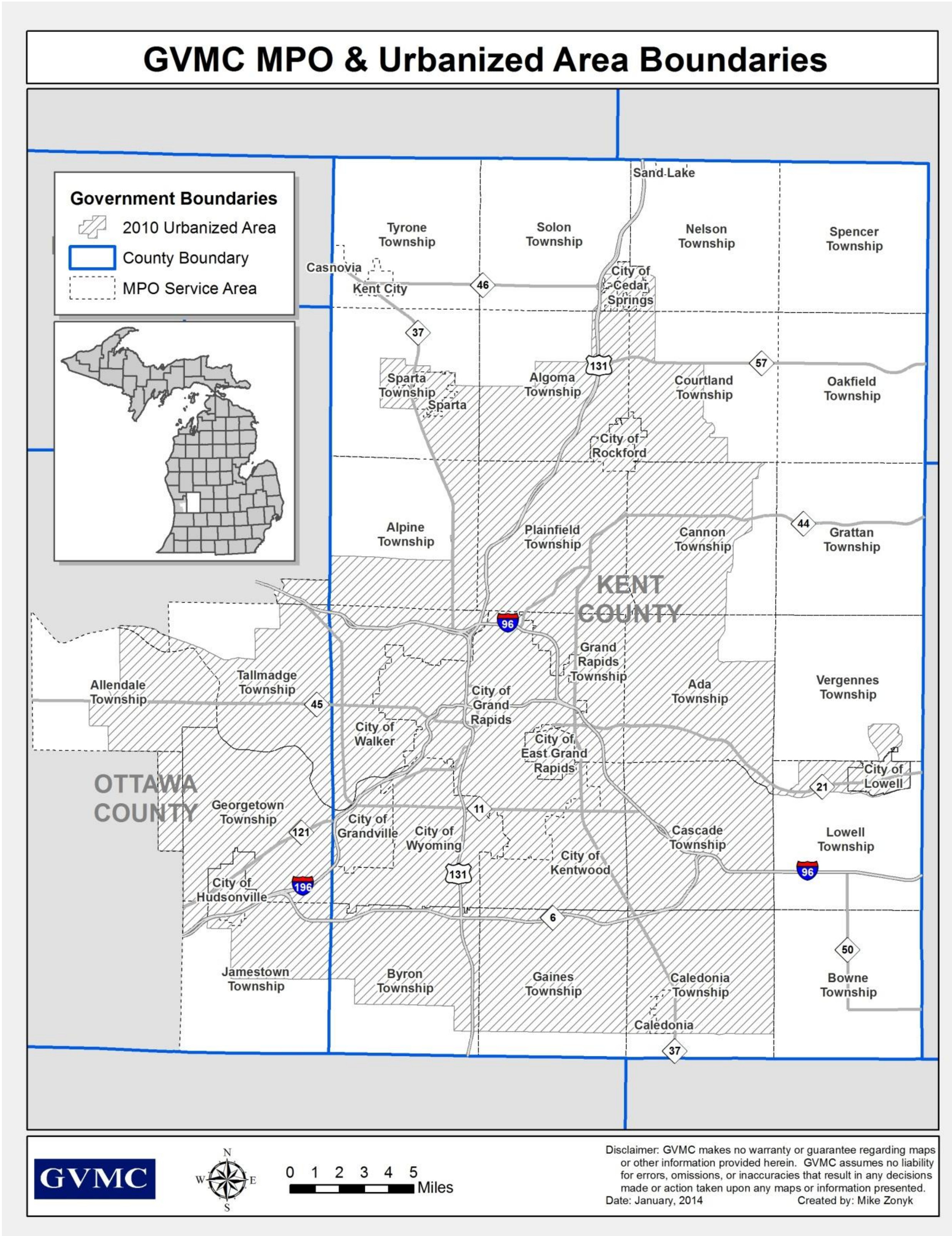
Objective 2 – Enhance mobility by reducing overall travel times and delays along "network of interest" by providing adequate intersection capacity for the throughput of people and freight and by strengthening the efficiency of corridor operations through continued investment in signal timing/progression efforts.

Objective 3 – Increase the reliability of the transportation system and reduce travel delay caused by incidents by continuing enhancement of real time automated incident detection technologies and working toward improved response protocol when incidents are identified.

2. Geographic Area of Application

For each of the three CMP objectives, "Areas of Application" must be determined. At a minimum the Area of Application should be the MPO study area. For the GVMC CMP this Area of Application has been determined to be all of Kent County and the eastern portions of Ottawa County including Allendale, Georgetown, Jamestown and Tallmadge Townships as well as the City of Hudsonville. The map below depicts the Area of Application for the GVMC CMP.

Figure 1 – GVMC MAP – Area of CMP Application



3. Network of Interest

A "Network of Interest" is the specific transportation subset within the Area of Application that will be the focus of a particular portion of the CMP. Traditionally, the entire MPO Metropolitan Area Boundary (MAB) would be the area of focus for the CMP. The GVMC "Network of Interest: is defined as the entire Urban Federal Aid Network.

For Objective 1 (*Improve transportation system productivity by addressing capacity deficient miles on the federal aid system)* the Network of Interest is defined by the transportation system in the entire MPO Urbanized Area (see figure 1).

For Objective 2 (*Enhance mobility by reducing overall travel times and delays along corridors within the Network of Interest)* Only those corridors noted on Figure 2 are included in the Network of Interest for Objective 2.

For Objective 3 (Increase the reliability of the transportation system and reduce travel delay caused by incidents. The Michigan Department of Transportation and the City of Grand Rapids maintain a cooperative Intelligent Transportation System (ITS) effort to monitor and respond to incidents on the major highways and arterials in the urban area. When an incident is detected a process is in place to safely and efficiently clear the incident thus reducing delays and additional incidents.

Currently, the system consists of 56 CCTV cameras, 112 Vehicle Detectors, 25 dynamic message signs, and 4 variable speed signs. As the coverage expands, this area will be redefined with CMP updates. The current (2012) coverage area is shown in figure 3 below.

Figure 2 – Network of Interest

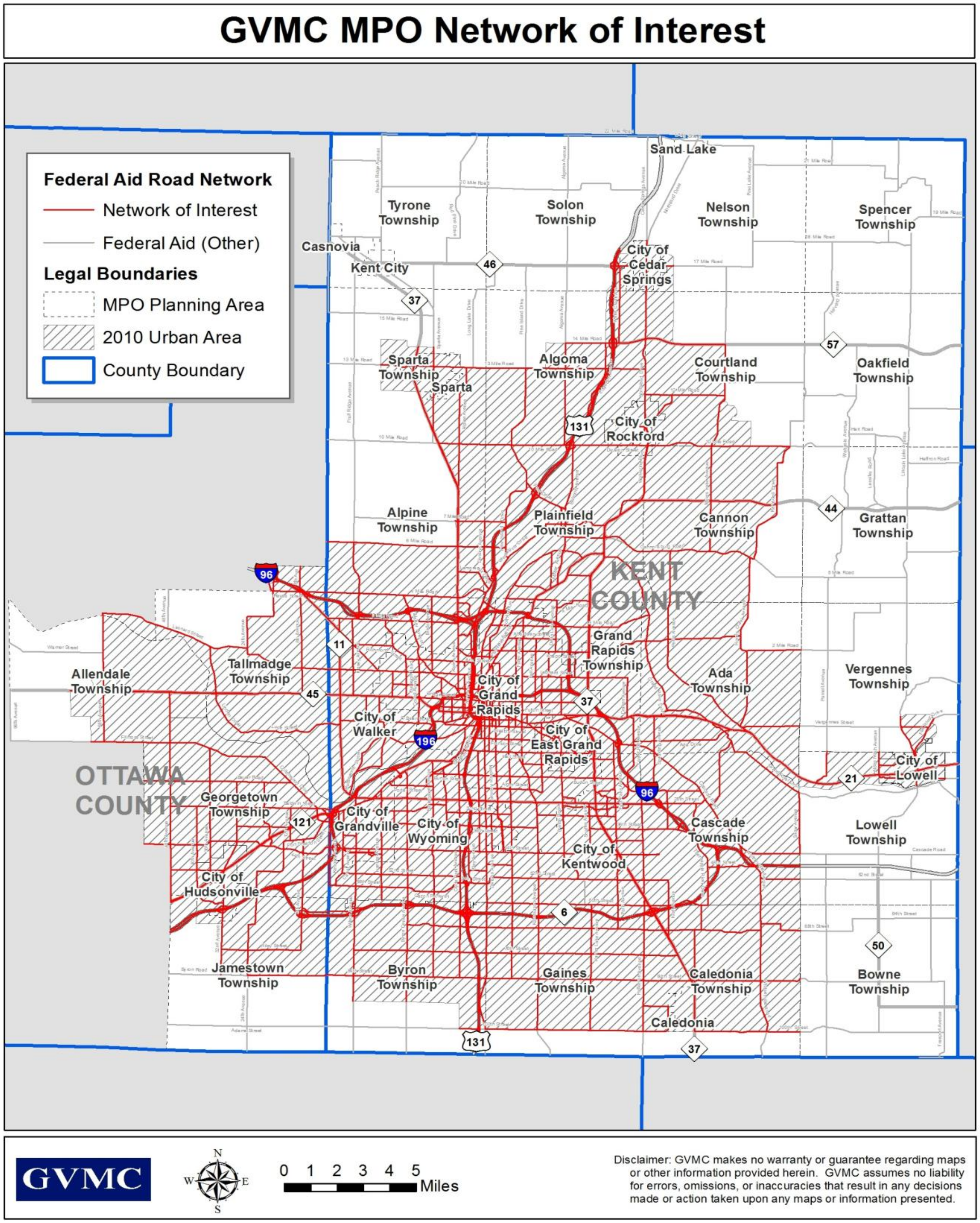
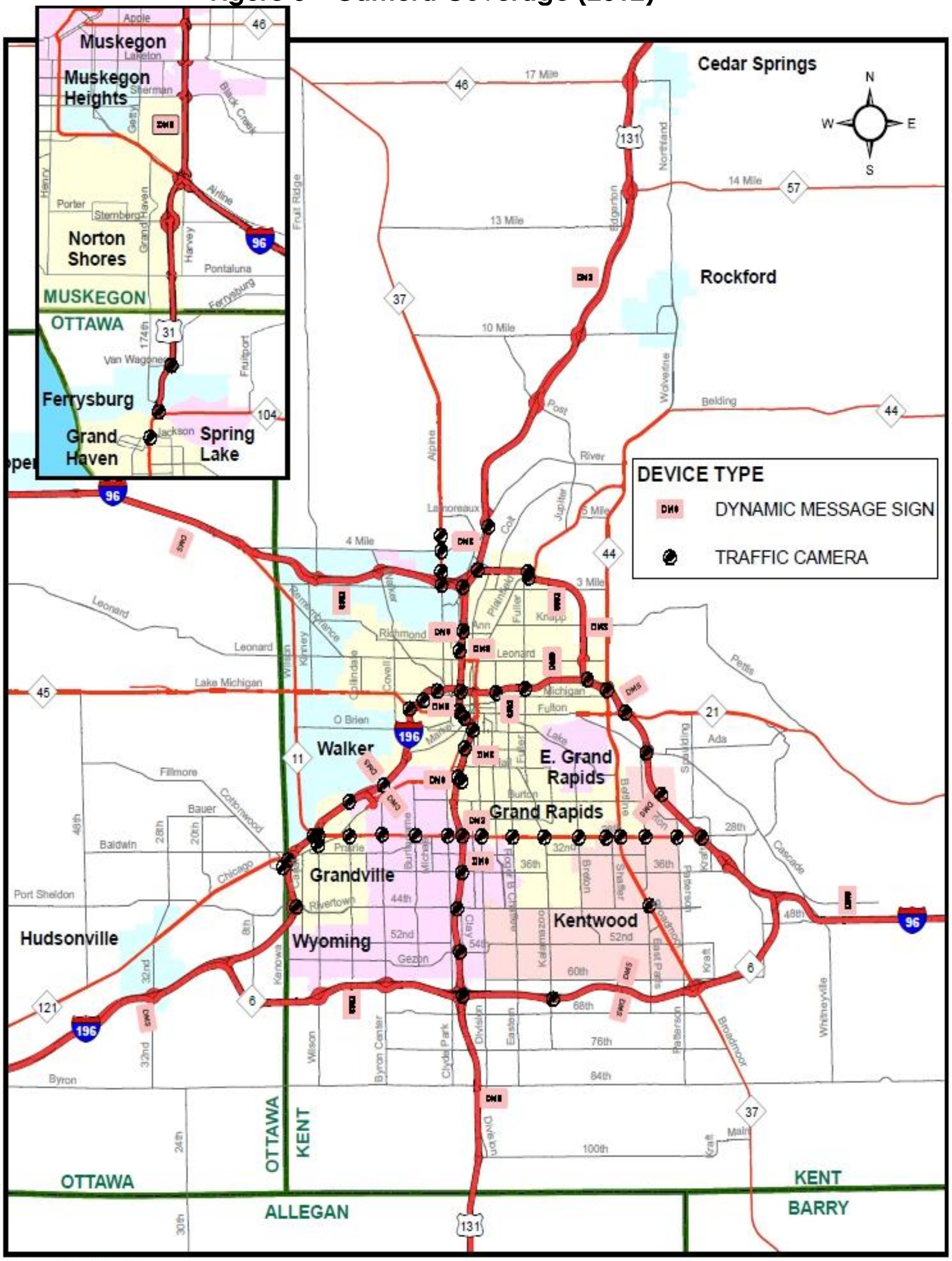


Figure 3 – Camera Coverage (2012)



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4. Performance Measures

The use of performance measures to assess the effectiveness and efficiency of the transportation network and of operations has greatly increased in recent years. Many of these measures are designed for more effective communication both with members of the public and with appointed and elected officials. Rather than using highly technical measures such as level of service, measures such as speed, travel time, and delay are used to describe mobility and access at various levels, from the entire regional system to particular corridors of significance, and even intersection level.

The GVMC CMP defines performance measures for each of the three objectives as follows:

For Objective 1 (*Improve transportation system productivity by addressing capacity deficient miles on the federal aid system)* there will be 3 performance measures. The primary performance measure will be the total number of capacity deficient miles on the federal aid network. The second performance measure will be the Vehicle Miles Traveled (VMT) by congestion level. The third performance measure is defined as the number of deficient miles on designated freight network.

For Objective 2 (*Enhance mobility by reducing overall travel times and delays along Network of Interest)* there is one performance measure. The first performance measure is the overall level of service for each of the specified intersections within the *Network of Interest*. For an intersection to be selected for further analysis, it would be rated at a LOS of "D" or worse. At LOS D there is significant delay experienced.

For Objective 3 (Increase the reliability of the transportation system and reduce travel delay caused by incidents) the performance measure will be the incident clearance times registered by the MDOT ITS Operations Center.

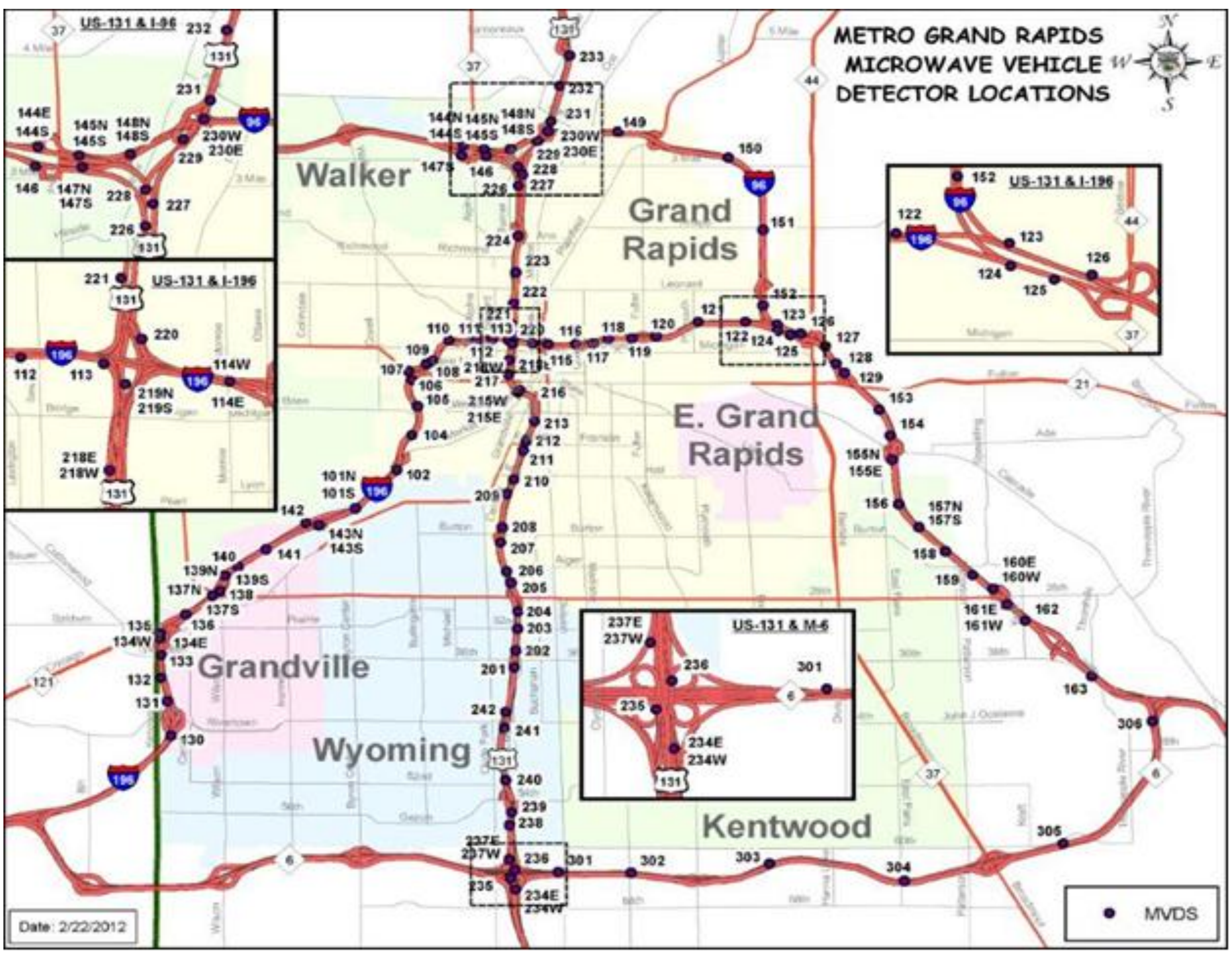
Targets for these individual performance measures will be identified during the development of the Metropolitan Transportation Plan which is updated on a 4 year rotating cycle.

5. <u>System Performance Monitoring Plan</u>

Historically, the availability of data has been the greatest challenge when determining if performance measures are meeting their mark. With the advent of ITS technology for freeway and arterial management, detector data is increasingly available for major facilities in many metropolitan areas.

The GVMC area is no different. Beginning in 2010, the Grand Rapids Metro area will roll out the first of many phases of real time traffic detection. By the time the project is complete most of the urban freeways will be instrumented with detection at a minimum 1 mile increments. Over time this technology will be placed at strategic locations on many of the area's major arterial corridors. Figure 4 shows the freeways to be instrumented in the early phases of this effort.

Figure 4 Detection Coverage



The Final Rule on Metropolitan Transportation Planning calls for "a coordinated program for data collection and system performance monitoring to assess the extent of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions."

Since the mid 1980's when the MPO was known as GRETS, the area has been a leader in the collection and dissemination of transportation related data. Currently, GVMC maintains a traffic count data base that includes nearly 2,000 locations. Each of the links in the modeled federal aid network is counted a minimum of every three years.

For Objective 1 (*Improve transportation system productivity by addressing capacity deficient miles on the federal aid system)* there will be a twofold approach to the performance monitoring plan. The first step will be to maintain the traffic count database on the entire network. Count data will be collected at each location in the modeled network. Second, GVMC will maintain a transportation travel demand model to project the impact of transportation and development projects will impact congestion levels on the transportation system.

For Objective 2 (*Enhance mobility by reducing overall travel times and delays along "network of significance")* The performance monitoring plan will involve collecting travel times for each of the identified "Network of Interest". In addition, intersections within the "Network of Interest" that exceed LOS "D" will be flagged for review. This review will take place as updates are made to the signal progression plans (every 5-7 years). A report will be generated for each MPO Long Range Plan (every 3-4 years) that identifies deficient intersections, efforts made to alleviate congested conditions, and the results of those efforts.

For Objective 3 (Increase the reliability of the transportation system and reduce travel delay caused by incidents) The performance measure will be average clearance times as noted by the MDOT ITS/Operations Center. In the past year MDOT has begun a process where incidents are monitored for clearance time efficiency. Reports are generated monthly that details detected incidents within view of the camera network available to the center. These reports will be the basis of the monitoring plan. As the camera coverage expands so will the coverage of the reporting.

6. Identify/Evaluate Strategies

Selection of the appropriate performance measures, analytical tools, and available data enables the identification of congested locations. Congestion may be recurring or non-recurring; the CMP should be capable of analyzing both types of congestion. Recurring congestion, which takes place at predictable intervals at particular locations, can generally be traced to a specific cause, such as a physical bottleneck or to conditions such as sun glare. Causes of non-recurring congestion may be more difficult to isolate, and solutions may require non-traditional strategies.

The GVMC CMP provides information about a wide range of congestion management strategies applicable to the Grand Rapids area. Using a CMP "cafeteria plan", the MPO committees can select the appropriate solution for recurring congested locations.

The intent of the CMP "cafeteria plan" is to provide a reference for the development of alternative strategies for consideration when Major Investment Studies (MIS) and Corridor Studies are required. These efforts which may be conducted within the context of the Grand Rapids metropolitan transportation planning process will lead to an identified preferred alternative or set of preferred alternatives. Preferred alternatives that do not require this level of further analysis may proceed directly to the MTP as identified.

GVMC CMP strategies include:

A. Highway Projects;
B. Transit Projects;
C. Intelligent Transportation System (ITS) and Transportation System Management (TSM) Strategies;
D. Transportation Demand Management (TDM) Strategies;
E. Land Development Strategies
F. Bicycle and Pedestrian Projects; and
G. Access Management Strategies;

A. Highway Projects

The Long Range Transportation Plan for the area presents the potential highway infrastructure projects that may be applicable for the Grand Rapids area. The regional travel model is the primary analysis tools to assess transportation impacts.

B. Transit Projects

Transit services and infrastructure projects have traditionally been implemented in regions to provide an alternative to automobile travel potentially reducing peak-period congestion and improving mobility and accessibility for commuters. The ITP Master Plan presents transit projects that may be applicable for the area. These projects reduce system wide VMT, improve corridor and system wide accessibility, improve roadway travel times, and decrease congestion on the roadway system. While much of the identified congestion in the region is in spot locations, when congested corridors are identified through the MTP process, ITP and GVMC staff work cooperatively to determine if a transit solution might be a viable alternative.

C. Intelligent Transportation System (ITS) and Transportation System Management (TSM)

Intelligent Transportation System (ITS) and Transportation System Management (TSM) strategies have traditionally focused on improving the operation of the transportation system without major capital investment and cost. While ITS strategies may be costly compared to more traditional TSM strategies, their relative congestion reduction impacts can be significant. Appendix A presents the ITS and TSM strategies that may be applicable for the Grand Rapids area. The strategies identified in Appendix A can build upon current ITS initiatives in the region such as the traffic signal coordination program。

D. TDM Measures

Transportation demand management (TDM) strategies are used to reduce travel during the peak, commute period. They are also used to help the area meet air quality conformity standards, and are intended to provide ways to provide congestion relief/mobility improvements without high cost infrastructure projects. Appendix A presents the TDM strategies that may be applicable for the region. These strategies can potentially build upon current initiatives being implemented in the region such as the local ride share program, funded through the MPO. ITP maintains the regions ride share program which is charged with determining and implementing the strategies that are deemed appropriate for the region.

E. Land Development Strategies

Land development strategies have been used in some areas to manage transportation demand on the system, and to help agencies meet air quality conformity standards. Land development strategies can include limits on the amount and location of development until certain service standards are met, or policies that encourage development patterns better served by public transportation and non-motorized modes. The Grand Valley Metro Council Blueprint strives to work with local jurisdictions to plan for land development strategies that strike an appropriate balance between land use and transportation. More information on the Blueprint effort can be found at: http://gvmc.org/blueprint/index.shtml

F. Bicycle and Pedestrian Projects

Non-motorized modes of transportation, such as biking and walking, are often overlooked as alternatives for alleviating congestion. Investments in these modes can increase safety and mobility in a cost-efficient manner, while providing a zero-emission alternative to motorized modes. The strategies listed can be implemented in the area with relatively little cost, but tend to have local rather than system wide impacts. The effectiveness of an investment in non-motorized travel depends heavily on coordination with local land use policies and connections with other modes, such as transit, for longer distance travel. Safety and aesthetics should also be emphasized in the design of bicycle and pedestrian facilities in order to increase their attractiveness.

G. Access Management

Access management is a broad concept that can include everything from curb cut restrictions on local arterials to minimum interchange spacing on freeways. Restricting turning movements on local arterials can reduce accidents and prevent turning vehicles from impeding traffic flow. Similarly, eliminating merge points and weaving sections at freeway interchanges increases the capacity of the facility. The access management strategies listed in Appendix A are applicable to the area, and can be used in either the modification or original design of a facility.

7. Implement Strategies/Improvements

This step involves the implementation and management of the defined strategies. GVMC will work closely with its member operating agencies that have participated in the CMP process throughout the implementation of congestion management strategies and activities. It is at this point that information gathered through the CMP process will be applied to establish priorities in the Long Range Plan and Transportation Improvement Program thereby facilitating the implementation of the congestion management process. This ensures a linkage between the CMP and funding decisions.

Integration into MPO planning process

The GVMC CMP is only one component of the overall metropolitan planning process. It is integrated with the Metropolitan Transportation Plan (MTP), Transportation Improvement Program (TIP) and MIS and Corridor Studies through its data and analysis functions. The process for the MTP works as follows:

1). Using the model results from the GVMC Travel Demand Model, GVMC staff identifies corridors or locations within corridors that are projected to exceed their designed 24-hour vehicle capacity.

2). Depending on the level of congestion expected to occur in the future year, GVMC working with other stakeholders (ITP, MDOT, local jurisdictions) apply elements listed within the "cafeteria plan" that do not add single occupant vehicle capacity in an attempt to alleviate the congested conditions in the future. An analysis is completed to determine if this process was successful in alleviating congestion. Projects/programs that result from this analysis typically get completed using local funding.

3). If the congestion could not be alleviated using non-capacity adding alternatives, a determination is made whether or not the congestion expected to occur is severe enough to warrant added capacity or if the condition is something that the region can manage or "live with".

4). If non-capacity adding alternatives are selected, an analysis of constraint is then completed to determine if the facility is constrained in any manner. Constraint can come in many forms including but not limited to financial, environmental, physical, political and general consensus.

5). Only after all other alternatives have been exhausted does GVMC turn to adding capacity to a facility. If a determination is made that adding capacity is required, an analysis of the least intrusive cross section is completed and forwarded as the preferred alternative.

The relationships to the MTP and TIP are summarized below.

<u>Relationship to the MTP</u>

The GVMC CMP is related to the development of the regional Metropolitan Transportation Plan in three ways:

- The CMP provides system performance information which may be used by GVMC staff to identify corridors or segments for detailed analysis in Corridor or Major Investment Studies, as recommended by the MTP; and

- The CMP Cafeteria Plan provides alternative congestion management strategies for consideration in MIS and Corridor Studies, which ultimately provide recommendations for preferred strategies to be incorporated into the MTP.

- The CMP provides system performance information for local jurisdictions which sponsor improvements. This information may influence their recommended projects for corporation in the MTP.

<u>Relationship to the TIP</u>

The GVMC CMP is related to the development of the regional Transportation Improvement Program in three ways:

- The CMP provides system performance information for project sponsors, which may influence their recommended projects for incorporation in the TIP;

- The CMP provides system performance information for use by GVMC in evaluating projects nominated for inclusion in the TIP; and

- The CMP provides information about alternative congestion management strategies considered for SOV capacity projects to be advanced using federal funds.

Relationship to Major Investment Studies (MIS) and Other Special Studies

The GVMC CMP is related to the development of MIS and Corridor Studies in two ways:

- The CMP provides system performance information which may be used by GVMC to identify corridors or segments for detailed analysis in Corridor or Major Investment Studies; and

- The CMP Cafeteria Plan provides alternative congestion management strategies for consideration in MIS and Corridor Studies. When traffic congestion is referenced in the Purpose and Need statement for an MIS, the MIS should consider the congestion management strategies included in the GVMC CMP Cafeteria Plan as a starting point for the development of alternative strategies. This does not preclude the MIS from considering other strategies that may not be in the CMP Cafeteria Plan, nor does it require that the MIS select a strategy from the CMP Cafeteria Plan as the preferred alternative.

Relationship to the Regional Intelligent Transportation Systems (ITS) Architecture

All ITS strategies implemented from the CMP Cafeteria Plan will be consistent with the Regional ITS Architecture. GVMC will ensure that both the Regional ITS Architecture and the CMP Cafeteria Plan are reviewed for consistency and reconciled as necessary when either is updated.

Regionally Significant Projects not in CMP

Occasionally, regionally significant projects on facilities not included on the CMP network are implemented for reasons not related to congestion relief. Due to the fact that all federal aid urban facilities in the study area are included in the GVMC CMP, only new facilities would fall into the category of regionally significant facilities not in the CMP. In these cases CMP cafeteria options are followed as described below:

- An analysis of alternatives, including TDM and TSM, is conducted in the context of a Major Investment Study, Corridor Study or development of a NEPA Environmental Document to develop the preferred strategy for the project;
- The development of alternatives for the MIS, Corridor Study or NEPA Document includes a review of the strategies catalogued in the GVMC CMP cafeteria plan;

- The documentation of the study describes how the CMP cafeteria plan strategies were addressed in the development of the preferred strategy.

8. <u>Monitoring Strategy Effectiveness</u>

GVMC as administrators of the CMP will periodically evaluate the effectiveness of strategies identified through the CMP. GVMC will continue to utilize the performance measures developed through the CMP to determine the effectiveness of the selected strategies. In assessing the degree to which the CMP strategies addressed the identified congestion, GVMC will also assess the issue of how well, and to what extent the strategies were implemented, and will continue to consider factors that may have contributed to the success or failure of the selected projects or programs. This evaluation will take place prior to each full update of the regions Metropolitan Transportation Plan and reported to the GVMC Technical and Policy Committees as the data/reports are completed.

This approach will require a plan to collect pre-implementation data, as well as make preparations for an ongoing monitoring process. This ongoing monitoring should isolate even marginal changes in system performance that may be associated with the improvement.

To this end in 2007, GVMC initiated a comprehensive program to measure system delay. While 24 hour volume to capacity (v/c) ratio is effective in identifying congested corridors on a daily basis, the GVMC travel time program will evaluate congestion during peak travel periods. Using a floating car method, average travel times are established for each of the corridors of significance throughout the MPO study area. The initial 2007 efforts were used as a baseline for future work. Before each update to the Long Range Plan, the travel time program will be implemented to measure delay along the corridors of significance. Comparisons will be made to previously recorded travel times and an analysis/report will be completed outlining the various improvements that were completed since the last travel time. Conclusions will be made on the effectiveness of the improvements and recommendations will be made on future efforts. Details on the Travel Time Index (TTI) Program can be found at *<u>gvmc.org</u>*.

Based on the feedback from the assessment process, GVMC will make appropriate adjustments. These adjustments may be with respect to the strategies considered, or may reflect back to the performance measures used; the data collection and management component of the process; or the analytical methods and tools applied. The CMP will be subject not only to periodic review, but to a timetable for upgrading the tools and methods to keep pace with current practice.

Recommendations

For the CMP to be integrated into the Long Range Plan and subsequently into the Transportation Improvement Program (TIP), the various sections of the CMP need to be put into a format that can be implemented. The following is a series of recommendations that are structured in a manner that allows for relative ease of implementation.

<u>Recommendation: Recurring Congestion</u>

Objective 1 (*Improve transportation system productivity by addressing capacity deficient miles on the federal aid system)* emphasizes the reduction of deficient miles on the federal aid system. To address this objective, a list of deficient corridors was developed and can be found in Appendix E. In addition, the list contains recommended solutions to the identified deficiencies. Every attempt is made to minimize the disruption to neighborhoods and communities by avoiding where possible invasive pavement widening projects as the primary solution.

The first recommendation is to implement the solutions in Appendix E. If the recommendations in Appendix E are implemented this objective will be met.

Recurring Congestion Solutions - Cost: $70,000,000

<u>Recommendation: Corridor Progression/Operations</u>

Objective 2 (*Enhance mobility by reducing overall travel times and delays along "corridors of significance")* emphasizes an operations approach to reducing delay by using technology to improve traffic flow along corridors of significance.

The second recommendation is to create a regional inventory of all signalized intersections. There has been a great deal of investment in improved technologies over the past decade and that this investment might not be being fully utilized due to a lack of low cost equipment that precludes the intersection from using the technology that is currently present and working at its optimum ability. Considering an increasing amount of congestion is the result of intersection delay, attention to these low cost fixes would be a good investment.

The third recommendation is to allocate funding for geometric and technological upgrades at the many intersections with identified capacity need.

These actions would meet the intent of Objective #2.

The following is an estimate of need for the system. It is based on recent funding levels and has been inflated (1.5%/year) over time.

Task	Average Annual Need	25 year Long Term Need
Geometric Upgrades	$ 500,000	$12,500,000
Signal/Corridor Upgrades	$ 395,461	$ 9,886,526
Communications Upgrades	$ 292,934	$ 7,323,353
Corridor Progression	$ 335,653	$ 8,391,341
Intersection Asset Inventory	$ 0	$ 150,000
Total	**$1,524,048**	**$38,251,220**

Corridor Progression/Operations Solutions - Cost: $38,251,220

Recommendation: Non-Recurring Congestion

Objective 3 – Increase the reliability of the transportation system and reduce travel delay caused by incidents by continuing enhancement of real time automated incident detection technologies and working toward improved response protocol when incidents are identified.

The forth recommendation is to maintain and moderately expand to completion the regional ITS network.

The fifth and final recommendation is to allocate funding toward the development and operation of a freeway service patrol. This service could be subsidized by sponsors/advertising as is done in other parts of the country.

Task	Annual Need	Long Term Need
Operations/Maintenance	$1,500,000	$37,500,000
Freeway Courtesy Patrol	$ 250,000	$ 6,250,000
Moderate Expansion	$1,200,000	$12,000,000
Total	**$2,950,000**	**$54,750,000**

Non-Recurring Congestion Solutions - Cost: $54,750,000

Appendix A

Cafeteria Plan Alternatives

Potential Transit Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	**Congestion and Mobility Benefits**
Alternative: Implementing Park-and-Ride Lots	
These can be used in conjunction with HOV lanes and/or express bus services. They are particularly helpful for encouraging HOV use for longer distance commute trips.	Reduce regional VMT Increase mobility and transit efficiency
Alternative: Increasing Bus Route Coverage or frequencies	
This provides better accessibility to transit to a greater share of the population. Increasing frequency makes transit more attractive to use.	Increase transit ridership Decrease travel time Reduce daily VMT
Alternative: Bus Rapid Transit (BRT)	
This provides a more attractive transit mode by removing typical bus delay and carrying more passengers.	*Increase transit ridership* *Decrease travel time* *Reduce daily VMT*

Potential ITS/TSM Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	Congestion and Mobility Benefits
Alternative: Ramp Metering	
This allows freeways to operate at their optimal flow rates, thereby speeding travel and reducing collisions.	Decreased travel time
Alternative: *Highway Information Systems*	
These systems provide travelers with real-time information that can be used to make trip and route choice decisions.	Reduced travel times and delay Peak period travel shift
Alternative: *Advanced Traveler Information Systems*	
This provides an extensive amount of data to travelers, such as real time speed estimates on the web or over wireless devices, and transit vehicle schedule progress.	Reduced travel times and delay Peak period travel shift
Alternative: Traffic Signal Coordination/Activation	
This improves traffic flow and reduces emissions by minimizing stops on arterial streets.	Improve travel time Reduce number of stops
Alternative: Freeway Incident Detection and Management Systems	
This is an effective way to alleviate nonrecurring congestion. Systems typically include video monitoring, dispatch systems, and sometimes roving service patrol vehicles.	Reduce accident delay Reduce travel time

Potential TDM Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	Congestion and Mobility Benefits
Alternative: Alternative Work Hours	
This allows workers to arrive and leave work outside of the traditional commute period. It can be on a scheduled basis or a true flextime.	Reduce peak period VMT Improve travel time for participants
Alternative: Telecommuting	
This involves employees to work at home or regional tele-commute center instead of going into the office. They might do this all the time, or only one or more days per week.	Reduce VMT Reduce SOV trips
Alternative: Mixed-Use Development	
This allows many trips to be made without automobiles. People can walk to restaurants and services rather than use their vehicles.	Increase walk trips Decreased SOV trips Decrease in VMT & VHT
Alternative: Ridesharing	
This is typically arranged/encouraged through employers or transportation management agencies (TMA), which provides ride-matching services.	Reduce work related VMT Reduce SOV trips

Potential Land Development Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	Congestion and Mobility Benefits
Alternative: Transit-Oriented Development	
This clusters housing units and/or businesses near transit stations in walkable communities	Decrease SOV share Increased transit usage Decreased vehicle trips/VMT
Alternative: Infill and Densification	
This takes advantage of infrastructure that already exists, rather than building new infrastructure on the fringes of the urban area.	Decrease SOV Increased transit Decreased VMT per dwelling

Potential Non-motorized Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	Congestion and Mobility Benefits
Alternative: New Sidewalks and Designated Bicycle Lanes on Local Streets.	
Enhancing the visibility of bicycle and Increased mobility and access pedestrian facilities increases the perception of safety. In many cases, bike lanes can be added to existing roadways	Increased mobility and access Increased non-motorized mode share Reduced incidents
Alternative: Improved Bicycle Facilities at Transit Stations and Other Destinations	
Bicycle racks and bike lockers at transit stations and other trip destinations increase security. Additional amenities such as locker rooms with showers at workplaces provide further incentives for using bicycles.	Increased bicycle mode share Reduced congestion at major trip generators
Alternative: *Improved Safety of Existing Bicycle and Pedestrian Facilities.*	
Maintaining lighting, signage, striping, traffic control devices, and pavement quality, and installing curb cuts, curb extensions, median refuges, and raised crosswalks can increase bicycle and pedestrian safety.	Increased non-motorized mode share Reduced incidents
Alternative: *Exclusive Non-Motorized Rights-of-Way.*	
Abandoned rail rights-of-way and existing parkland can be used for medium- to long distance bike trails, improving safety and reducing travel times.	Increased mobility Reduced congestion on nearby roads

Potential Access Management Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	Congestion and Mobility Benefits
Alternative: Left Turn Restrictions; Curb Cut and Driveway Restrictions	
Turning vehicles can impede traffic flow and are more likely to be involved in crashes.	Increased capacity/efficiency Improved mobility/travel time
Alternative: Turn lanes and New or Relocate Driveways and Exit Ramps	
In some situations, increasing or modifying access to a property can be more beneficial than reducing access	Increase capacity/efficiency Improved mobility/safety Improved travel times

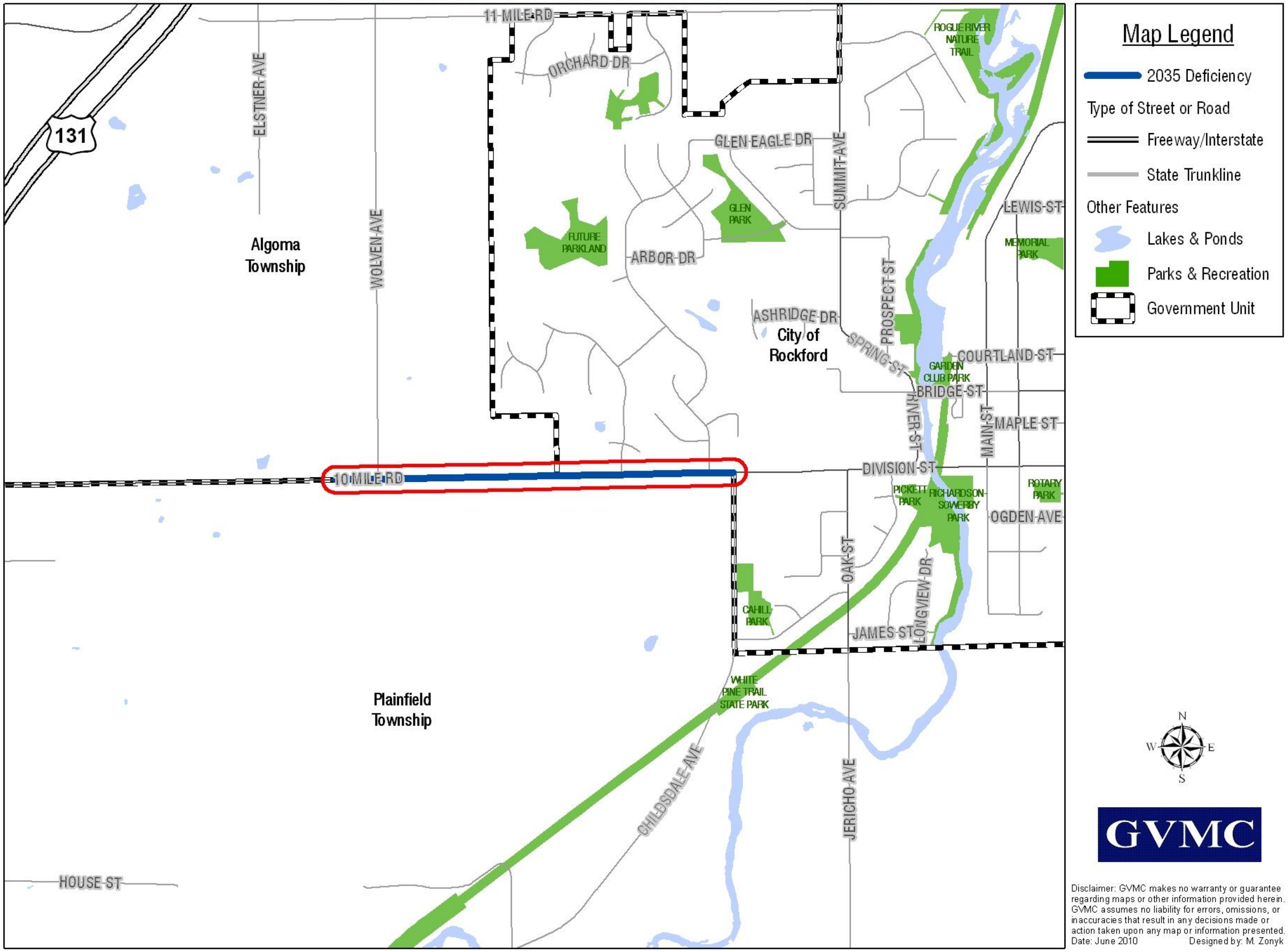
Potential Highway Strategies in the GVMC CMP Cafeteria Plan

Strategies/Projects	Congestion and Mobility Benefits
<u>Alternative: Increasing Number of Lanes without Highway Widening</u>	
Uses "excess" width in the highway cross section used for breakdown lanes or median	Increased Capacity
<u>Alternative: Geometric Design Improvements</u>	
This includes widening to provide shoulders, additional turn lanes at intersections, auxiliary lanes to improve merging and diverging.	Increase mobility Reduce congestion by improved, sight lines improving bottlenecks Increase traffic flow and improve safety
<u>Alternative: HOV Lanes</u>	
This increases corridor capacity while at the same time provides an incentive for single-occupant drivers to shift to ridesharing. These lanes are most effective as part of a comprehensive effort to encourage HOVs, including publicity, outreach, park-and-ride lots, and ride share matching services.	Reduce Regional Trips Increase Vehicle Occupancy Improve Travel Time Increase transit use efficiency *Reduce Regional VMT*
<u>Alternative: Highway Widening by Adding Lanes</u>	
Traditional Method for relieving congestion	Increased capacity, reduced congestion in the short term. Long term effects depend on local conditions

Appendix B

GVMC Congestion Management Process
Analysis Documentation

10 Mile Road From West of Wolven To Chilsdale Avenue



10 Mile Road - Wolven Ave to Childsdale Ave

Jurisdiction: KCRC/Algoma Twp

NFC: Urban Principal Arterial

Length: 1.69 miles Lanes: 2

Current ADT: 17,000 Current Capacity: 13,200

Projected 2035 ADT: 20,800 Projected V/C: **1.58**

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

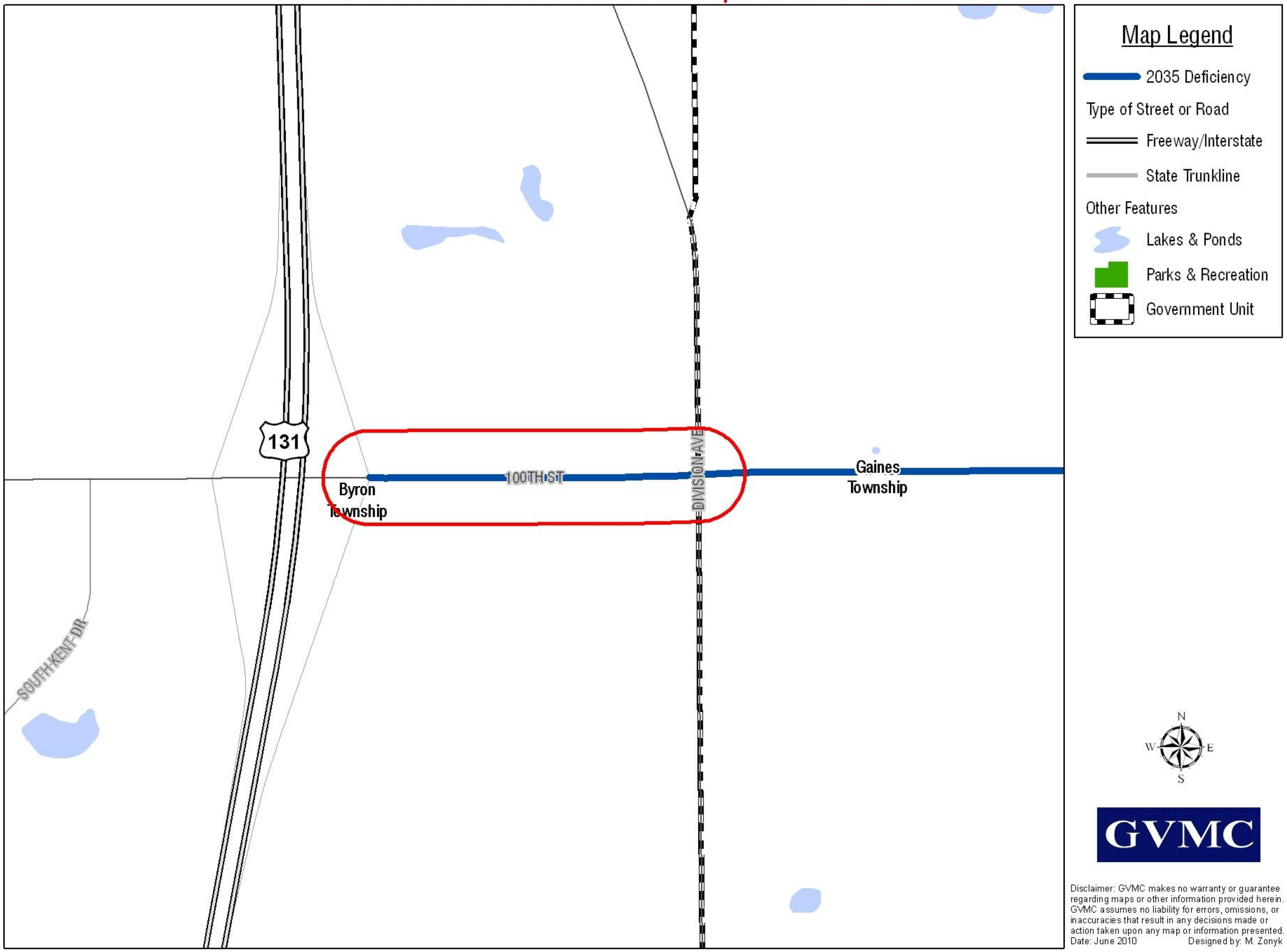
Preferred Alternative: Reconstruct and Widen to 5 Lanes in 2011

CMP Analysis

This facility serves as the primary corridor for access to the City of Rockford from US-131. To eliminate the future deficiency, over 8,000 vehicles per day would need to be removed from the corridor. None of the CMP options can reasonably be expected to achieve this reduction. Therefore the selected alternative is to widen the facility from its current two lanes to a five lane configuration. A five lane configuration provides the amount of capacity needed for the nearly 21,000 vehicles per day expected to use this corridor in 2035. The center turn lane will also add a safe refuge for vehicles making left turns on this high speed corridor.

Deficiency Resolved? Yes, the 2035 V/C will be 0.60.

100th Street From US-131 NB Ramps To Division Avenue



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Date: June 2010 Designed by: M. Zonyk

100th Street – US-131 to Division Avenue

Jurisdiction: KCRC/Byron Twp.

NFC: Urban Minor Arterial

Length: 0.20 miles Lanes: 3

Current ADT: 9,300 Current Capacity: 18,000

Projected 2035 ADT: 17,000 Projected V/C: 0.94

Phase Deficient: Borderline by 2035

Transit Available: No Freight Route: Yes

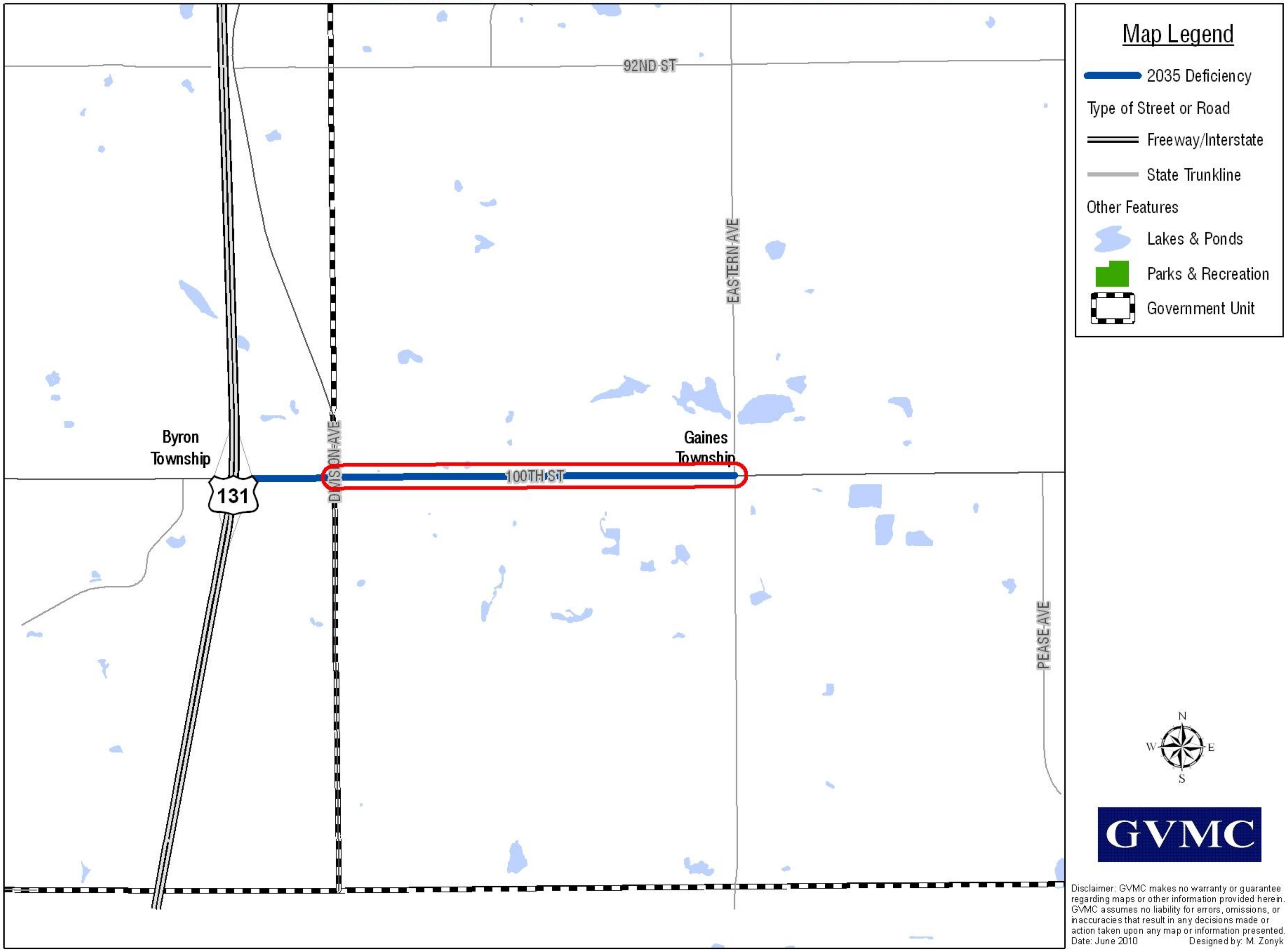
Preferred Alternative: Continued Monitoring – Access Management for new Development

CMP Analysis

This facility serves as an access corridor to US-131. There is commercial development adjacent to the interchange. As development occurs consideration should be given to well planned access management.

Deficiency Resolved? N/A

100th Street From Division Avenue To Eastern Avenue



100th Street – Division Ave to Eastern Ave

Jurisdiction: KCRC/Byron Twp

NFC: Urban Minor Arterial

Length: 0.98 miles Lanes: 2

Current ADT: 5,831 Current Capacity: 13,600

Projected 2035 ADT: 13,400 Projected V/C: 0.98

Phase Deficient: Borderline in 2035

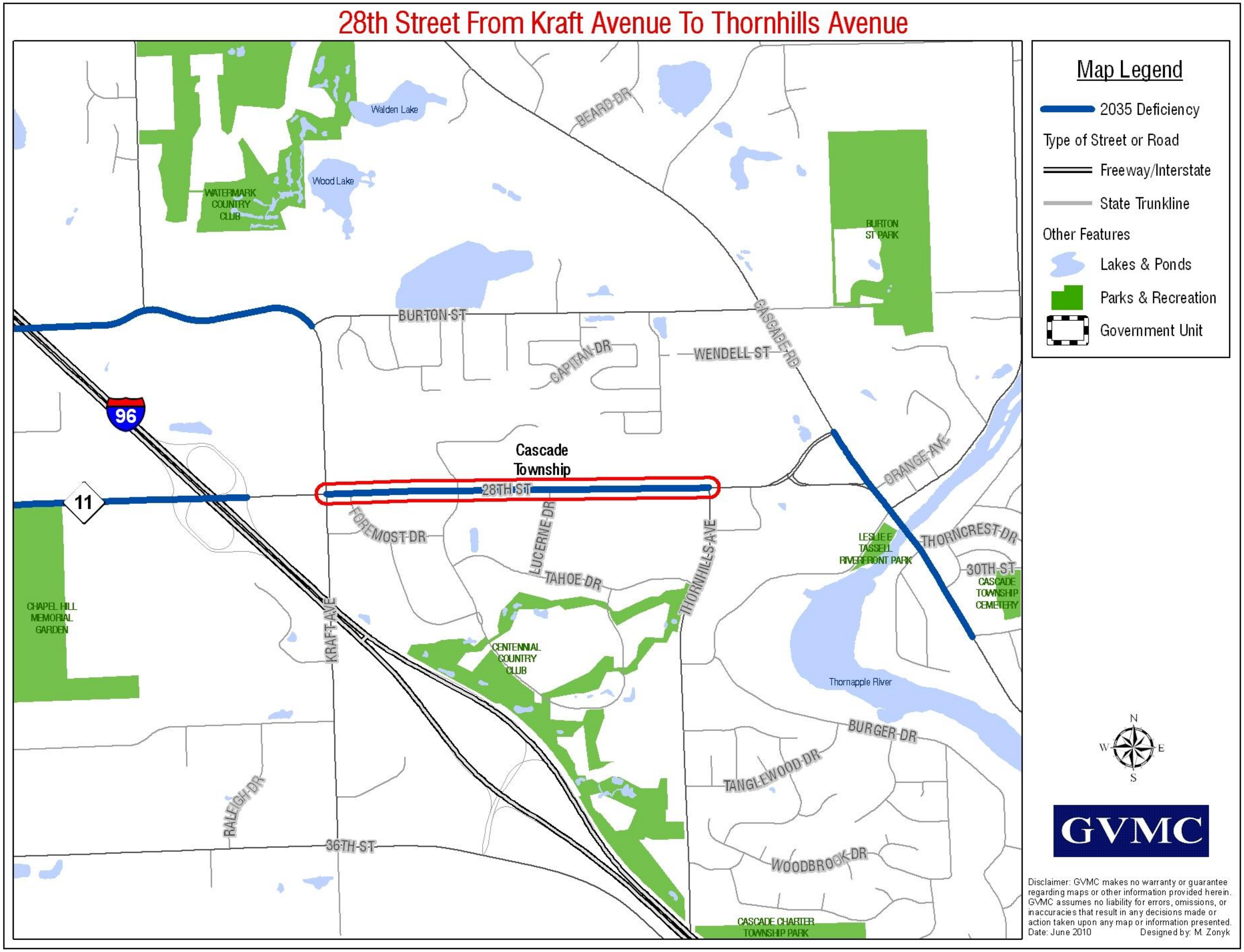
Transit Available: No Freight Route: Partial

Preferred Alternative: Continued Monitoring – Access Management for new Development

CMP Analysis

This facility serves as an access corridor to US-131. There is commercial development adjacent to the interchange. As development occurs consideration should be given to well planned access management.

Deficiency Resolved? N/A



28th Street From Kraft Avenue To Thornhills Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Cascade Township
28TH ST
BURTON ST
WENDELL ST
CAPITAN DR
BEARD DR
CASCADE RD
ORANGE AVE
THORNCREST DR
30TH ST
FOREMOST DR
LUCERNE DR
TAHOE DR
THORNHILLS AVE
KRAFT AVE
BURGER DR
TANGLEWOOD DR
WOODBROOK DR
RALEIGH DR
36TH ST
Walden Lake
Wood Lake
WATERMARK COUNTRY CLUB
BURTON ST PARK
CHAPEL HILL MEMORIAL GARDEN
CENTENNIAL COUNTRY CLUB
LESLIE E TASSELL RIVERFRONT PARK
CASCADE TOWNSHIP CEMETERY
Thornapple River
CASCADE CHARTER TOWNSHIP PARK
96
11
GVMC
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Date: June 2010
Designed by: M. Zonyk

28th Street – Kraft Avenue to Thornhills Avenue

Jurisdiction: KCRC/Cascade Twp

NFC: Urban Minor Arterial

Length: 1.09 miles   Lanes: 5

Current ADT: 31,000   Current Capacity: 34,800

Projected 2035 ADT: 33,500   Projected V/C: 0.96

Phase Deficient: Bordeline in 2035

Transit Available: No   Freight Route: Yes

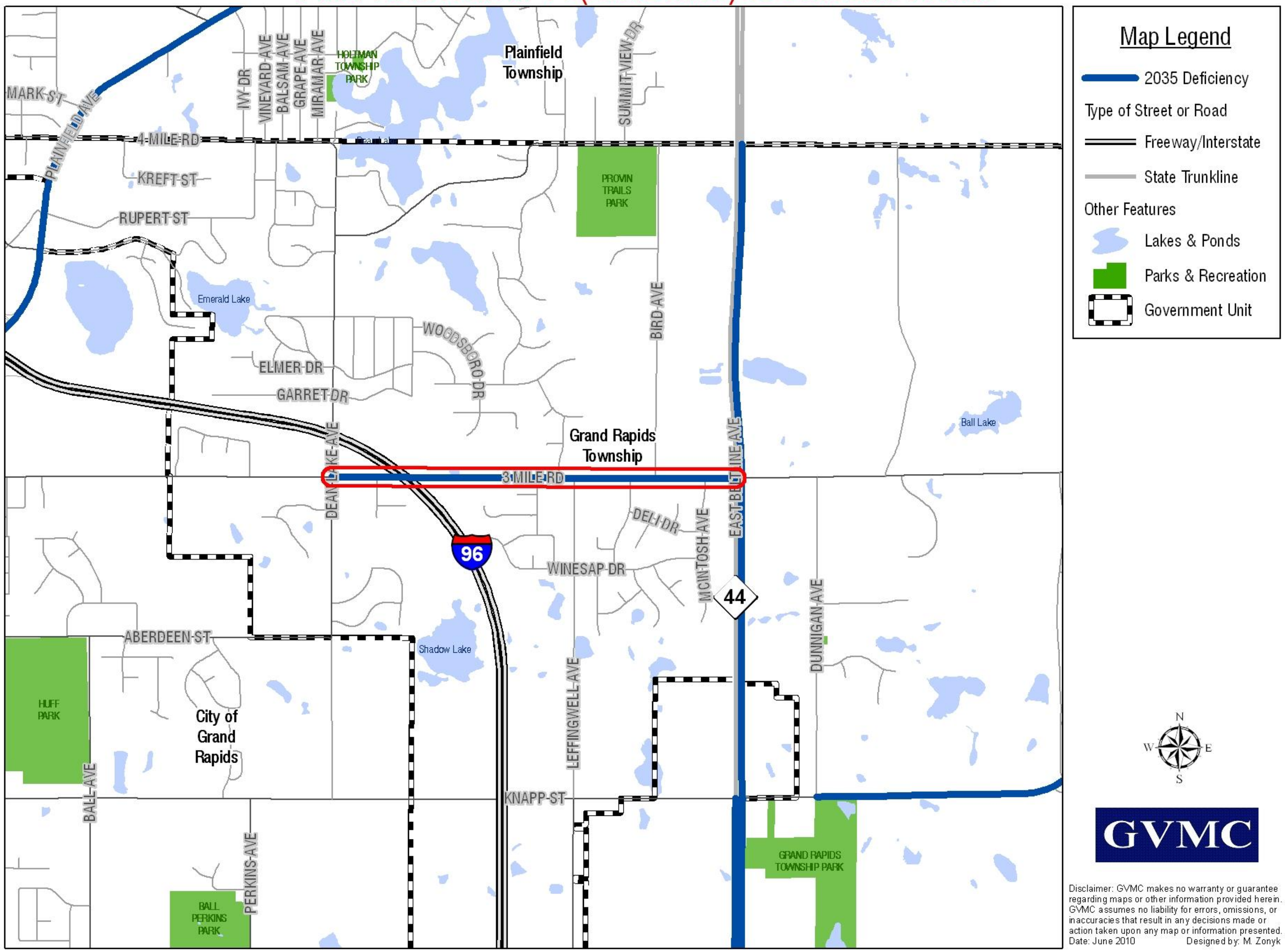
Preferred Alternative: Continued Monitoring – Access Management for new Development

CMP Analysis

This facility serves as the primary corridor for access to Cascade Township from I-96. The corridor is primarily developed commercial/office. Growth in the corridor will be slow as there is little land left for development.

Deficiency Resolved? N/A

3 Mile Road From M-44 (East Beltline) To Dean Lake Avenue



3 Mile Road – M-44 (East Beltline) to Dean Lake Avenue

Jurisdiction: KCRC/Grand Rapids Twp

NFC: Urban Minor Arterial

Length: 1.25 miles   Lanes: 2

Current ADT: 9,000   Current Capacity: 12,000

Projected 2035 ADT: 11,000   Projected V/C: 0.91

Phase Deficient: Borderline by 2035

Transit Available: No   Freight Route: Partial

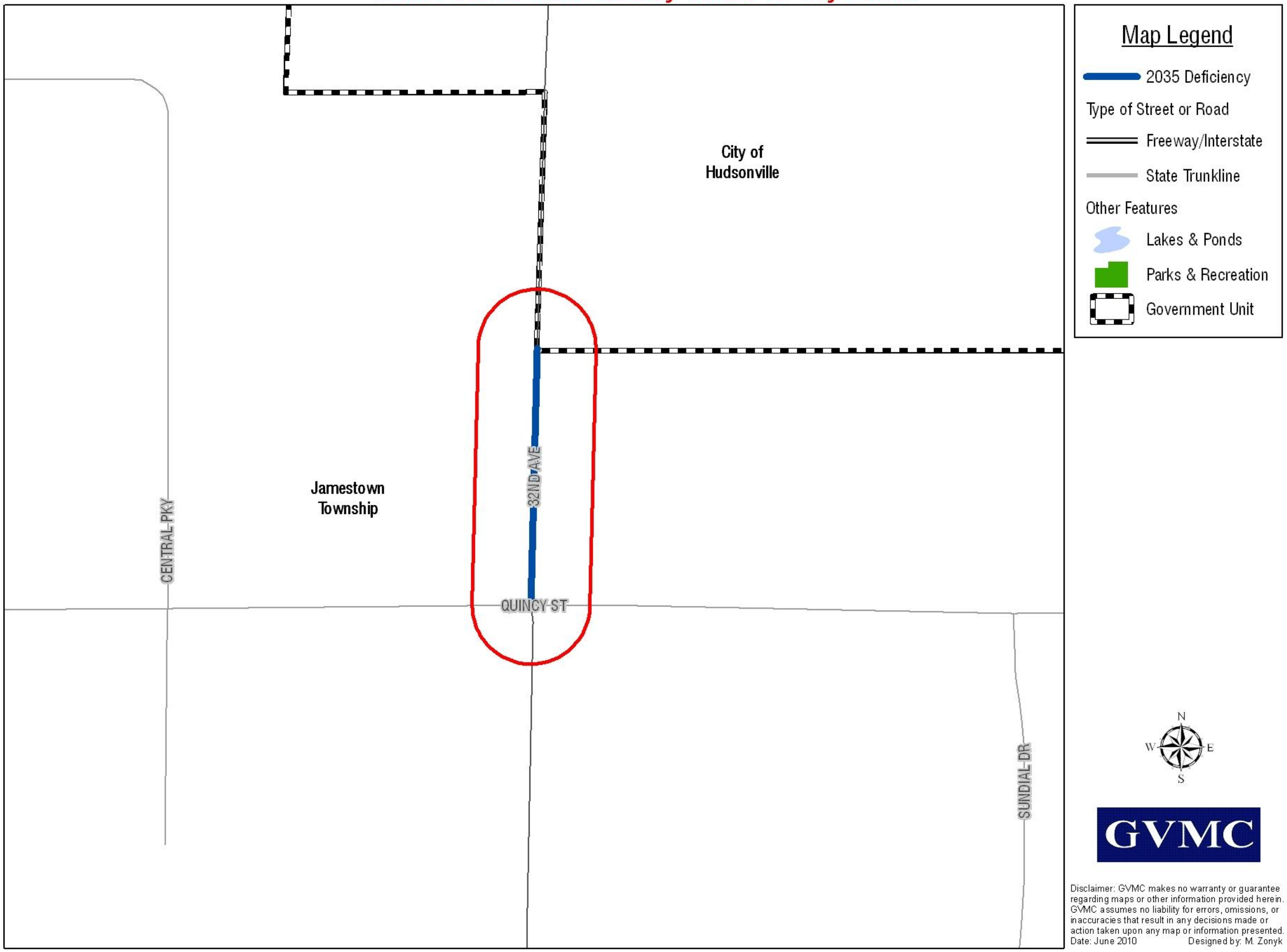
Preferred Alternative: Continued Monitoring – Access Management for new Development

CMP Analysis

This facility serves as a corridor for access from residential areas on the north end of Grand Rapids to the East Beltline. As the commercial and retail properties develop on the Beltline, demand on this facility will increase. The facility currently has enough capacity to handle the projected volumes. This should be monitored and adjusted as necessary with each plan update.

Deficiency Resolved? N/A

32nd Avenue From Quincy Street To City Limits



32^{nd} Avenue – Quincy Street to Hudsonville City Limits

Jurisdiction: OCRC/Jamestown Twp.

NFC: Urban Minor Arterial

Length: 0.14 miles	Lanes: 3
Current ADT: 21,000	Current Capacity: 18,000
Projected ADT: 24,000	Projected V/C: **1.33**

Phase Deficient: Currently Deficient

Transit Available: No	Freight Route: Yes

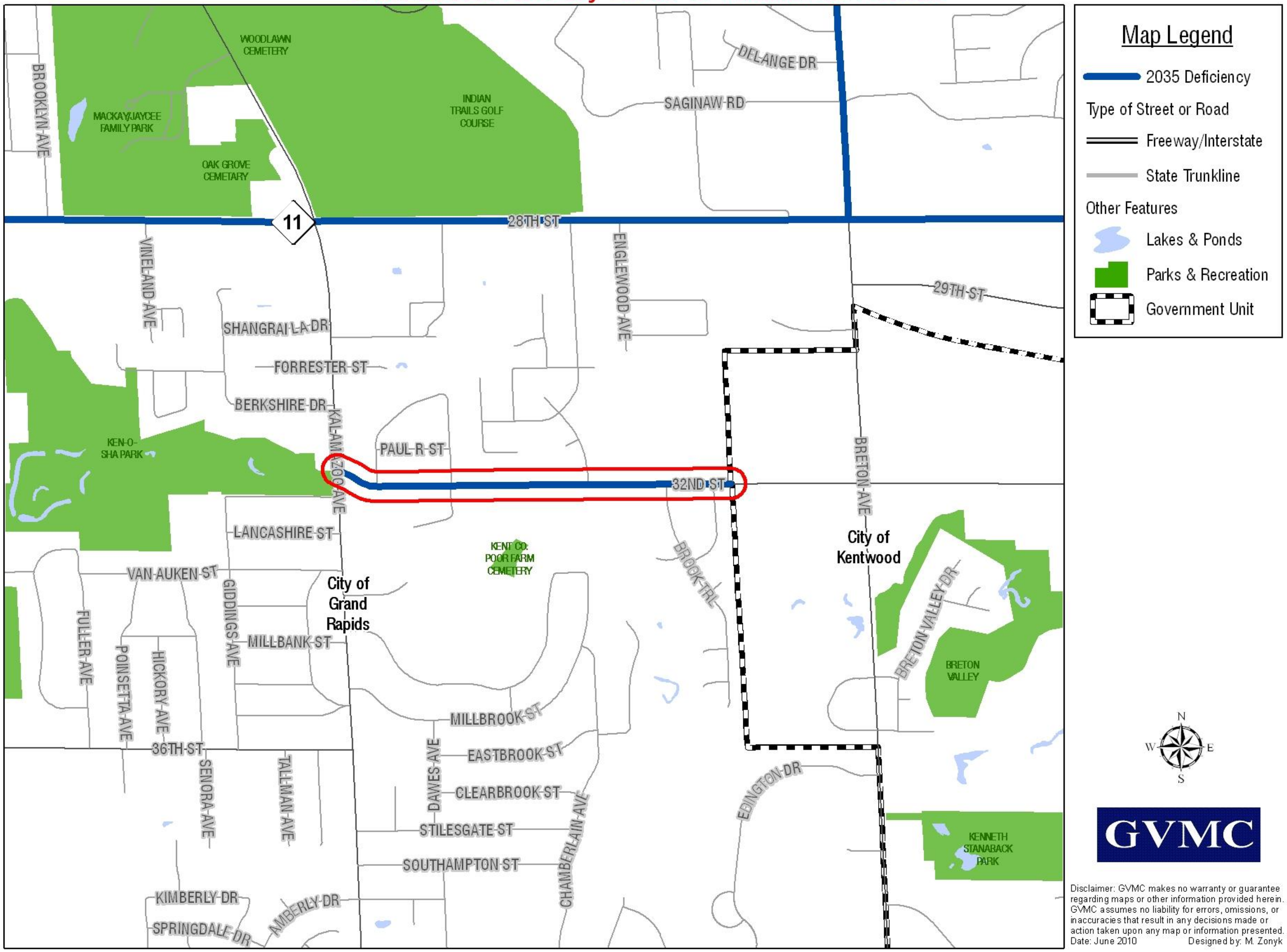
Preferred Alternative: Reconstruct and Widen to 5 Lanes by 2018

CMP Analysis

This facility serves as the primary corridor for access to the City of Hudsonville and I-196 from the developing area to the south. The facility is currently capacity deficient. To alleviate the congested conditions, 6,000 vehicles per day would need to be removed from the corridor. Transit is not available in the area and other less invasive options are not sufficient to address the congested conditions. A five lane configuration provides the amount of capacity needed for the nearly 24,000 vehicles per day expected to use this corridor in 2035. The center turn lane will also add a safe refuge for vehicles making left turns on this corridor. The projected volume includes the construction of a proposed Meijer Store.

Deficiency Resolved? Yes, the 2035 V/C will be 0.69.

32nd Street From City Limits To Kalamazoo Avenue



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Date: June 2010 Designed by: M. Zonyk

32nd Street – GR/KW Limits to Kalamazoo Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.75 miles   Lanes: 3

Current ADT: 14,000   Current Capacity: 18,000

Proj. 2035 ADT: 17,100   Projected V/C: 0.95

Phase Deficient: Borderline by 2035

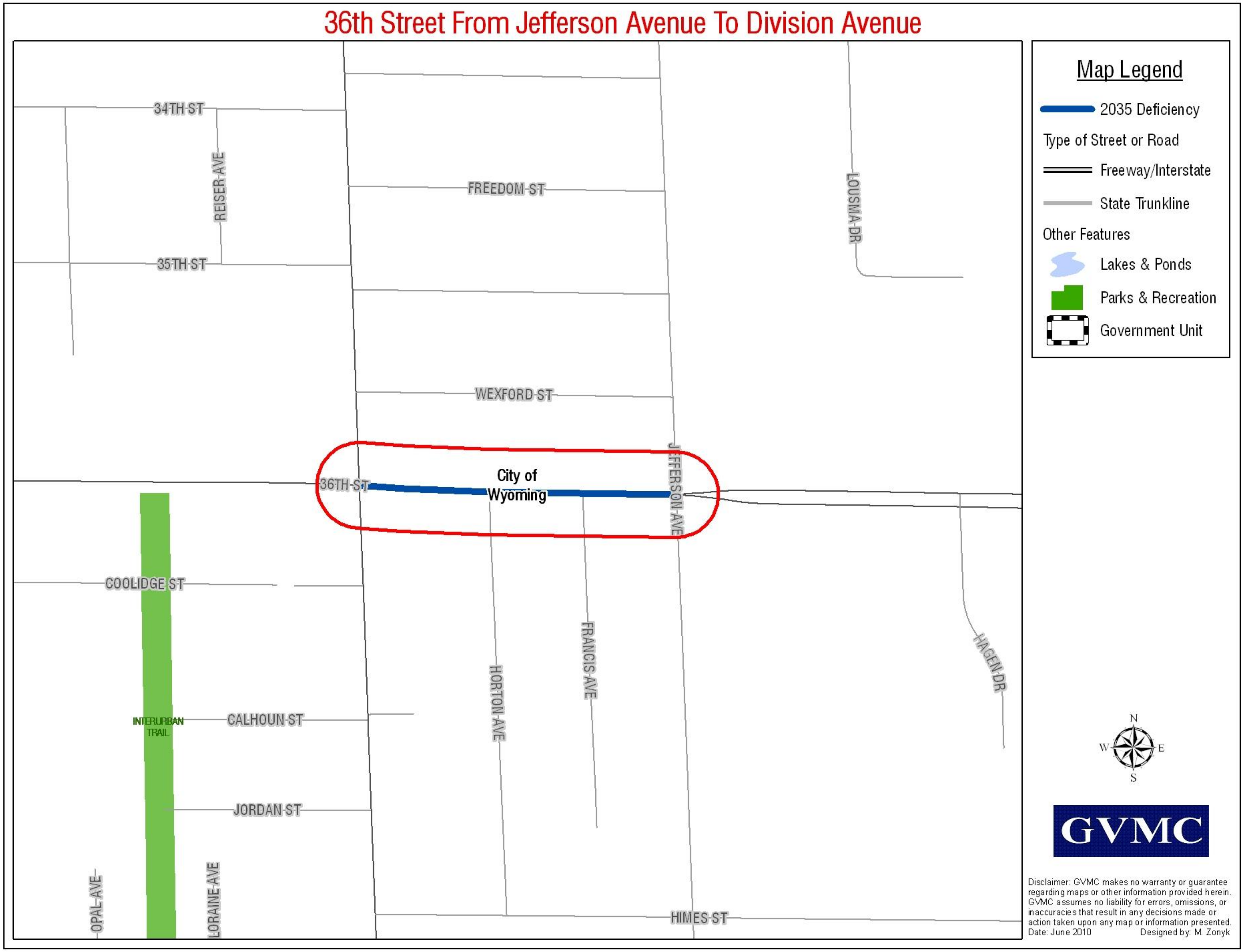
Transit Available: No   Freight Route: No

Preferred Alternative: Continued Monitoring

CMP Analysis

This facility serves as a feeder corridor from adjacent residential areas to the 28th and 44th Street commercial corridors. The growth is expected to be low through 2035 with little or no new growth expected. The corridor was recently converted to a 3 lane facility with bike lanes. Attention to access management will help stretch the available capacity in the corridor.

Deficiency Resolved? N/A


36th Street From Jefferson Avenue To Division Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
34TH ST
REISER AVE
FREEDOM ST
LOUSMA DR
35TH ST
WEXFORD ST
36TH ST
City of Wyoming
JEFFERSON AVE
COOLIDGE ST
FRANCIS AVE
HAGEN DR
HORTON AVE
INTERURBAN TRAIL
CALHOUN ST
JORDAN ST
OPAL AVE
LORAINE AVE
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GVMC
Disclaimer: GVMC makes no warranty or guarantee regarding maps or other information provided herein. GVMC assumes no liability for errors, omissions, or inaccuracies that result in any decisions made or action taken upon any map or information presented.
Date: June 2010
Designed by: M. Zonyk

36^{th} Street – Jefferson Ave to Division Ave

Jurisdiction: City of Wyoming

NFC: Urban Minor Arterial

Length: 0.21 miles   Lanes: 4

Current ADT: 21,200   Current Capacity: 26,400

Proj. 2035 ADT: 23,444   Projected V/C: 0.89

Phase Deficient: Borderline by 2035

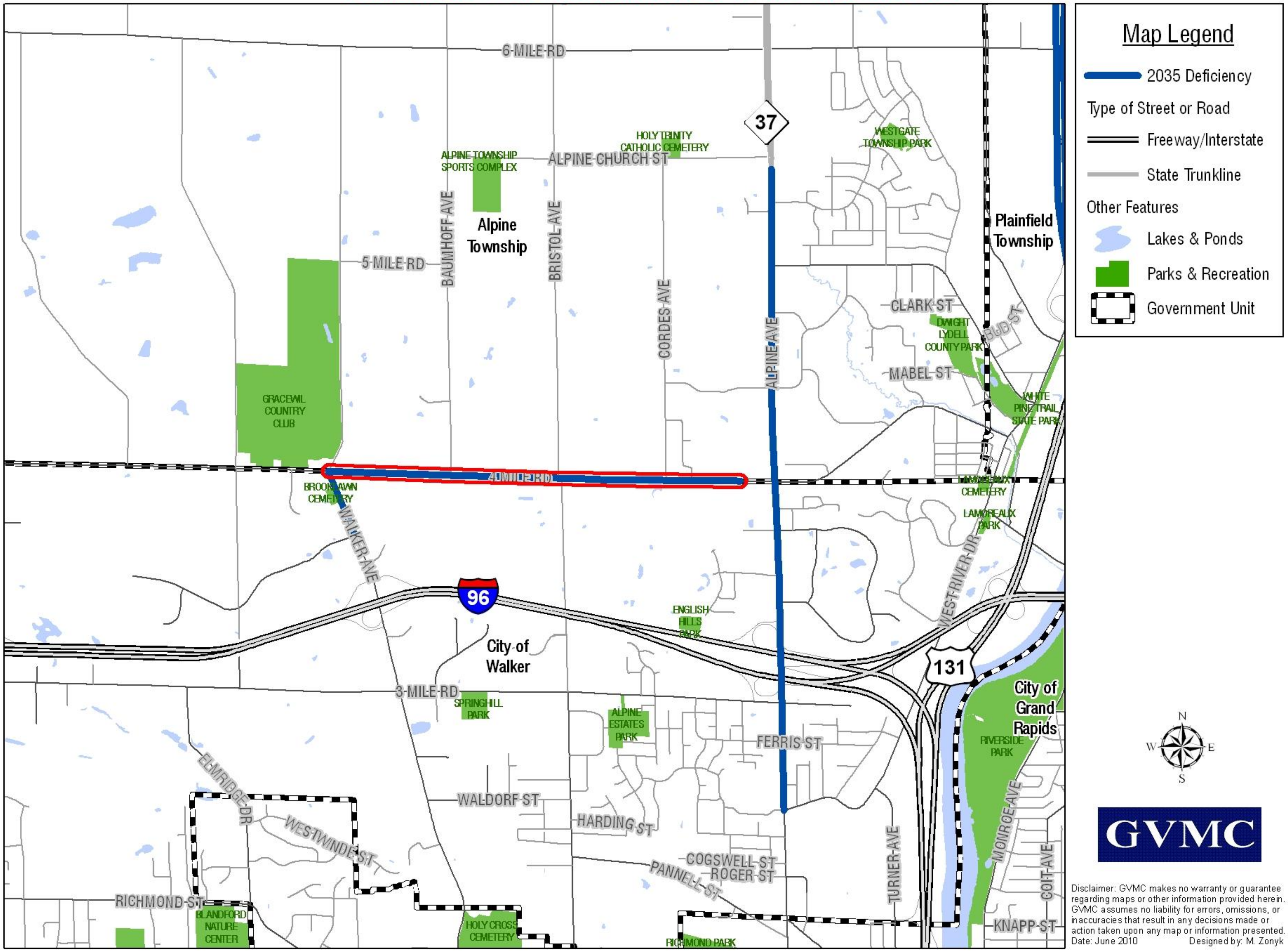
Transit Available: No   Freight Route: Yes

Preferred Alternative: Continue Monitoring

CMP Analysis
This facility serves as a primary access corridor from US-131 and the Roger B Chaffee area light industrial area. The commercial traffic is above average. This is the only section of the corridor between the industrial area and the freeway system. The corridor should be monitored for future capacity issues.

Deficiency Resolved? N/A

4 Mile Road From Walker Avenue To Old Orchard Ave



4 Mile Road – Walker Avenue – Old Orchard Avenue

Jurisdiction: KCRC/Alpine Twp

NFC: Urban Minor Arterial

Length: 0.57 miles Lanes: 2

Current ADT: 9,400 Current Capacity: 12,000

Proj. 2035 ADT: 13,400 Projected V/C: 1.11

Phase Deficient: Deficient by 2018 with (Cabellas)

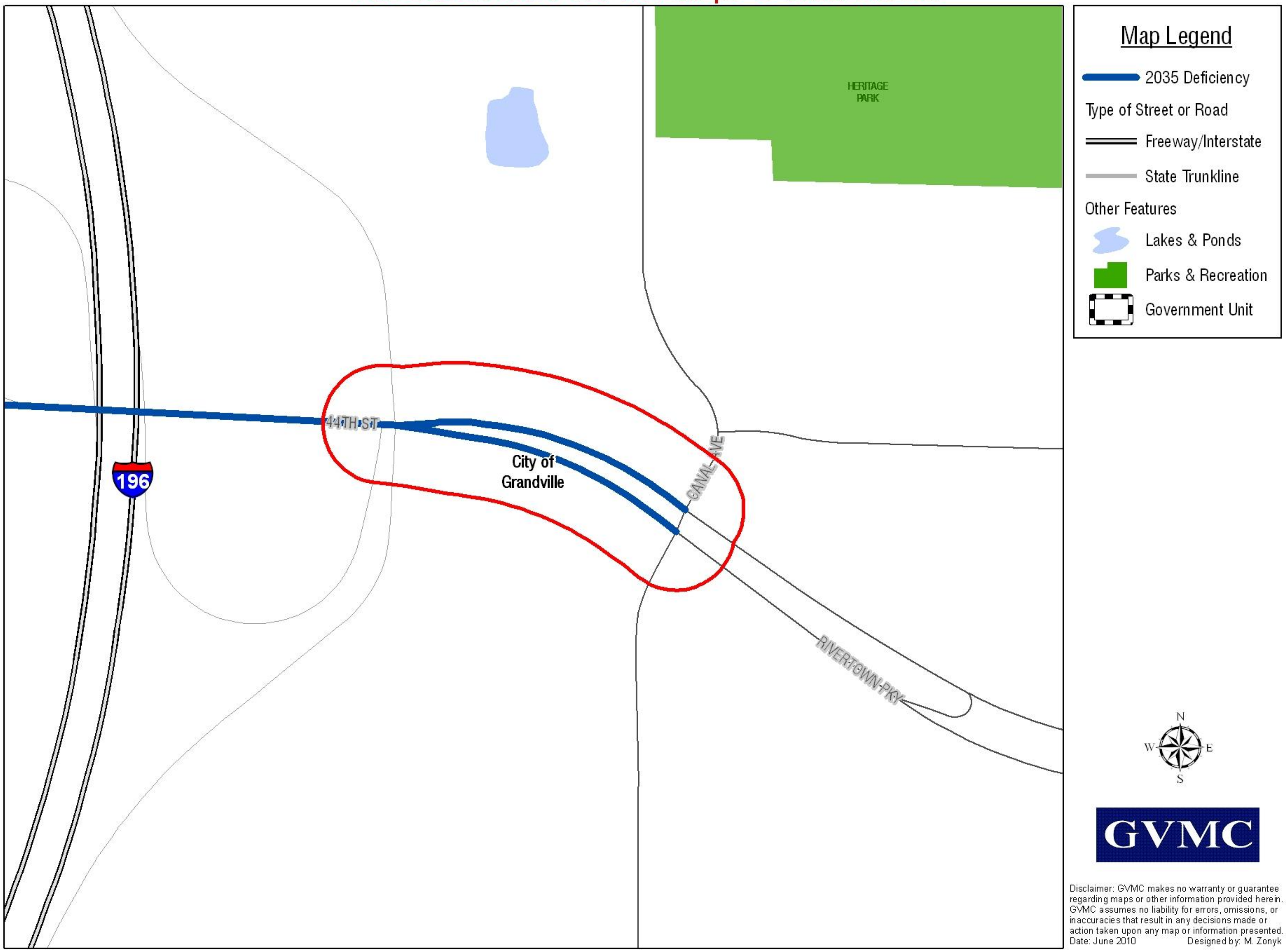
Transit Available: No Freight Route: No

Preferred Alternative: Reconstruct and add center turn lane by 2018 in conjunction with development

<u>CMP Analysis</u>
This facility currently serves as an access corridor from rural Alpine Township residential areas to the bustling commercial Alpine Avenue Corridor. There is proposed mixed use development along the corridor that is projected to bring the daily volumes above acceptable limits by 2018. There is no transit in the area that would help alleviate the congested conditions. All other options would be insufficient to completely address the projected congestion levels. The corridor is currently programmed for improvement in 2014. If the development is further delayed, improvements to this corridor should be limited to reconstruction.

Deficiency Resolved? Yes, the 2035 V/C is .74

44th Street From I-196 EB Ramps To Canal Avenue



44th Street – I-196 EB Ramps to Canal Avenue

Jurisdiction: City of Grandville

NFC: Urban Principal Arterial

Length: 0.27 miles Lanes: 6

Current ADT: 48,057 Current Capacity: 52,200

Proj. 2035 ADT: 50,022 Projected V/C: 0.96

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

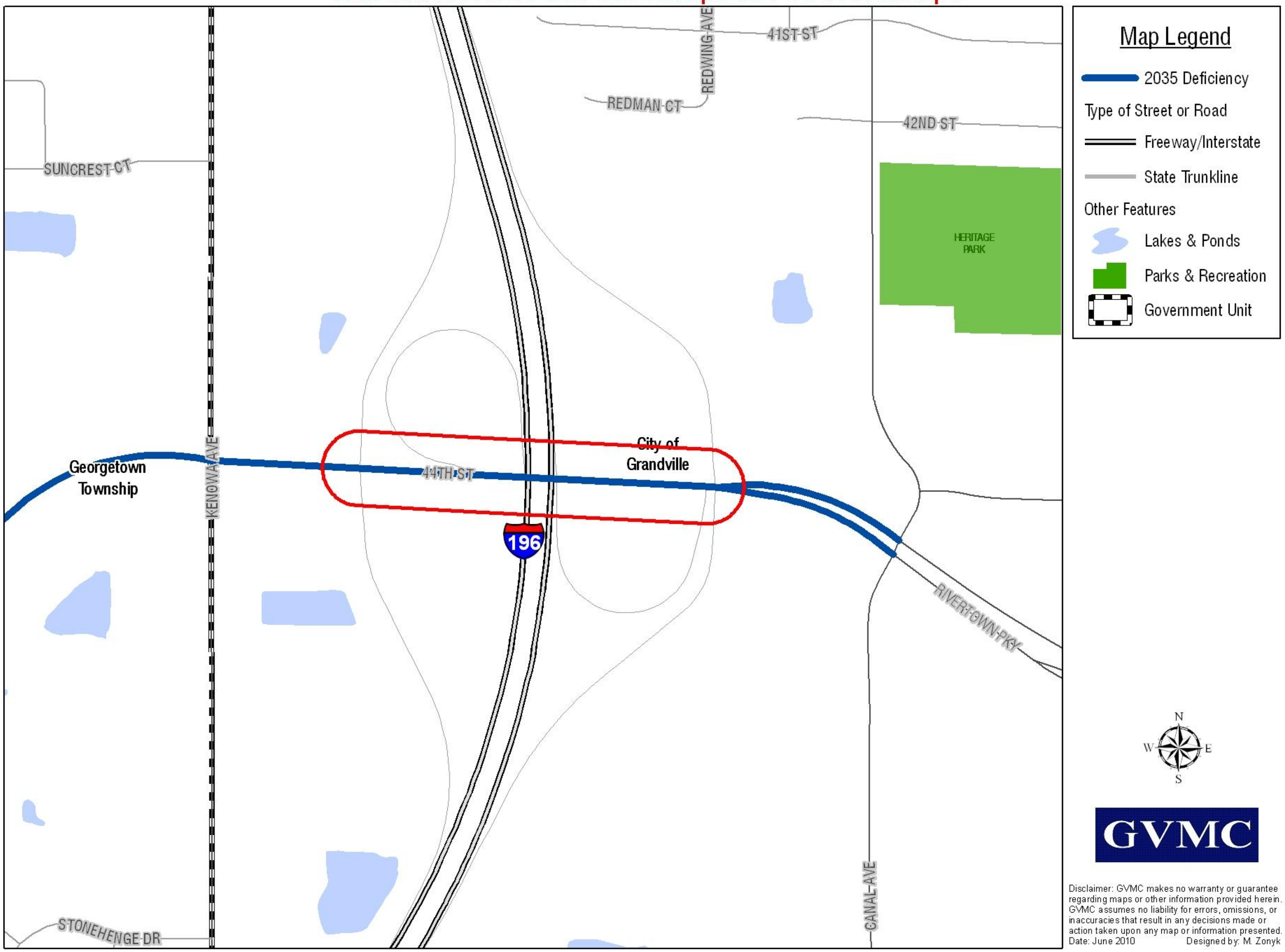
Preferred Alternative: Continued Signal Progression and Monitoring

CMP Analysis

This short section of the 44th Street corridor between the freeway and Canal Avenue is a transition point from divided to a boulevard cross section. The 44th Street Corridor is the primary corridor stretching from the airport on the east end deep into heavily populated areas in western Ottawa County. It also serves as the primary access corridor to the regional mall and associated commercial areas in Grandville. Currently and into the future there is an acceptable of capacity along this section. Any spot congestion experienced is related to the many signalized intersections in short proximity to each other. Maintaining appropriate signal timing in this corridor is crucial for continued adequate operations.

Deficiency Resolved? N/A

44th Street From I-196 WB Ramps To I-196 EB Ramps



44th Street – I-196 EB Ramps to I-196 WB Ramps

Jurisdiction: MDOT/City of Grandville

NFC: Urban Principal Arterial

Length: 0.15 miles Lanes: 5

Current ADT: 38,047 Current Capacity: 38,600

Proj. 2035 ADT: 40,108 Projected V/C: 1.04

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

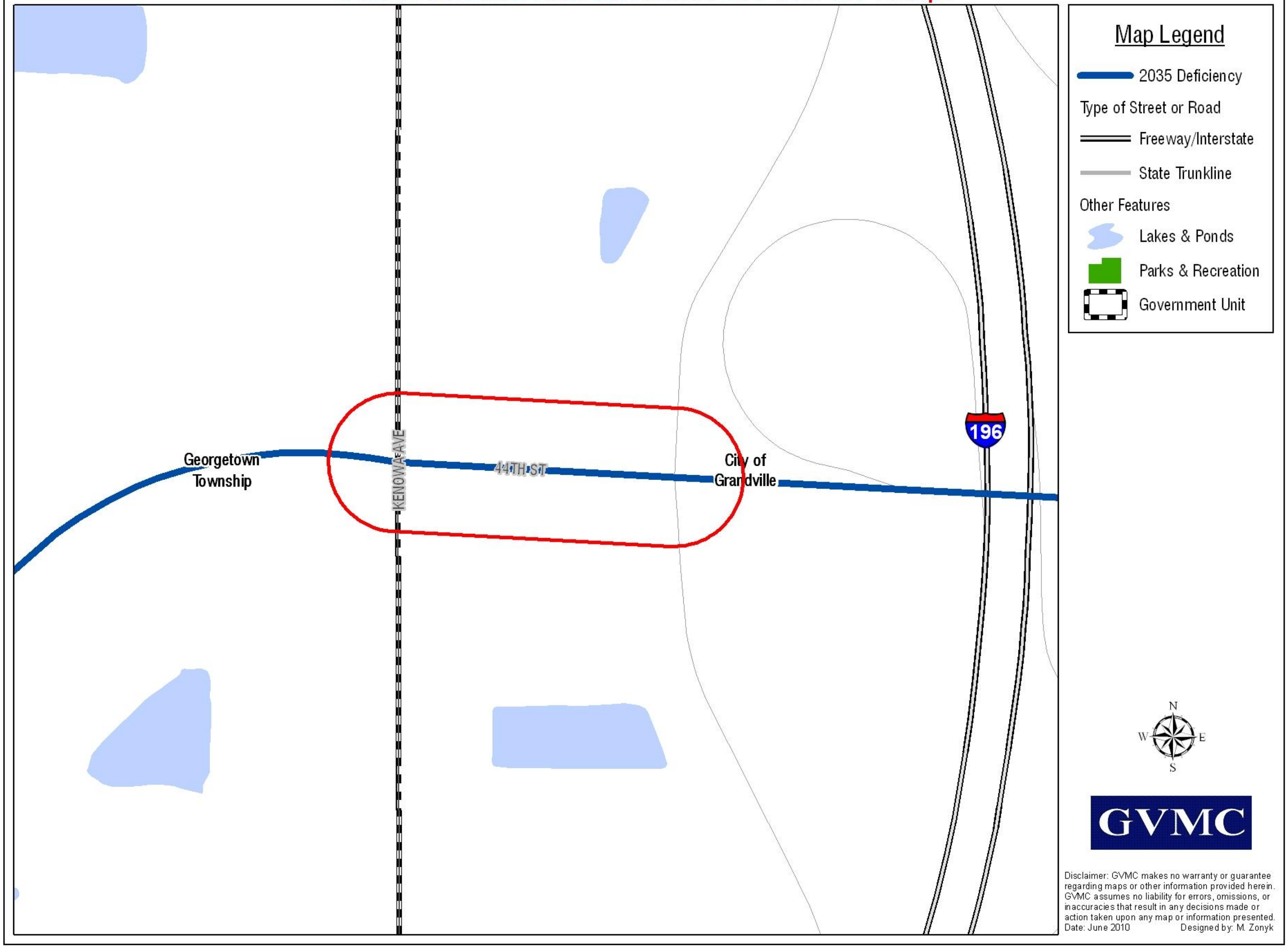
Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

This short section of the 44th Street corridor is primarily the bridge over I-196 between the ramps. The 44th Street Corridor is the primary corridor stretching from the airport on the east end deep into heavily populated areas in western Ottawa County. It also serves as the primary access corridor to the regional mall and associated commercial areas in Grandville. Currently and into the future there is an acceptable of capacity along this section. Any spot congestion experienced is related to the many signalized intersections in short proximity to each other. Maintaining appropriate signal timing in this corridor is crucial for continued adequate operations.

Deficiency Resolved? N/A

44th Street From Kenowa Avenue To I-196 WB Ramps



44th Street – Kenowa Avenue to I-196 WB Ramps

Jurisdiction: City of Grandville

NFC: Urban Principal Arterial

Length: 0.11 miles Lanes: 5

Current ADT: 33,042 Current Capacity: 34,800

Proj. 2035 ADT: 37,708 Projected V/C: 1.08

Phase Deficient: Borderline by 2035

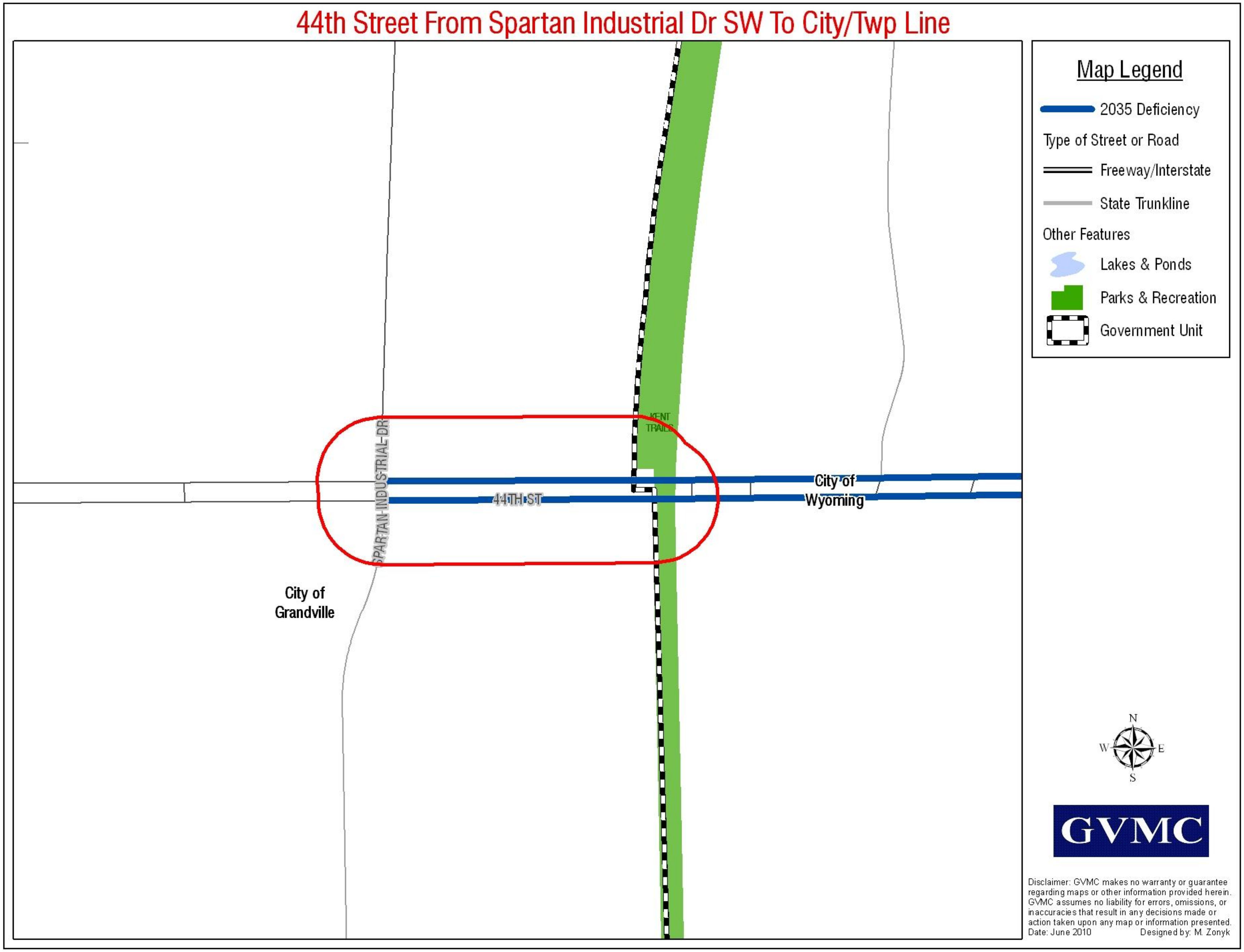
Transit Available: Yes Freight Route: Yes

Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

This short section of the 44th Street corridor is primarily the between the I-196 ramps and the intersection at Kenowa Avenue. The 44th Street Corridor is the primary corridor stretching from the airport on the east end deep into heavily populated areas in western Ottawa County. It also serves as the primary access corridor to the regional mall and associated commercial areas in Grandville. Currently and into the future there is an acceptable of capacity along this section. Any spot congestion experienced is related to the many signalized intersections in short proximity to each other. In recent years the Kenowa/44th Street intersection has been upgraded. Further upgrades may not be possible due to physical constraint and sight distance issues on 44th Street. Maintaining appropriate signal timing in this corridor is crucial for continued adequate operations.

Deficiency Resolved? Constrained


44th Street From Spartan Industrial Dr SW To City/Twp Line
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
SPARTAN-INDUSTRIAL-DR
44TH ST
City of Wyoming
City of Grandville
N
S
W
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GVMC
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Date: June 2010
Designed by: M. Zonyk

44th Street – Spartan Industrial Drive to City Limits

Jurisdiction: City of Grandville

NFC: Urban Principal Arterial

Length: 0.12 miles Lanes: 4 (Blvd)

Current ADT: 30,947 Current Capacity: 34,800

Proj. 2035 ADT: 32,449 Projected V/C: 0.93

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

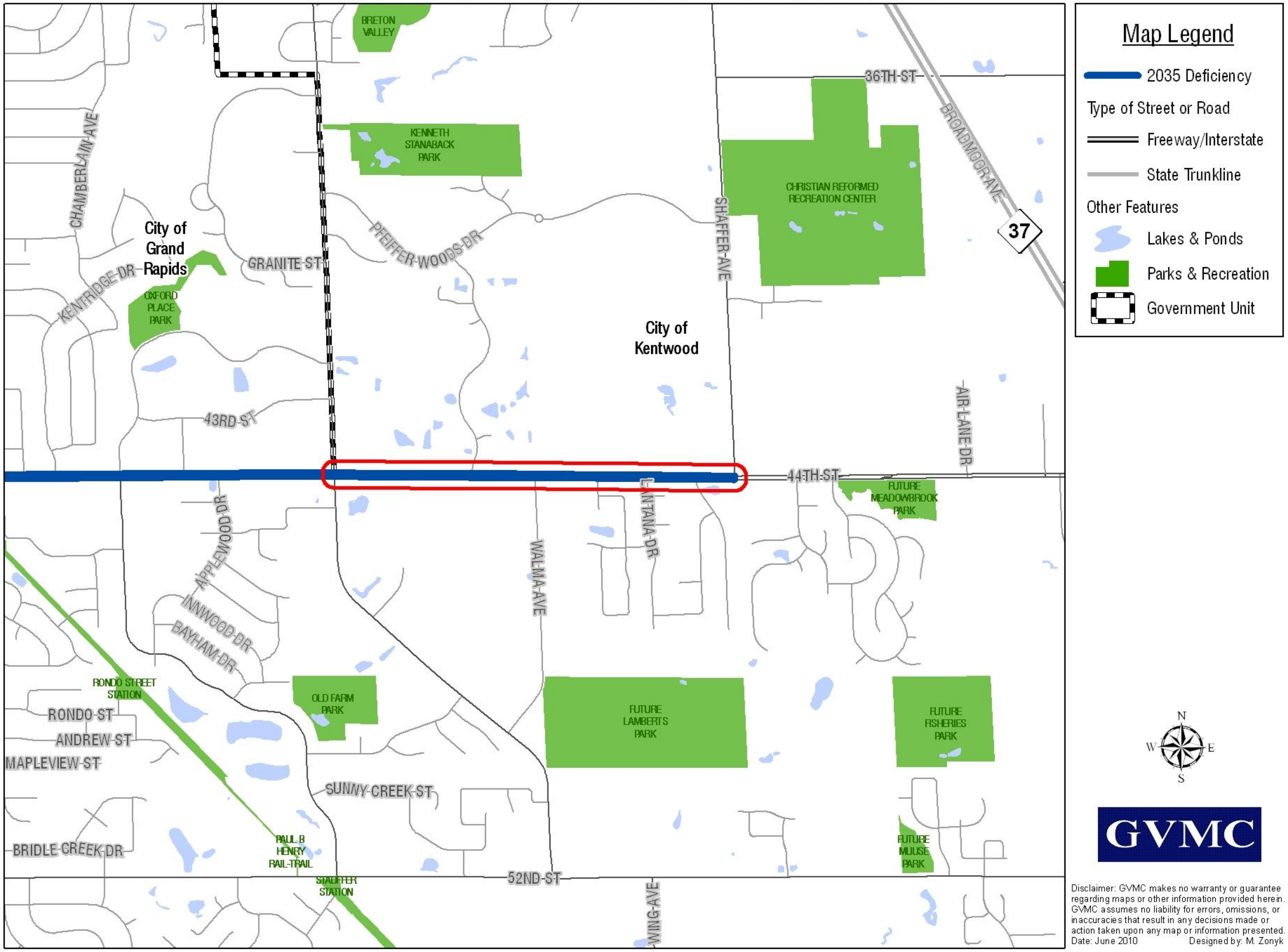
Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

This short section of the 44th Street corridor lies on the eastern edge of the City of Grandville. To the West is a newly expanded 6 lane Boulevard. This portion of the corridor lies adjacent to a medium sized industrial complex. Commercial traffic is higher than average. Currently and into the future there is an acceptable of capacity along this section. Any spot congestion experienced is related to the many signalized intersections in short proximity to each other. Maintaining appropriate signal timing in this corridor is crucial for continued adequate operations.

Deficiency Resolved? N/A

44th Street From Breton Avenue To Shaffer Avenue SE



44^{th} Street – Breton Avenue to Shaffer Avenue

Jurisdiction: City of Kentwood

NFC: Urban Principal Arterial

Length: 1.00 miles Lanes: 4 (Blvd)

Current ADT: 27,036 Current Capacity: 34,800

Proj. 2035 ADT: 31,600 Projected V/C: 0.91

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

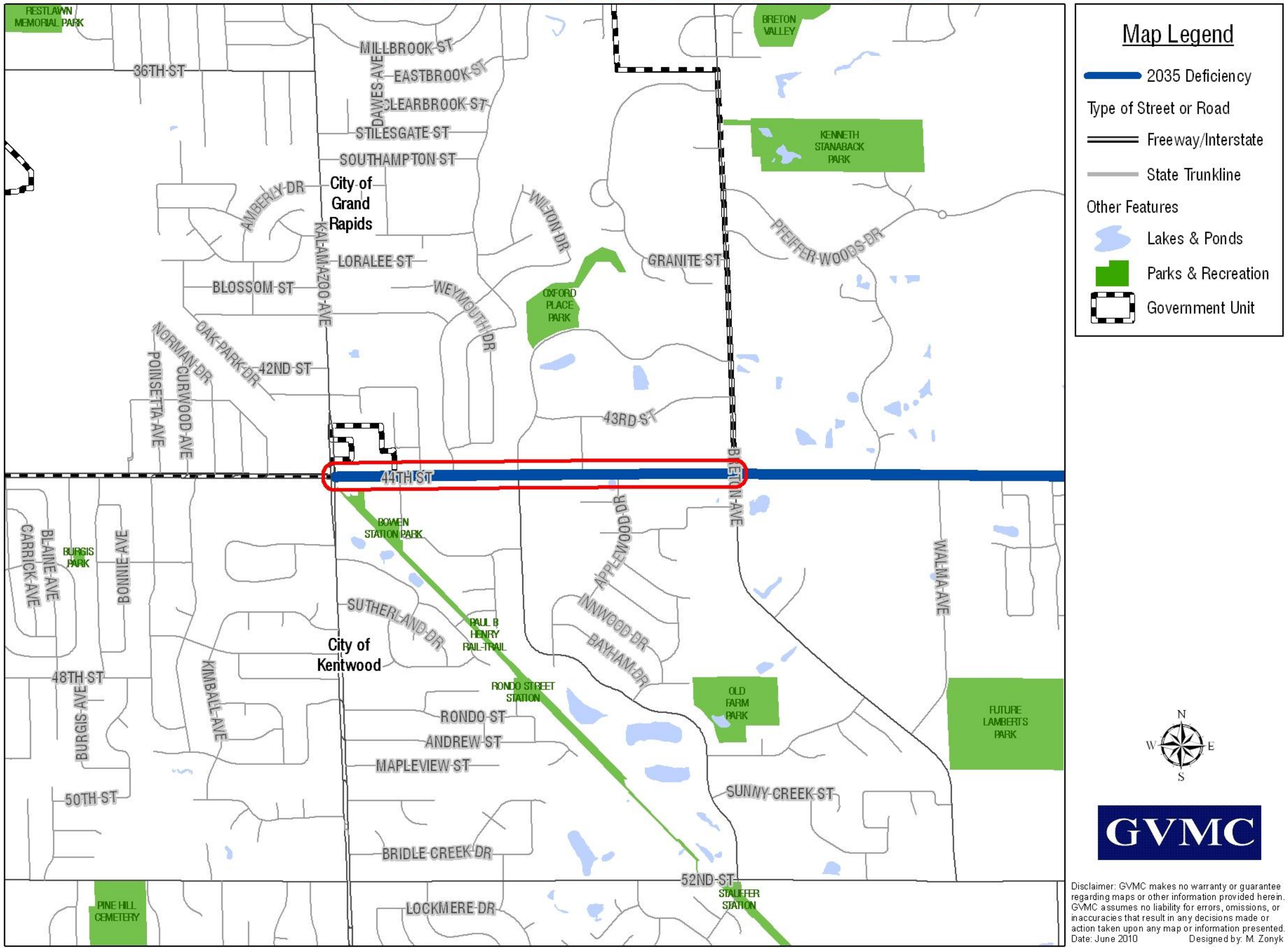
Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

This section of the 44^{th} Street corridor lies in the City of Kentwood. Currently and into the future there is an acceptable of capacity along this section. Any spot congestion experienced is related to the signalized intersections. Maintaining appropriate signal timing in this corridor is crucial for continued adequate operations.

Deficiency Resolved? N/A

44th Street From Kalamazoo Ave SE To Breton Avenue SE



44th Street – Kalamazoo Avenue to Breton Avenue

Jurisdiction: City of Kentwood

NFC: Urban Principal Arterial

Length: 1.00 miles Lanes: 4 (Blvd)

Current ADT: 35,424 Current Capacity: 34,800

Proj. 2035 ADT: 40,498 Projected V/C: 1.16

Phase Deficient: Deficient by 2025

Transit Available: Yes Freight Route: Yes

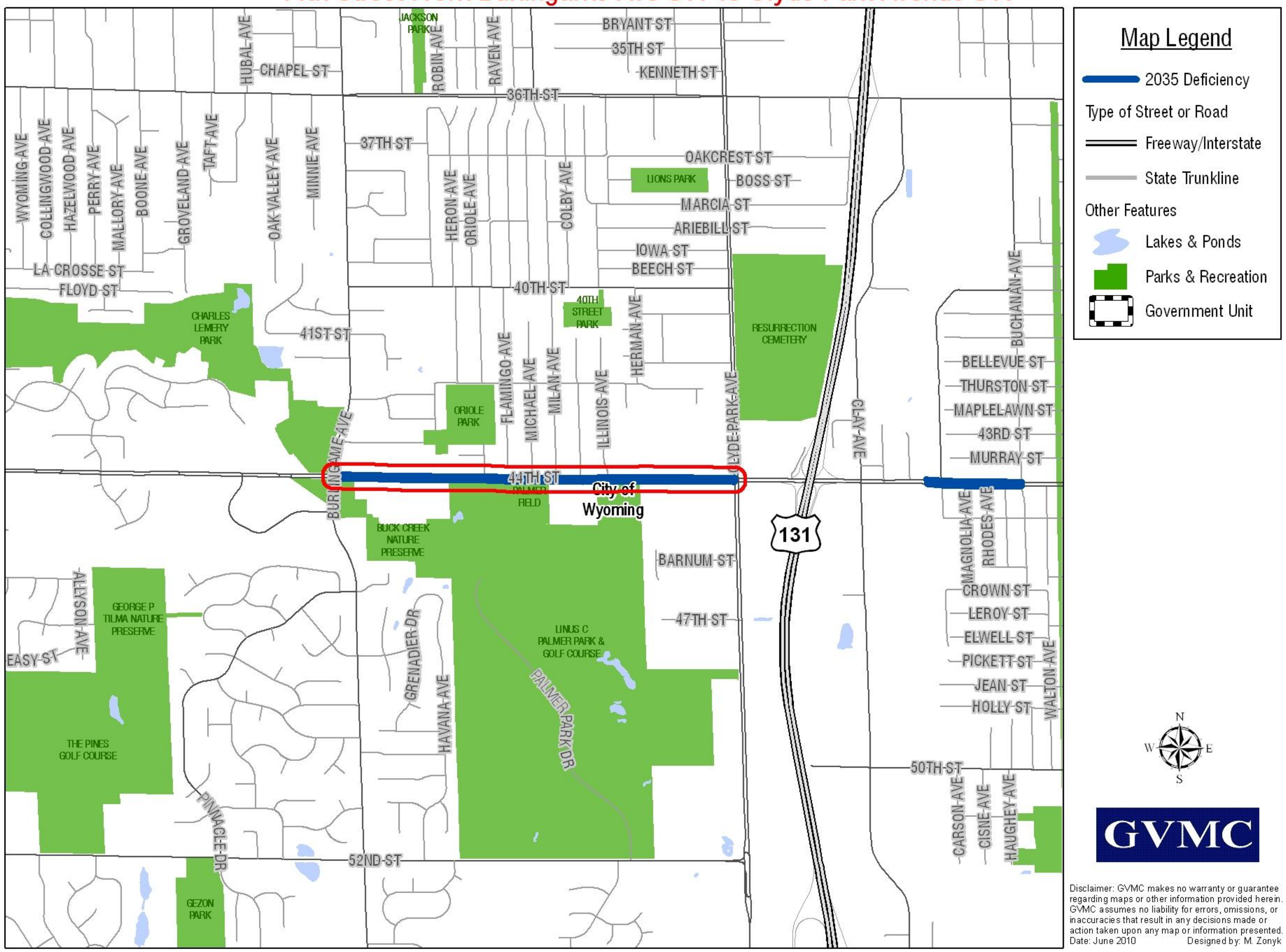
Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

Aside from the sections of this corridor adjacent to the US-131 Freeway, this is the highest volume section of the 44th Street corridor. The current volumes are far less than has been experienced in past years. The completion of the M-6 freeway 2 miles south of 44th Street has taken some of the through trips off the corridor. Also the demise of the Steelcase shipping facility located along this corridor has reduced the commercial traffic significantly. The projected volumes are in excess of the designed capacity. However the amount of traffic can likely be accommodated within the existing cross section. For this reason there is not any additional capacity being recommended for this section of roadway. As time passes and the local economy rebounds and the Steelcase property is redeveloped a review of this situation will occur and a change to this recommendation may be warranted.

Deficiency Resolved? No

44th Street From Burlingame Ave SW To Clyde Park Avenue SW



44^{th} Street – Burlingame Avenue to Clyde Park Avenue

Jurisdiction: City of Wyoming

NFC: Urban Principal Arterial

Length: 1.06 miles Lanes: 4 (Blvd)

Current ADT: 31,276 Current Capacity: 34,800

Proj. 2035 ADT: 32,300 Projected V/C: 0.93

Phase Deficient: Borderline by 2035

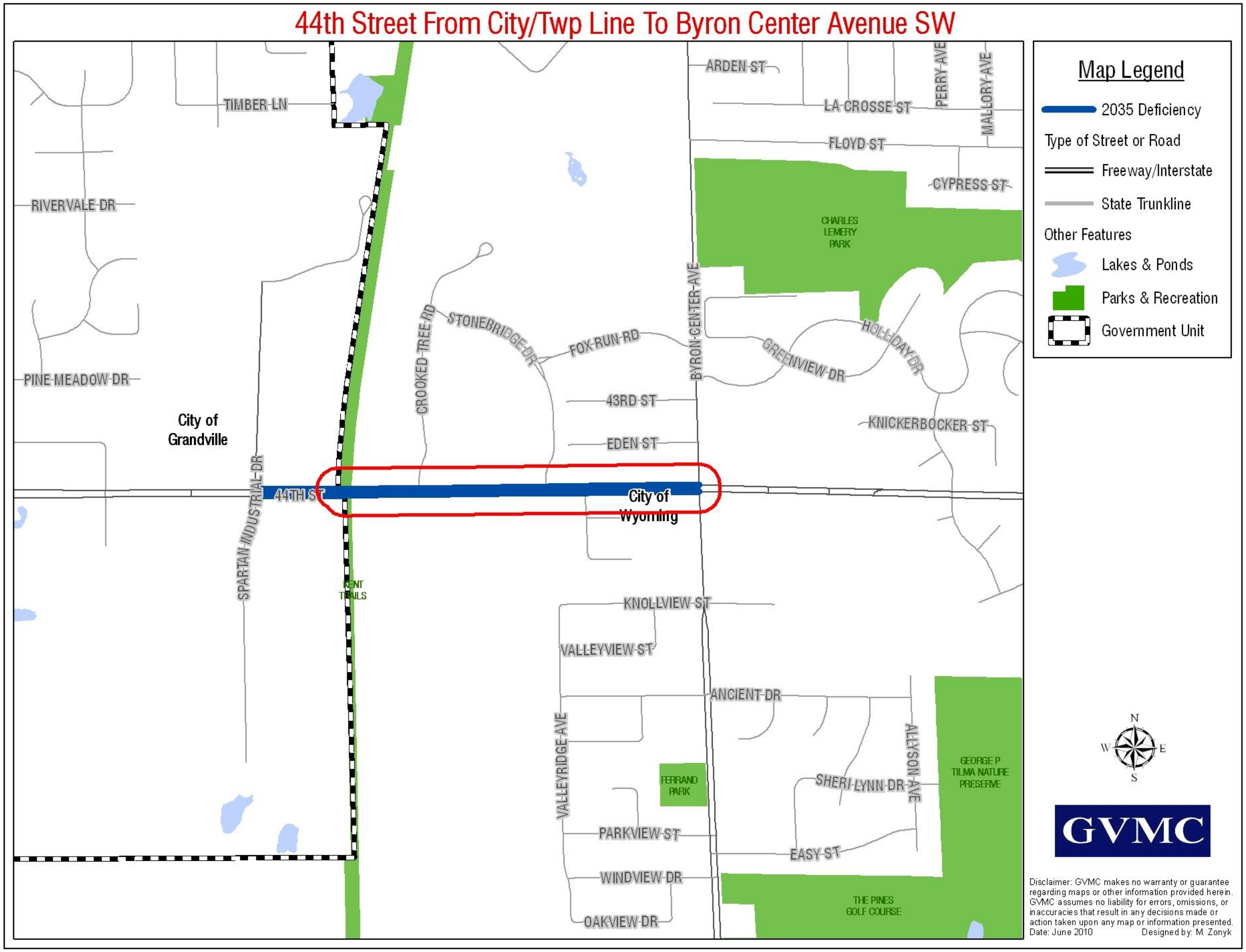
Transit Available: Yes Freight Route: Yes

Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

44^{th} Street directly west of the US-131 interchange contains a vast mix of development. There are schools, parks, restaurants medium density residential, a golf course and several offices. M-6 has taken much of the commercial and through traffic off the corridor. The remaining traffic tends to be more localized than in the past. While the projected traffic levels are reaching capacity there is nothing to indicate that a significant change in the physical cross section is warranted.

Deficiency Resolved? N/A



44th Street From City/Twp Line To Byron Center Avenue SW
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grandville
City of Wyoming
44TH ST
BYRON CENTER AVE
SPARTAN INDUSTRIAL DR
CHARLES LEMERY PARK
GEORGE P TILMA NATURE PRESERVE
THE PINES GOLF COURSE
FERRAND PARK
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Date: June 2010 Designed by: M. Zonyk

44th Street – City Limits to Byron Center Avenue

Jurisdiction: City of Wyoming

NFC: Urban Principal Arterial

Length: 0.49 miles Lanes: 4 (Blvd)

Current ADT: 30,932 Current Capacity: 34,800

Proj. 2035 ADT: 32,100 Projected V/C: 0.92

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

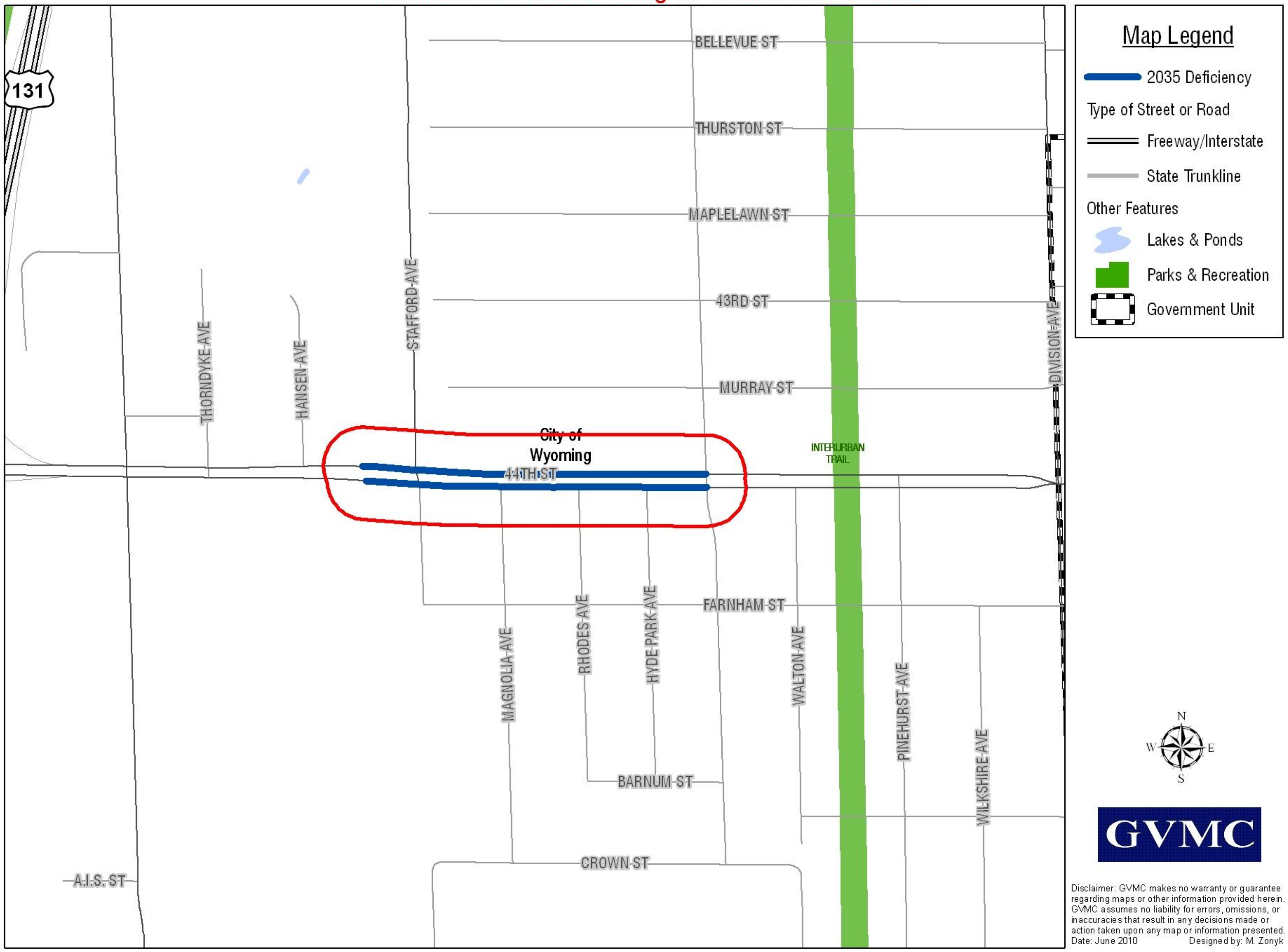
Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

This section of 44th Street in the City of Wyoming is on the western edge of the city and also contains a vast mix of development. There are restaurants medium density residential, and several offices. M-6 has taken much of the commercial and through traffic off the corridor. The remaining traffic tends to be more localized than in the past with nearby destinations including the Rivertown Crossings Mall a mile to the west. While the projected traffic levels are reaching capacity there is nothing to indicate that a significant change in the physical cross section is warranted.

Deficiency Resolved? N/A

44th Street From RR Xing To Buchanan Avenue



44th Street – Rail Crossing to Buchanan Avenue

Jurisdiction: City of Wyoming

NFC: Urban Principal Arterial

Length: 0.25 miles Lanes: 4 (Blvd)

Current ADT: 29,314 Current Capacity: 34,800

Proj. 2035 ADT: 34,000 Projected V/C: 0.98

Phase Deficient: Borderline by 2035

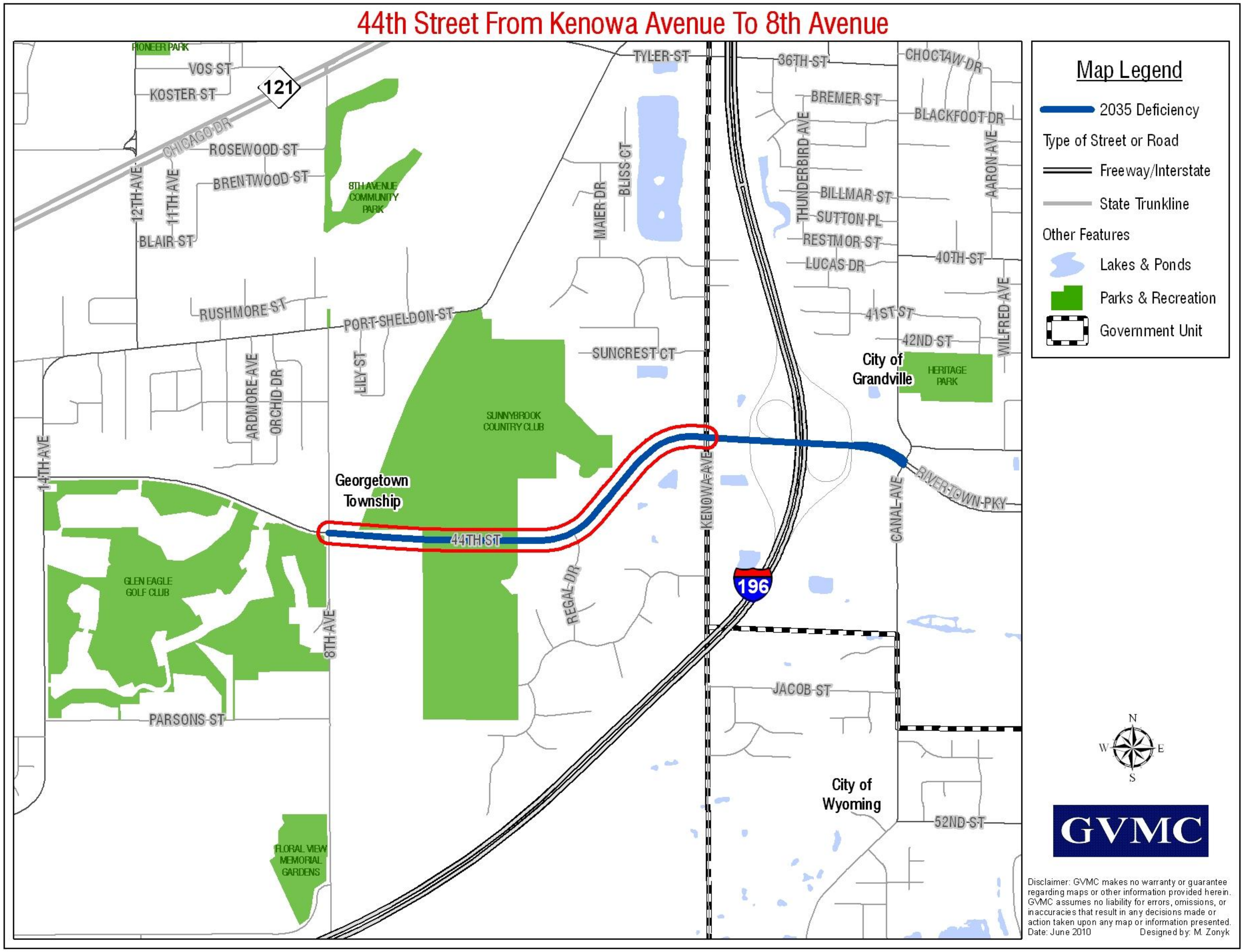
Transit Available: Yes Freight Route: Yes

Preferred Alternative: Continued Signal Progression, Enhance Transit Capacity, Monitor

CMP Analysis

This section of 44th Street in the City of Wyoming is just east of the new interchange at US-131. The primary land use is residential on the north side and office with some retail and restaurants on the south side. As with most of the rest of the 44th Street Corridor, commercial and through traffic has been significantly reduced with the completion of M-6. If the properties in the general area is redeveloped into a most intense land use this section should be reviewed periodically for more invasive treatments.

Deficiency Resolved? N/A



44th Street From Kenowa Avenue To 8th Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Georgetown Township
City of Grandville
City of Wyoming
44TH ST
KENOWA AVE
8TH AVE
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Designed by: M. Zonyk

44th Street – Kenowa Avenue to 8th Avenue

Jurisdiction: OCRC/Georgetown Twp.

NFC: Urban Principal Arterial

Length: 1.10 miles Lanes: 5

Current ADT: 31,600 Current Capacity: 34,800

Proj. 2035 ADT: 34,200 Projected V/C: 0.98

Phase Deficient: Borderline by 2035

Transit Available: No Freight Route: Yes

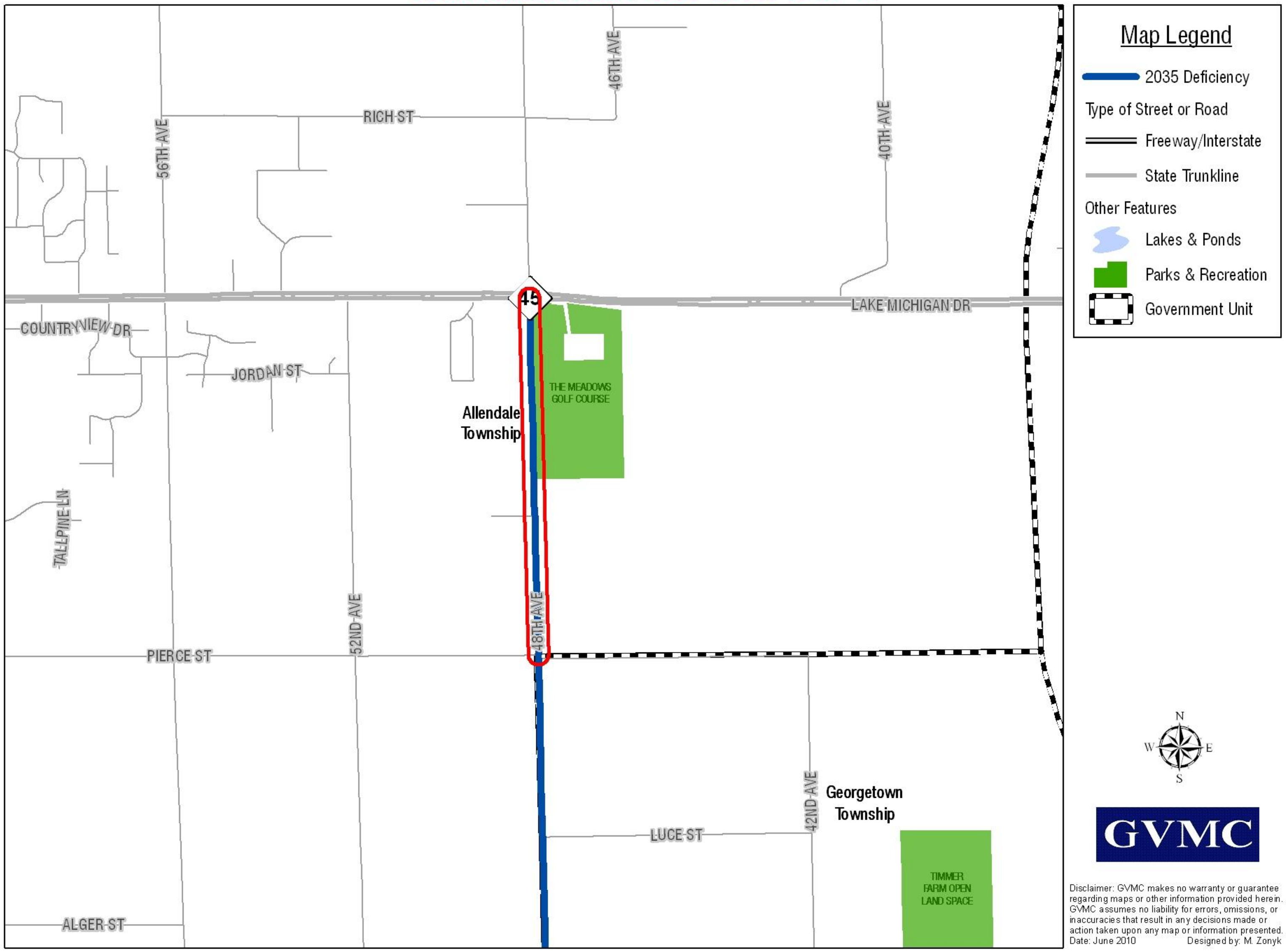
Preferred Alternative: Continued Monitor

CMP Analysis

This section of 44th Street in eastern Ottawa serves as an access point to the interstate system at I-196. The land use is primarily residential with apartments and a one low density residential sub division. The primary land use is Sunny Brook Country Club. If this private club remains unchanged it is reasonable to assume that traffic volumes will stay slightly below capacity well into the future.

Deficiency Resolved? N/A

48th Avenue From Pierce Street To M-45



48th Avenue – Pierce Street to M-45

Jurisdiction: OCRC/Allendale Twp

NFC: Urban Minor Arterial

Length: 1.01 miles Lanes: 2/3

Current ADT: 9,944 Current Capacity: 13,200

Proj. 2035 ADT: 15,425 Projected V/C: 1.17

Phase Deficient: Deficient in 2025

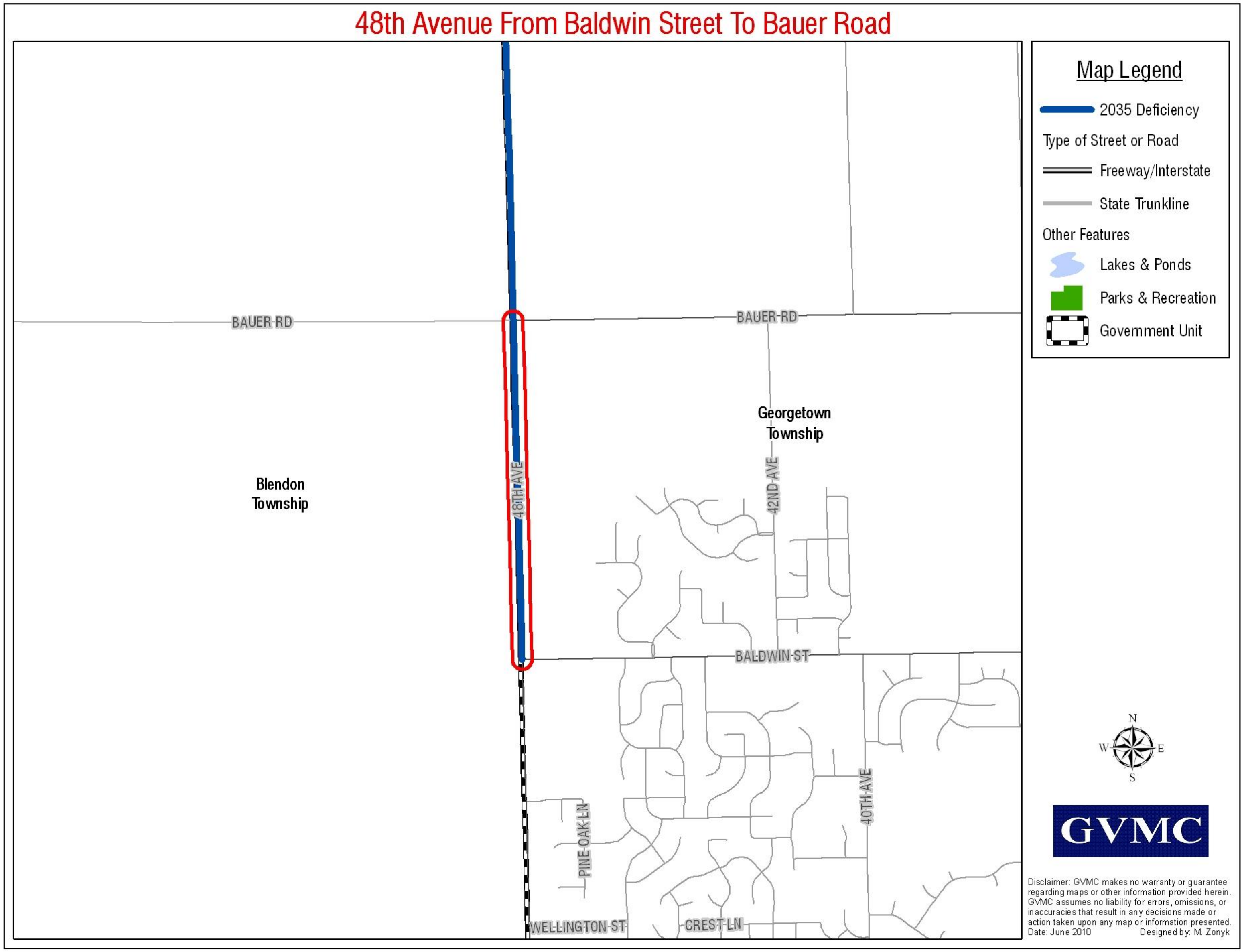
Transit Available: Yes Freight Route: No

Preferred Alternative: Reconstruct to continuous 3 lane cross section with all-season design

CMP Analysis

This section of 48th Avenue serves as a primary access point to Grand Valley State University and its associated student housing. The facility is a 2 lane with center turn lanes at key intersections. The recommendation is to make this corridor a continuous 3 lane designed for all season commercial traffic with bike lanes on both sides.

Deficiency Resolved? Yes, the three lane cross section will accommodate up to 18,000 VPD The future V/C will be 0.86


48th Avenue From Baldwin Street To Bauer Road
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
BAUER RD
BAUER RD
Georgetown Township
Blendon Township
48TH AVE
42ND AVE
BALDWIN ST
40TH AVE
PINE OAK LN
WELLINGTON ST
CREST LN
N
W
E
S
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48th Avenue – Baldwin Street to Bauer Street

Jurisdiction: OCRC/Blendon Twp

NFC: Urban Minor Arterial

Length: 1.00 miles Lanes: 2

Current ADT: 6,546 Current Capacity: 13,600

Proj. 2035 ADT: 13,312 Projected V/C: 0.98

Phase Deficient: Borderline by 2035

Transit Available: No Freight Route: Yes

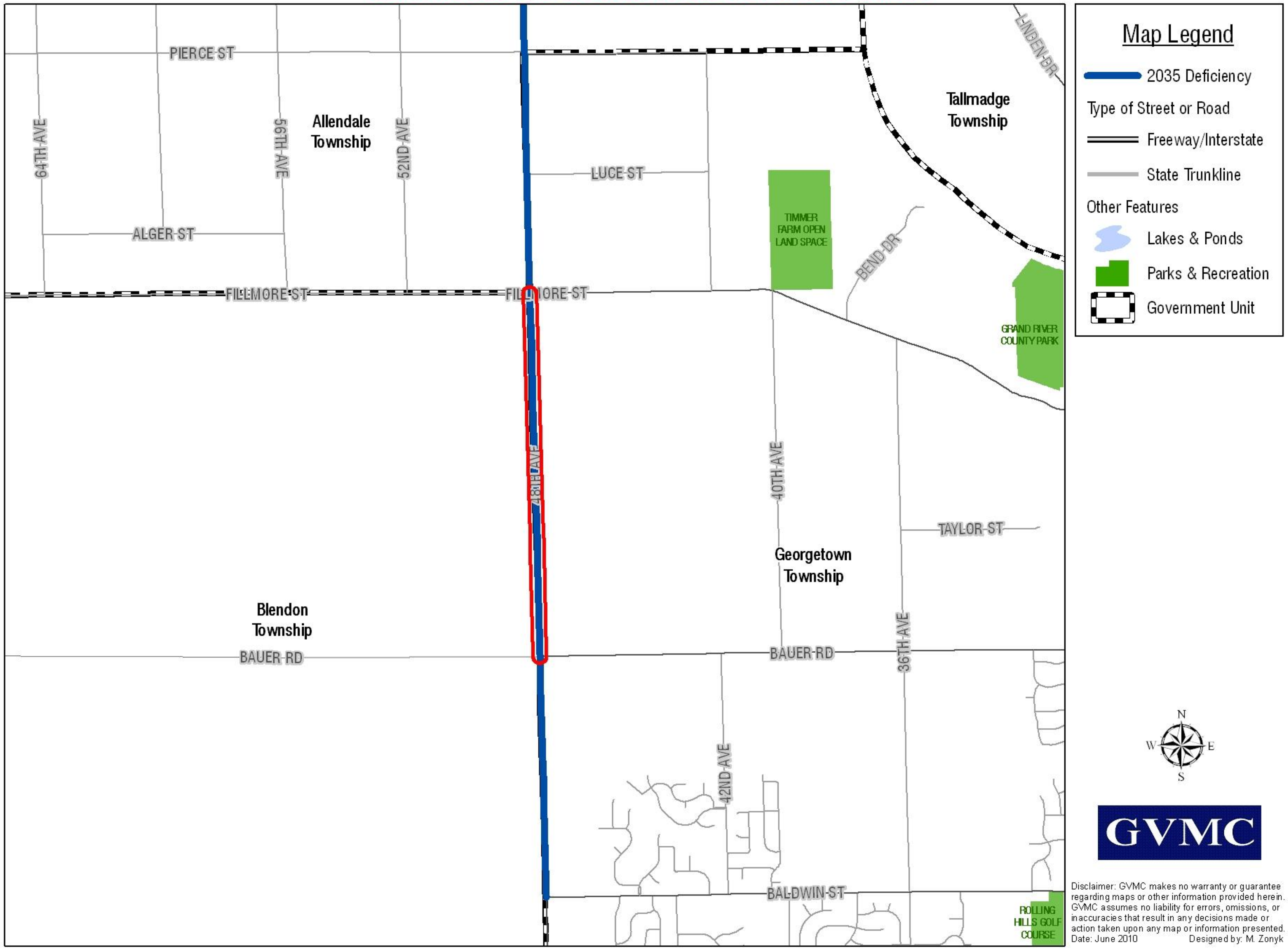
Preferred Alternative: Continue Monitoring, Access Management Planning

CMP Analysis

This section of 48th Avenue serves as North-South "Beltline type facility for central Ottawa County. The primary land use tends to be residential and agricultural with a Bauer Elementary located on this segment. As growth continues to occur this segment should be monitored.

Deficiency Resolved? N/A

48th Avenue From Bauer Road To Fillmore Street



48th Avenue – Bauer Street to Fillmore Street

Jurisdiction: OCRC/Blendon Twp

NFC: Urban Minor Arterial

Length: 1.51 miles Lanes: 2

Current ADT: 7,864 Current Capacity: 13,600

Proj. 2035 ADT: 13,825 Projected V/C: 1.02

Phase Deficient: Projected to be over capacity by 2035

Transit Available: No Freight Route: Yes

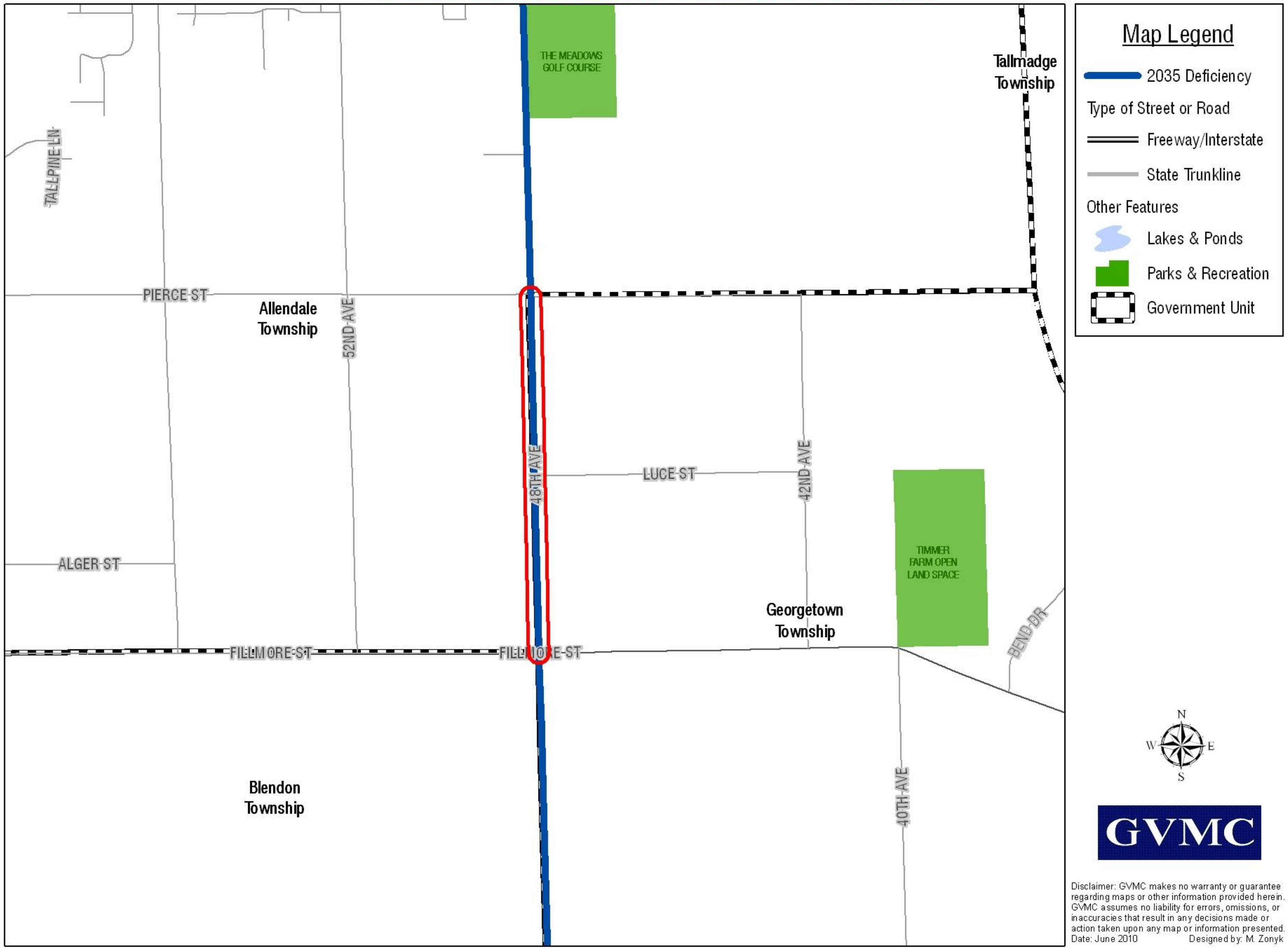
Preferred Alternative: Continue Monitoring, Access Management Planning

<u>CMP Analysis</u>

This section of 48th Avenue serves as North-South "Beltline type facility for central Ottawa County with a primary destination being GVSU and the retail destinations in Allendale. The primary land use tends to be residential and agricultural. As growth continues to occur this segment should be monitored. The capacity issue projected is only slight and should be monitored but no additional capacity is recommended. Access management planning may be enough to avoid costly capacity projects into the distant future.

Deficiency Resolved? N/A

48th Avenue From Fillmore Street To Pierce Street



48^{th} Avenue – Fillmore Street to Pierce Street

Jurisdiction: OCRC/Georgetown Twp

NFC: Urban Minor Arterial

Length: 1.00 miles Lanes: 2

Current ADT: 7,990 Current Capacity: 13,600

Proj. 2035 ADT: 13,769 Projected V/C: 1.01

Phase Deficient: Projected to be over capacity by 2035

Transit Available: No Freight Route: Yes

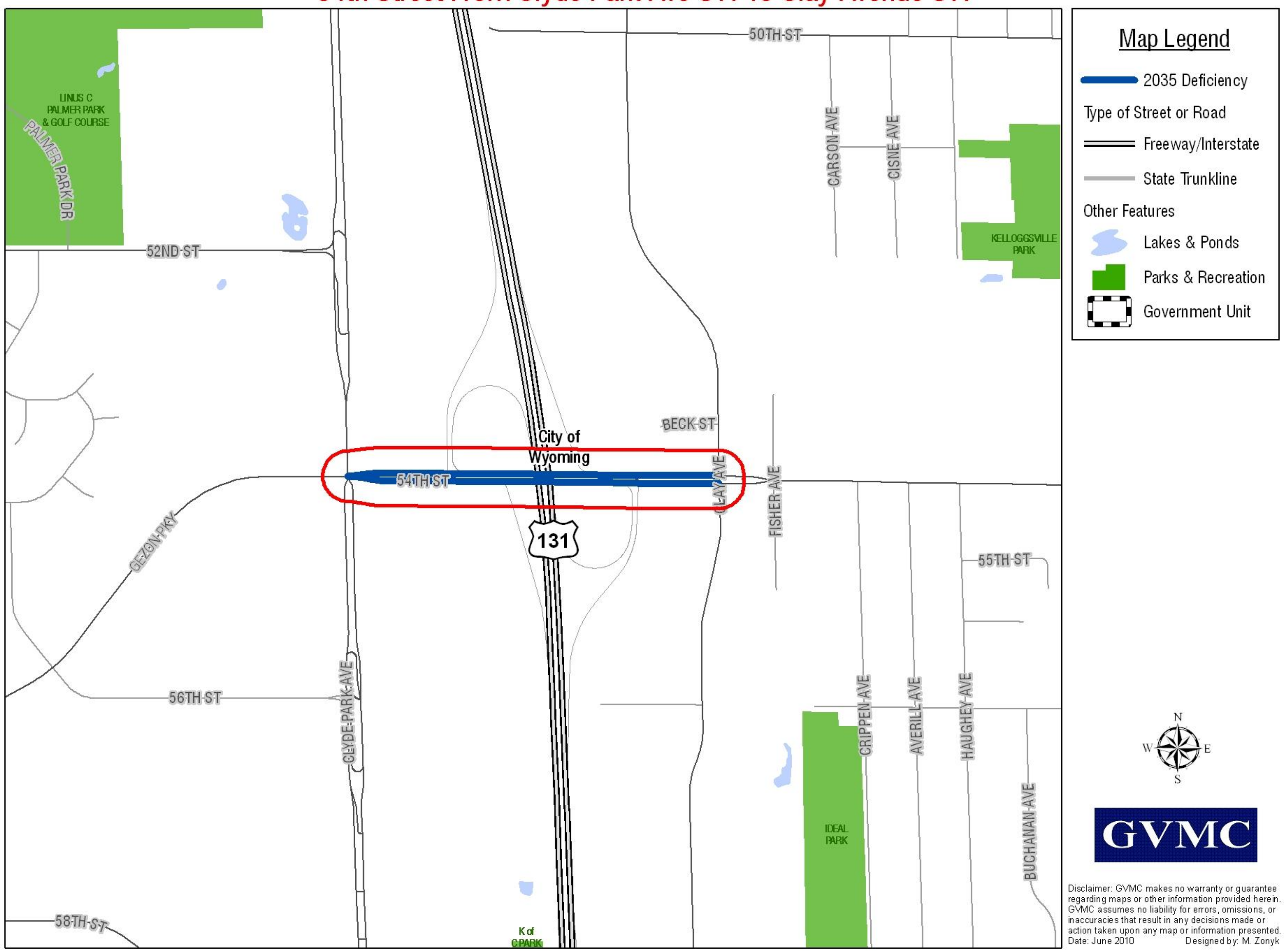
Preferred Alternative: Continue Monitoring, Access Management Planning

CMP Analysis

This section of 48^{th} Avenue serves as North-South "Beltline type facility for central Ottawa County with a primary destination being GVSU and the retail destinations in Allendale. The primary land use tends to be residential and agricultural. As growth continues to occur this segment should be monitored. The capacity issue projected is only slight and should be monitored but no additional capacity is recommended. Access management planning may be enough to avoid costly capacity projects into the distant future.

Deficiency Resolved? N/A

54th Street From Clyde Park Ave SW To Clay Avenue SW



54th Street – Clyde Park Avenue to Clay Avenue

Jurisdiction: City of Wyoming

NFC: Urban Principal Arterial

Length: 0.42 miles Lanes: 5

Current ADT: 32,600 Current Capacity: 34,800

Proj. 2035 ADT: 36,664 Projected V/C: 1.05

Phase Deficient: Projected to be over capacity by 2025

Transit Available: Yes Freight Route: Yes

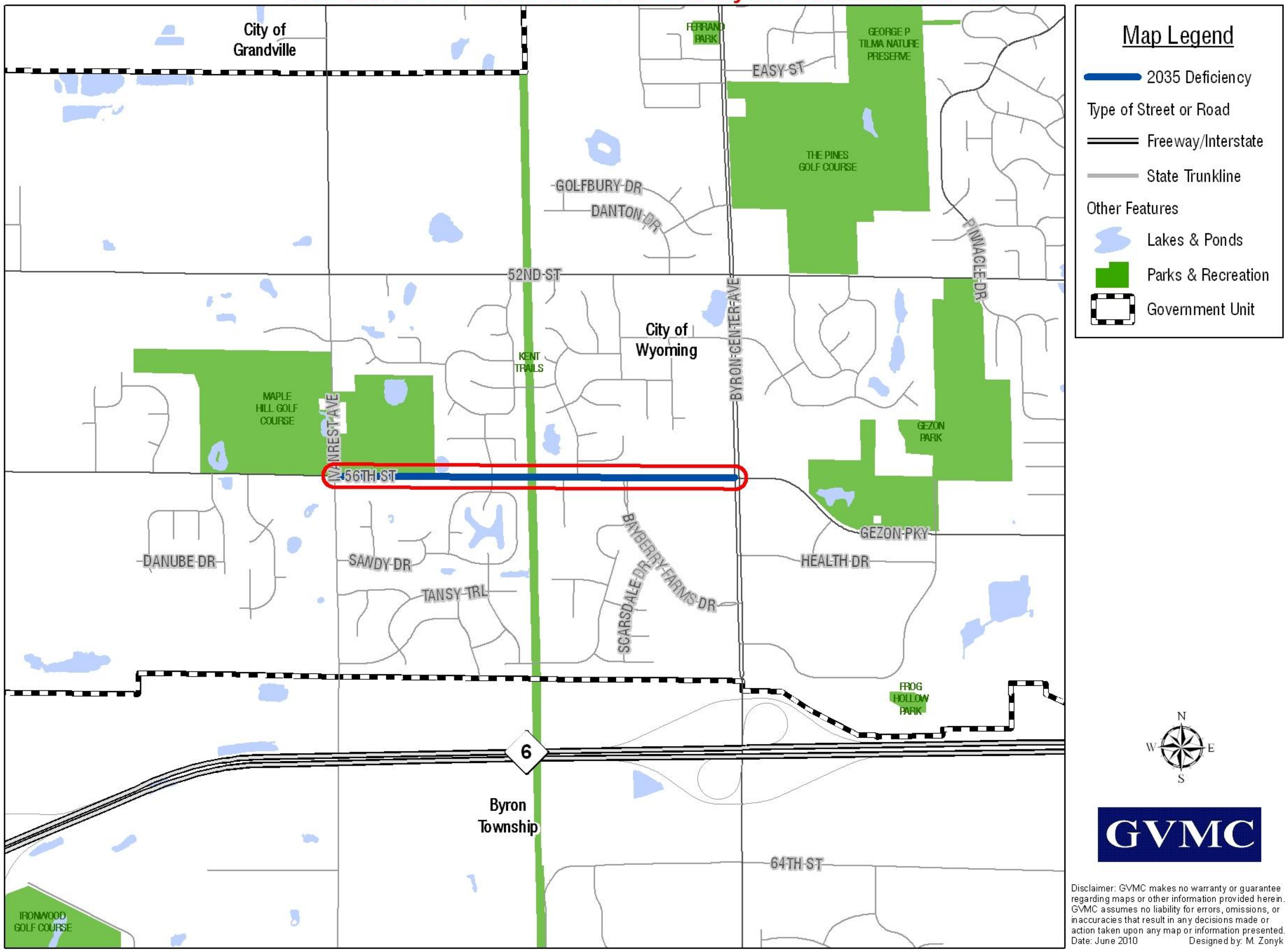
Preferred Alternative: Continue Monitoring, Access Management Planning, enhanced transit capacity

CMP Analysis

This section of 54th Street serves as a direct access to the freeway system via US-131 from the residential areas in western Kentwood. The land use along the corridor is mixed and includes light density residential, retail and a small pocket of light industrial. Projections for this corridor indicate that the volumes will exceed capacity by 5% by 2025. This situation does not currently warrant the planning for additional capacity as transit and other alternatives should be sufficient to address the additional demand.

Deficiency Resolved? No, by choice.

56th Street From Ivanrest Ave SW To Byron Center Avenue SW



56th Street – Ivanrest Avenue to Byron Center Avenue

Jurisdiction: City of Wyoming

NFC: Urban Minor Arterial

Length: 1.00 miles Lanes: 2

Current ADT: 10,206 Current Capacity: 12,600

Proj. 2035 ADT: 13,769 Projected V/C: 1.09

Phase Deficient: Projected to be over capacity by 2025

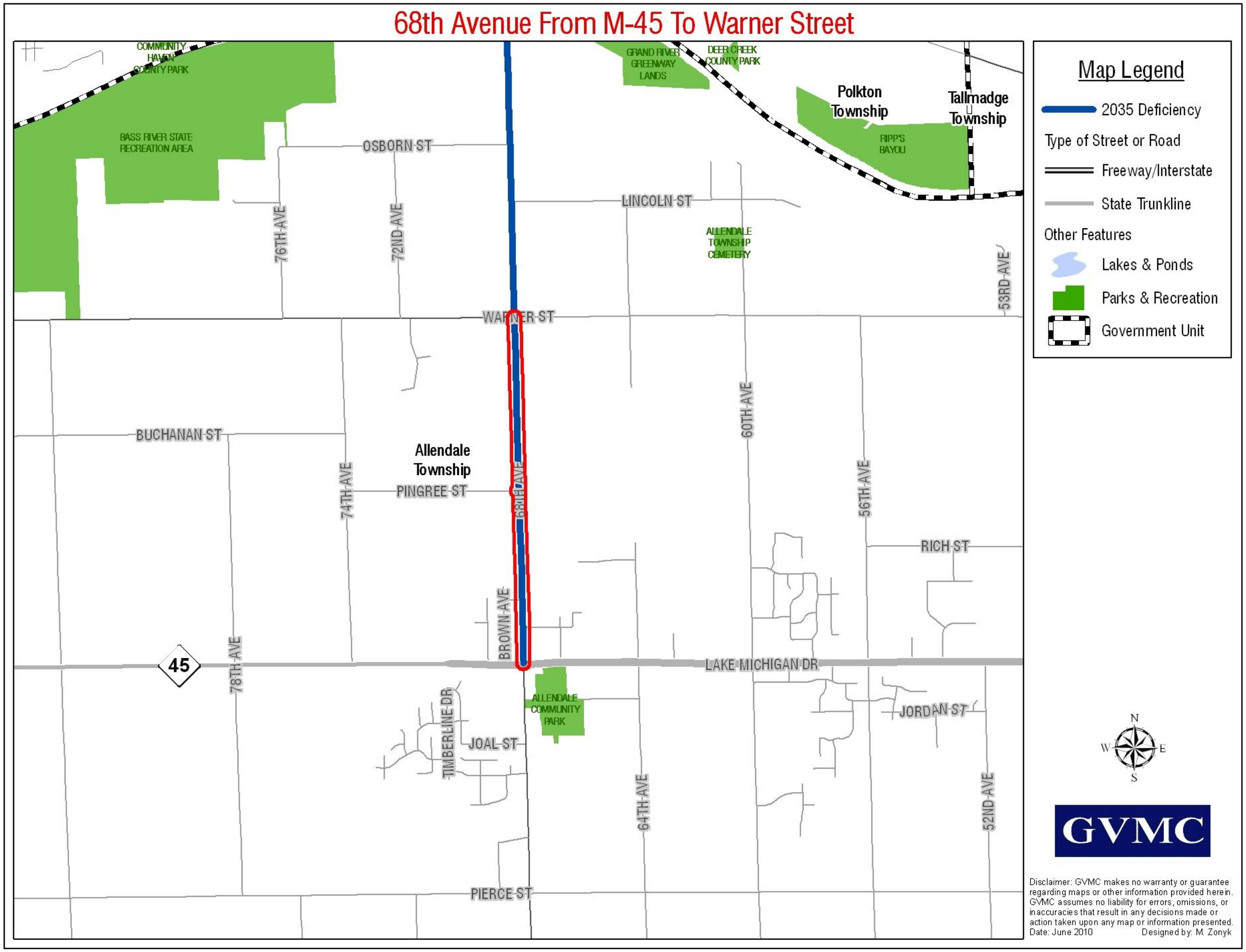
Transit Available: No Freight Route: No

Preferred Alternative: Reconstruct and add center turn lane (2-3 lanes)

CMP Analysis

56th Street in the Wyoming Panhandle serves as a secondary east-west corridor. The primary land use is medium density residential. The eastern end of the corridor reaches US-131 and the retail core near Clyde Park Avenue. Also trips use this section of 56th to reach Byron Center Avenue and Metro Hospital and M-6. Growth is expected to occur and the volumes will reflect the demand for access to major traffic generators in the immediate area. No transit is present and none is planned. Access Management has been well planned and other options will not sufficiently address the future congestion planned.

Deficiency Resolved? Yes, the V/C will be 0.77 with the addition of a third lane.



68th Avenue From M-45 To Warner Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Allendale Township
Polkton Township
Tallmadge Township
BASS RIVER STATE RECREATION AREA
GRAND RIVER GREENWAY LANDS
DEER CREEK COUNTY PARK
RIPP'S BAYOU
ALLENDALE TOWNSHIP CEMETERY
ALLENDALE COMMUNITY PARK
OSBORN ST
LINCOLN ST
WARNER ST
BUCHANAN ST
PINGREE ST
RICH ST
LAKE MICHIGAN DR
JORDAN ST
JOAL ST
PIERCE ST
76TH AVE
72ND AVE
74TH AVE
78TH AVE
68TH AVE
BROWN AVE
TIMBERLINE DR
64TH AVE
60TH AVE
56TH AVE
53RD AVE
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Date: June 2010
Designed by: M. Zonyk

68th Avenue – M-45 to Warner Street

Jurisdiction: OCRC/Allendale Twp

NFC: Urban Minor Arterial

Length: 1.51 miles Lanes: 2

Current ADT: 11,634 Current Capacity: 13,200

Proj. 2035 ADT: 16,000 Projected V/C: 1.21

Phase Deficient: Projected to be over capacity by 2025

Transit Available: No Freight Route: Yes

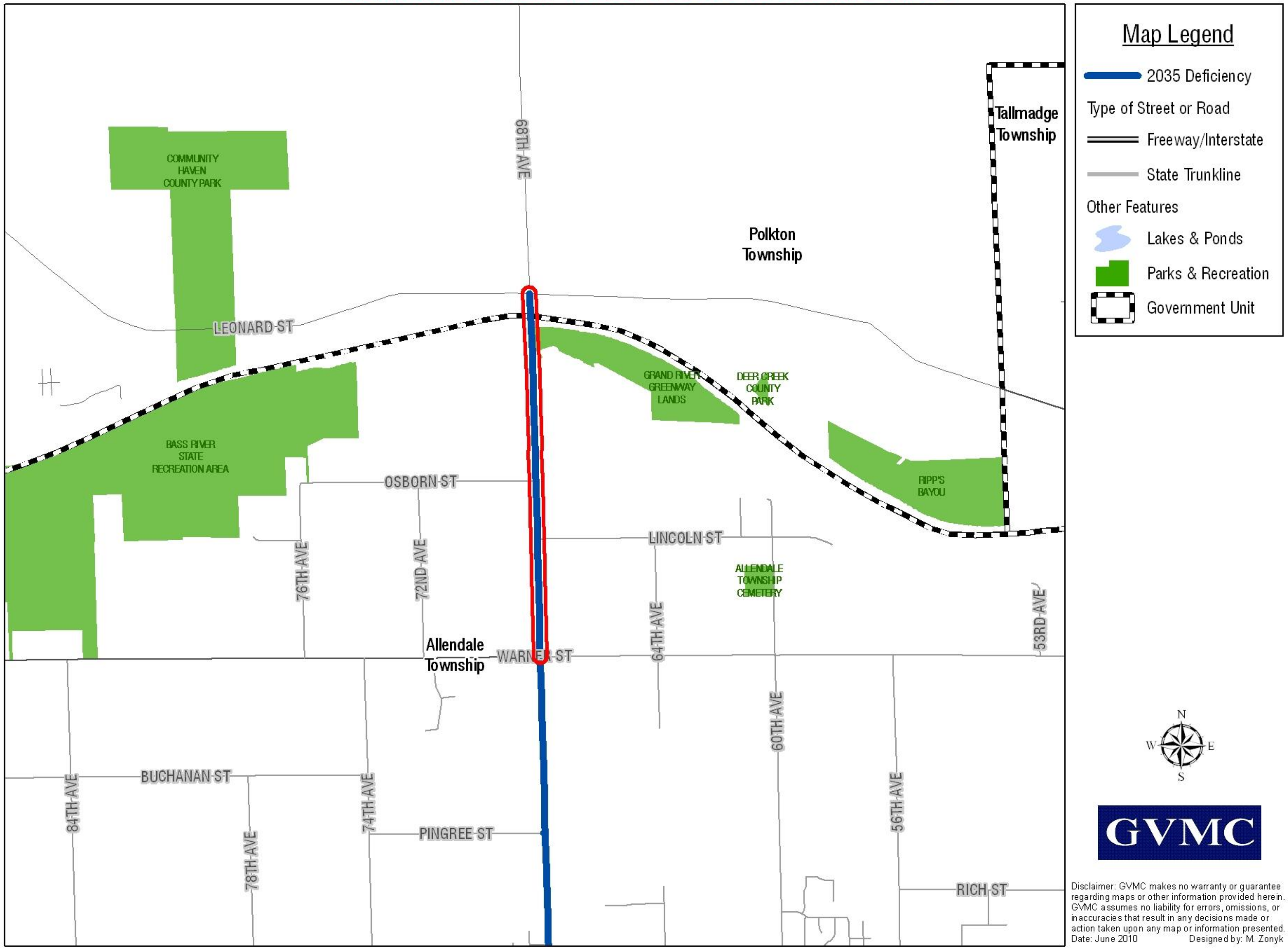
Preferred Alternative: Reconstruction with the addition of a center turn lane

CMP Analysis

68th Avenue in central Ottawa County is one of the few corridors that crosses the Grand River. In addition, this corridor provides primary access to the I-96 corridor to the north. The primary land use is agricultural with many commercial greenhouses operating along the facility. There is no linehaul transit service in the area and none planned. All other methods would not be sufficient to completely address the projected congested.

Deficiency Resolved? Yes, the V/C will be 0.89 with the addition of a third lane.

68th Avenue From Warner Avenue To Leonard Street



68th Avenue – Warner Street to Leonard Street

Jurisdiction: OCRC/Allendale Twp

NFC: Urban Minor Arterial

Length: 1.55 miles   Lanes: 2

Current ADT: 11,553   Current Capacity: 13,200

Proj. 2035 ADT: 15,300   Projected V/C: 1.16

Phase Deficient: Projected to be over capacity by 2025

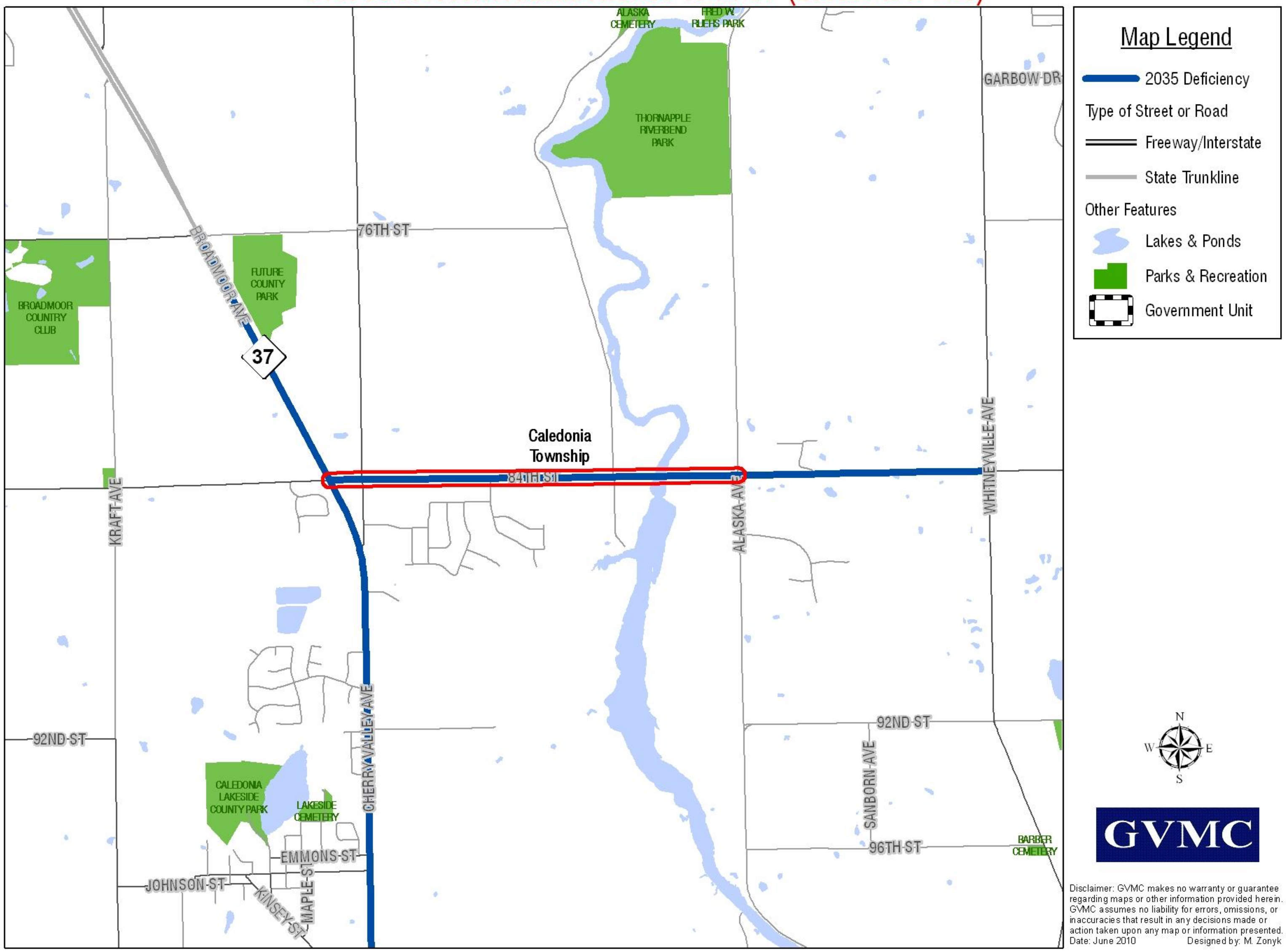
Transit Available: No   Freight Route: Yes

Preferred Alternative: Reconstruction with the addition of a center turn lane

<u>CMP Analysis</u>
68th Avenue in central Ottawa County is one of the few corridors that crosses the Grand River. In addition, this corridor provides primary access to the I-96 corridor to the north. The primary land use is agricultural with many commercial greenhouses operating along the facility. There is no linehaul transit service in the area and none planned. All other methods would not be sufficient to completely address the projected congested. Additional planning should be done to determine the capacity of the bridge that crosses the Grand River. This projection runs through 2035, while the life of any new bridge will certainly exceed that timeframe. Additional capacity may be required to adequately address demand for the expected life of the bridge and beyond.

Deficiency Resolved? Yes, the V/C will be 0.85 with the addition of a third lane.

84th Street From Alaska Avenue To M-37 (Broadmoor Ave)



84th Street – Alaska Avenue to M-37

Jurisdiction: KCRC/ Caledonia Twp

NFC: Urban Minor Arterial

Length: 1.14 miles   Lanes: 2

Current ADT: 10,735   Current Capacity: 13,200

Proj. 2035 ADT: 13,154   Projected V/C: 0.99

Phase Deficient: Borderline by 2035

Transit Available: No   Freight Route: No

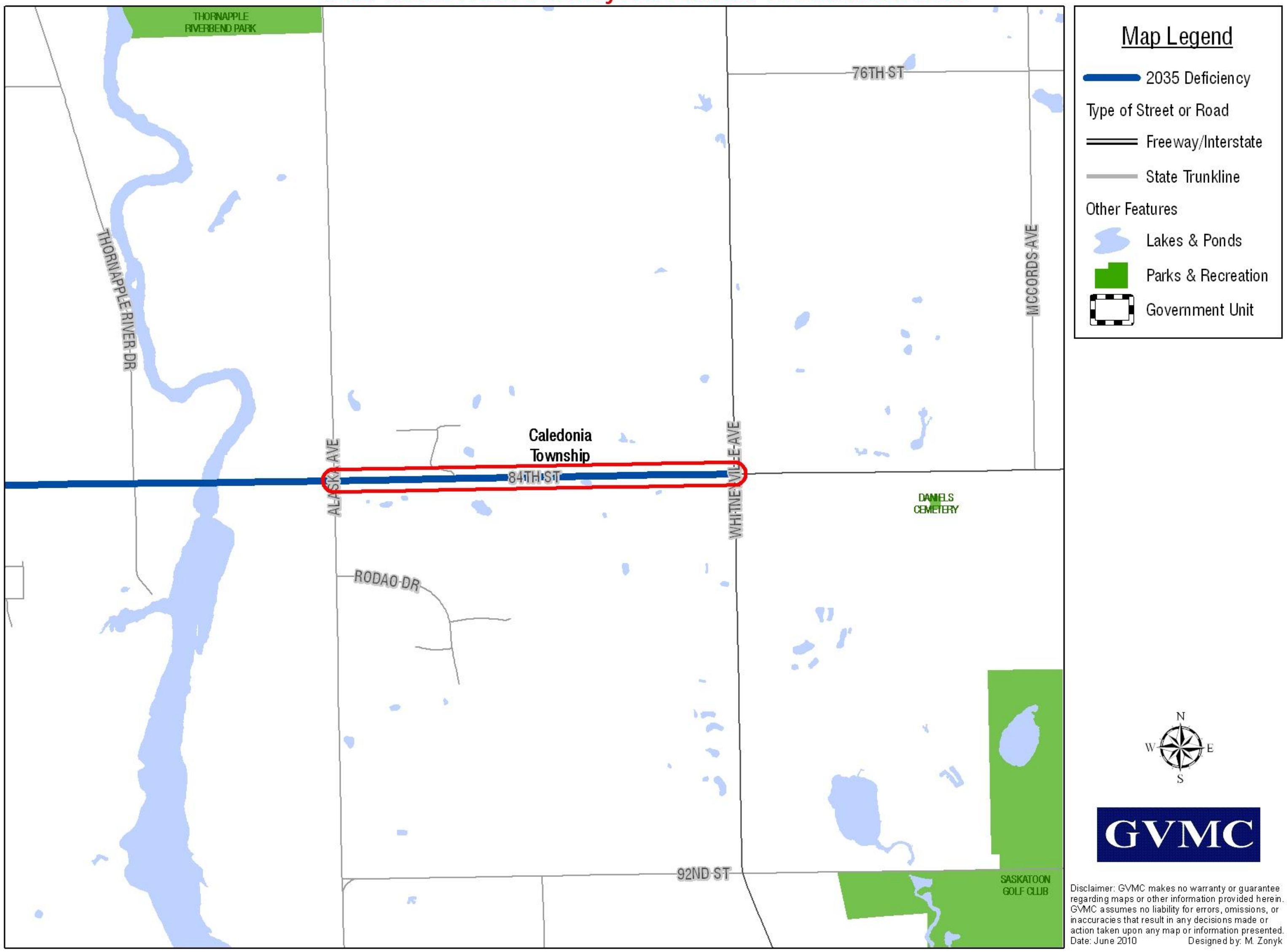
Preferred Alternative: Monitor, Access Management

CMP Analysis

The 84th Street corridor serves as a secondary east-west route across the southern tier of Kent County and into Ottawa County. While much of the demand on this corridor for long distance trips was reduced greatly with the completion of M-6 certain short sections still have some demand for accessing M-37 and other connectors to M-6. This segment serves localized traffic in the Southeastern portion of Kent County. The primary land use is low density residential. With proper access management techniques and the addition of center turn lanes at key intersections, there should be sufficient capacity to meet future demands.

Deficiency Resolved? N/A

84th Street From Whitneyville Avenue To Alaska Avenue



84th Street – Whitneyville Avenue to Alaska Avenue

Jurisdiction: KCRC/ Caledonia Twp

NFC: Urban Minor Arterial

Length: 1.50 miles Lanes: 2

Current ADT: 8,374 Current Capacity: 13,200

Proj. 2035 ADT: 11,000 Projected V/C: 0.83

Phase Deficient: Borderline by 2035

Transit Available: No Freight Route: No

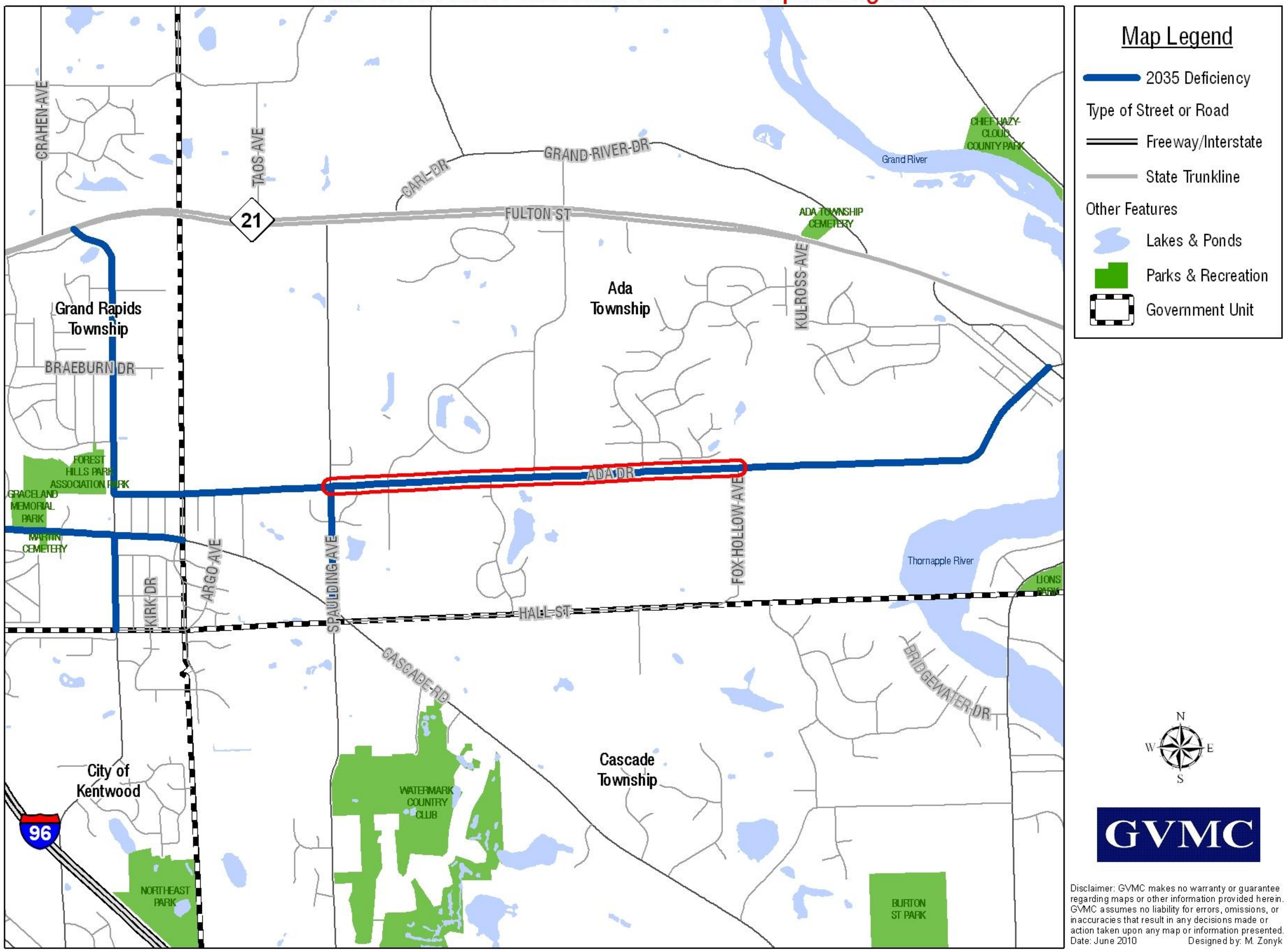
Preferred Alternative: Monitor, Access Management

CMP Analysis

The 84th Street corridor serves as a secondary east-west route across the southern tier of Kent County and into Ottawa County. While much of the demand on this corridor for long distance trips was reduced greatly with the completion of M-6 certain short sections still have some demand for accessing M-37 and other connectors to M-6. This segment serves localized traffic in the Southeastern portion of Kent County. The primary land use is low density residential. With proper access management techniques and the addition of center turn lanes at key intersections, there should be sufficient capacity to meet future demands.

Deficiency Resolved? N/A

Ada Drive From Fox Hollow Avenue To Spaulding Avenue



Ada Drive – Fox Hollow Avenue to Spaulding Avenue

Jurisdiction: KCRC/Ada Twp.

NFC: Urban Minor Arterial

Length: 1.50 miles	Lanes: 2
Current ADT: 6,359	Current Capacity: 12,300
Proj. 2035 ADT: 12,289	Projected V/C: 0.99

Phase Deficient: Borderline by 2035

Transit Available: No	Freight Route: No

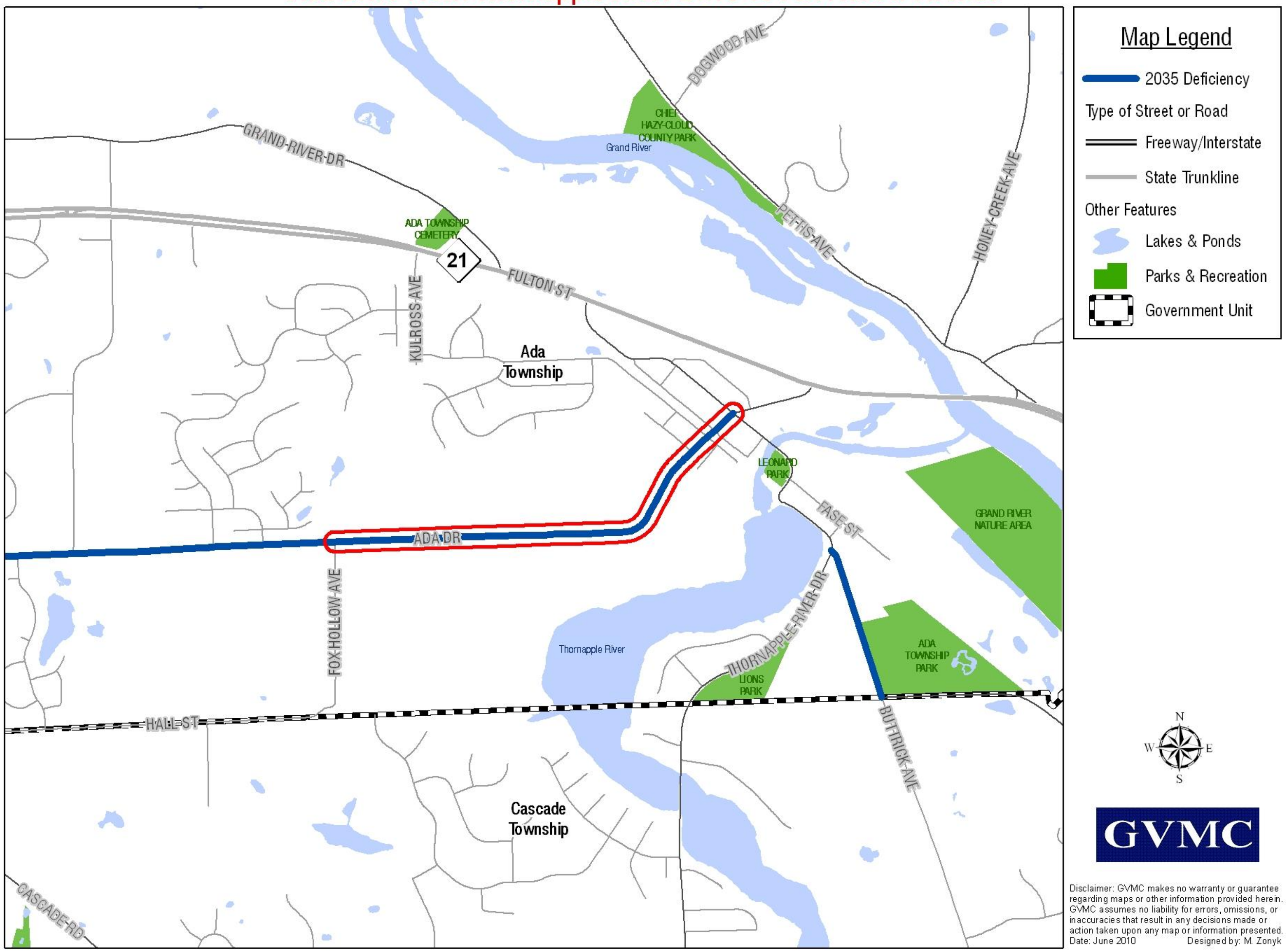
Preferred Alternative: Monitor, Access Management

CMP Analysis

Ada Drive in Ada Twp in the Southeastern portion of Kent County serves primarily as a secondary access road from Ada Village to/from activity centers and employment in adjacent areas. The growth projection for this part of the area is much greater than in previous years. The planned growth is being concentrated in and around the Ada Village area. This additional growth is the primary cause for the higher than usual projections. GVMC is taking the worst case scenario for this corridor. If this higher density development occurs this corridor will merit further observation and possibly additional capacity. If not, the facility should operate efficiently for many years to come.

Deficiency Resolved? N/A

Ada Drive From Thornapple River Drive To Fox Hollow Avenue



Ada Drive – Thornapple River Drive to Fox Hollow Avenue

Jurisdiction: KCRC/Ada Twp.

NFC: Urban Minor Arterial

Length: 1.31 miles Lanes: 2

Current ADT: 7,994 Current Capacity: 12,000

Proj. 2035 ADT: 10,729 Projected V/C: 0.89

Phase Deficient: Borderline by 2035

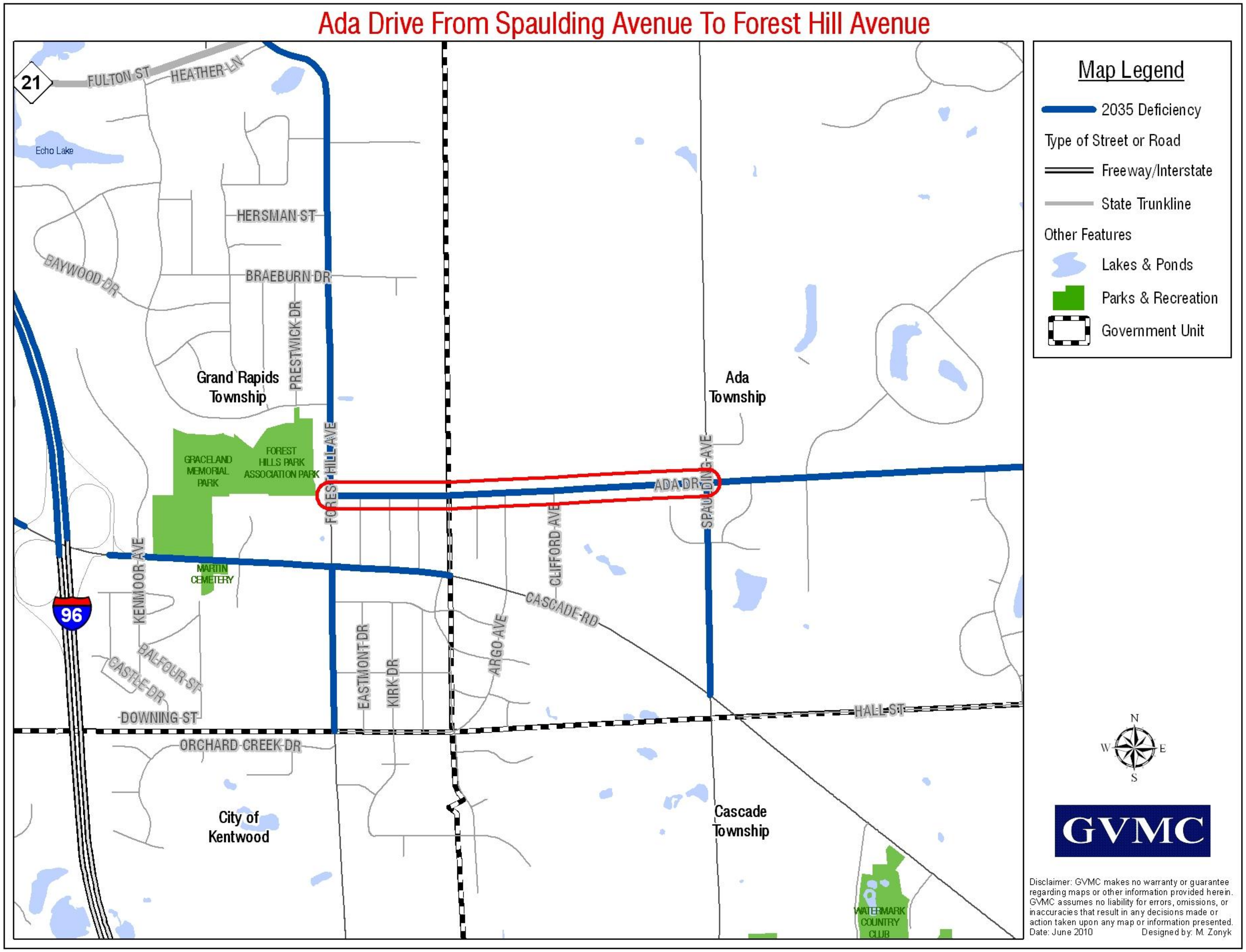
Transit Available: No Freight Route: No

Preferred Alternative: Monitor, Access Management

CMP Analysis

Ada Drive in Ada Twp in the Southeastern portion of Kent County serves primarily as a secondary access road from Ada Village to/from activity centers and employment in adjacent areas. The growth projection for this part of the area is much greater than in previous years. The planned growth is being concentrated in and around the Ada Village area. This additional growth is the primary cause for the higher than usual projections. GVMC is taking the worst case scenario for this corridor. If this higher density development occurs this corridor will merit further observation and possibly additional capacity. If not, the facility should operate efficiently for many years to come.

Deficiency Resolved? N/A


Ada Drive From Spaulding Avenue To Forest Hill Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
FULTON ST
HEATHER LN
Echo Lake
HERSMAN ST
BRAEBURN DR
BAYWOOD DR
PRESTWICK DR
Grand Rapids Township
FOREST HILL AVE
GRACELAND MEMORIAL PARK
FOREST HILLS PARK ASSOCIATION PARK
ADA DR
SPAULDING AVE
Ada Township
CLIFFORD AVE
CASCADE RD
KENMOOR AVE
MARTIN CEMETERY
BALFOUR ST
CASTLE DR
DOWNING ST
EASTMONT DR
KIRK DR
ARGO AVE
HALL ST
ORCHARD CREEK DR
City of Kentwood
Cascade Township
WATERMARK COUNTRY CLUB
GVMC
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Date: June 2010
Designed by: M. Zonyk

Ada Drive – Spaulding Avenue to Forest Hill Avenue

Jurisdiction: KCRC/Ada Twp.

NFC: Urban Minor Arterial

Length: 0.80 miles Lanes: 2

Current ADT: 6,236 Current Capacity: 12,000

Proj. 2035 ADT: 11,258 Projected V/C: 0.94

Phase Deficient: Borderline by 2035

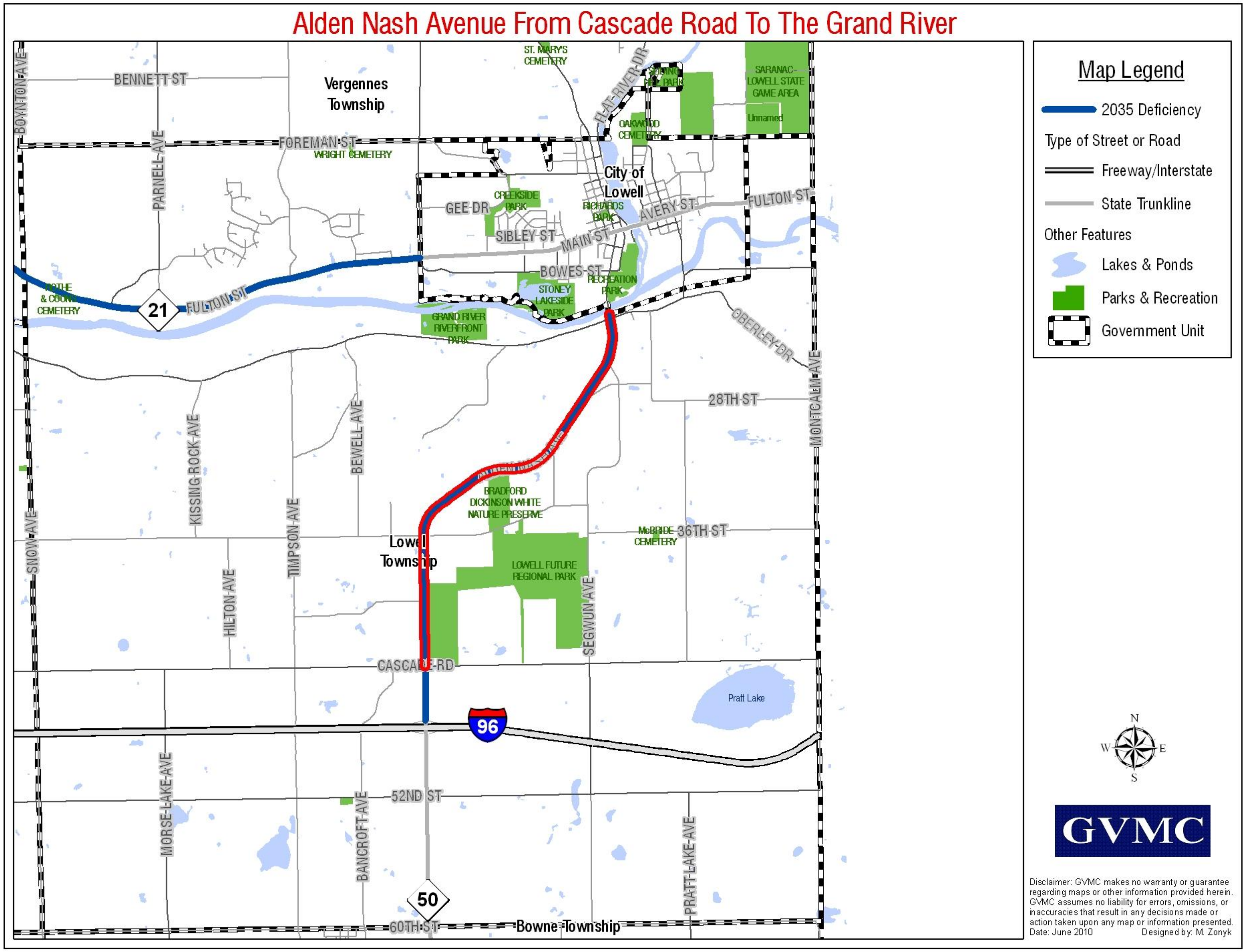
Transit Available: No Freight Route: No

Preferred Alternative: Monitor, Access Management

CMP Analysis

Ada Drive in Ada Twp in the Southeastern portion of Kent County serves primarily as a secondary access road from Ada Village to/from activity centers and employment in adjacent areas. The growth projection for this part of the area is much greater than in previous years. The planned growth is being concentrated in and around the Ada Village area. This additional growth is the primary cause for the higher than usual projections. GVMC is taking the worst case scenario for this corridor. If this higher density development occurs this corridor will merit further observation and possibly additional capacity. If not, the facility should operate efficiently for many years to come.

Deficiency Resolved? N/A



Alden Nash Avenue From Cascade Road To The Grand River
Vergennes Township
City of Lowell
Lowell Township
Bowne Township
BENNETT ST
FOREMAN ST
FULTON ST
GEE DR
SIBLEY ST
MAIN ST
AVERY ST
BOWES ST
FLAT RIVER DR
OBERLEY DR
28TH ST
36TH ST
CASCADE RD
52ND ST
60TH ST
BOYNTON AVE
PARNELL AVE
SNOW AVE
KISSING ROCK AVE
HILTON AVE
TIMPSON AVE
BEWELL AVE
SEGWUN AVE
MONTCALM AVE
MORSE LAKE AVE
BANCROFT AVE
PRATT LAKE AVE
Pratt Lake
21
50
96
ST. MARY'S CEMETERY
WRIGHT CEMETERY
SARANAC-LOWELL STATE GAME AREA
Unnamed
OAKWOOD CEMETERY
CREEKSIDE PARK
RICHARDS PARK
RECREATION PARK
STONEY LAKESIDE PARK
GRAND RIVER RIVERFRONT PARK
BRADFORD DICKINSON WHITE NATURE PRESERVE
LOWELL FUTURE REGIONAL PARK
McBRIDE CEMETERY
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Alden Nash Avenue – Cascade Road to The Grand River

Jurisdiction: KCRC/Lowell Twp

NFC: Rural Minor Arterial

Length: 3.46 miles   Lanes: 2

Current ADT: 10,900   Current Capacity: 13,600

Proj. 2035 ADT: 13,868   Projected V/C: 1.02

Phase Deficient: Borderline by 2035

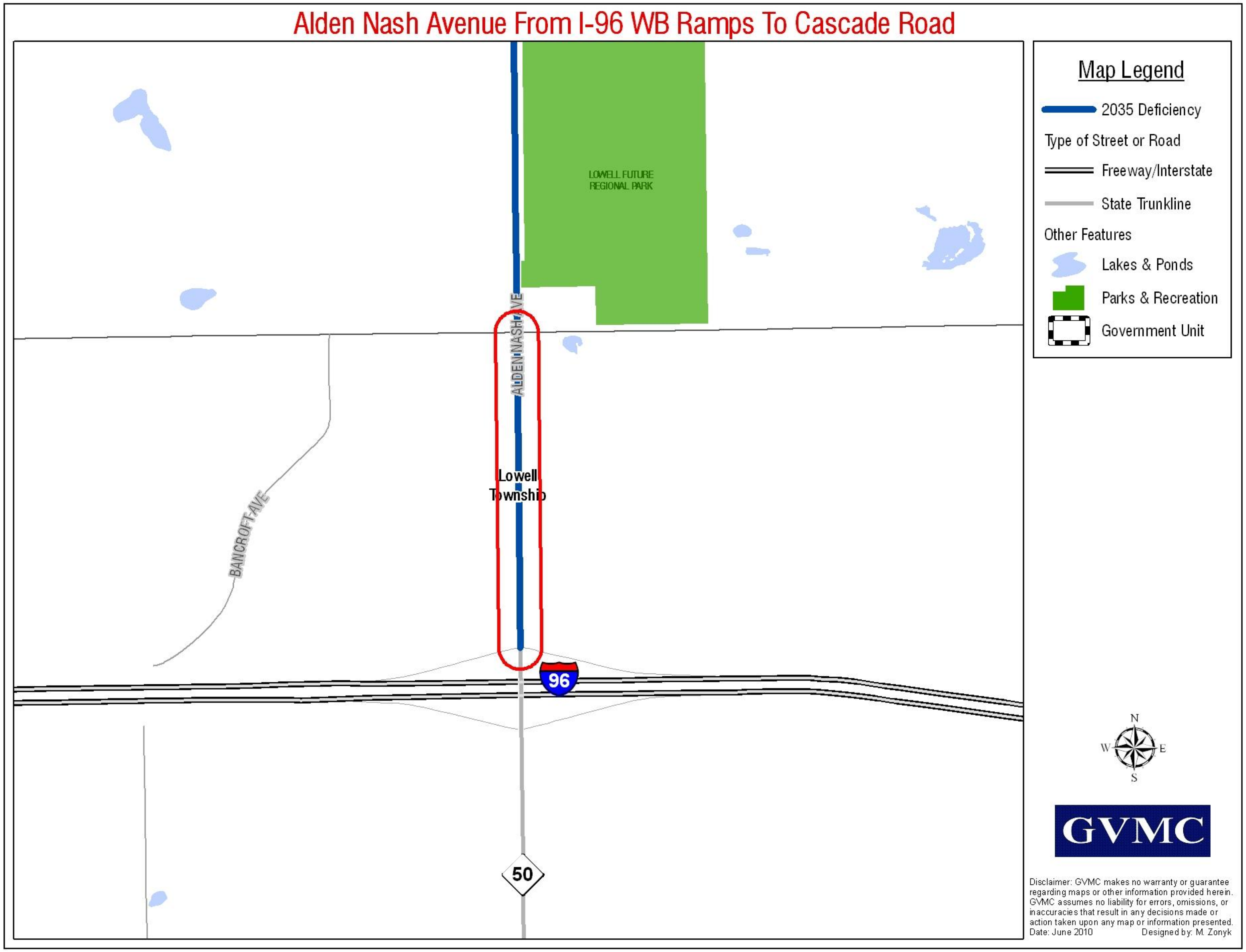
Transit Available: No   Freight Route: Yes

Preferred Alternative: Monitor, Access Management Planning

<u>CMP Analysis</u>

Alden Nash Avenue is not only one of the few river crossing locations in eastern Kent County but the facility provides the moderately populated area near the City of Lowell access to the freeway system via I-96. The primary land use is low density residential. The volumes along this corridor will continue to rise slightly over time as development occurs. However the growth that is projected is not expected to significantly contribute to congestion along this corridor. With proper access management planning and turn lanes at a few key intersections, this facility should have sufficient capacity into the distant future.

Deficiency Resolved? N/A


Alden Nash Avenue From I-96 WB Ramps To Cascade Road
LOWELL FUTURE REGIONAL PARK
ALDEN NASH AVE
Lowell Township
BANCROFT AVE
96
50
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Alden Nash Avenue – I-96 to Cascade Road

Jurisdiction: KCRC/Lowell Twp

NFC: Rural Minor Arterial

Length: 0.42 miles Lanes: 3

Current ADT: 15,243 Current Capacity: 18,000

Proj. 2035 ADT: 18,561 Projected V/C: 1.03

Phase Deficient: Borderline by 2035

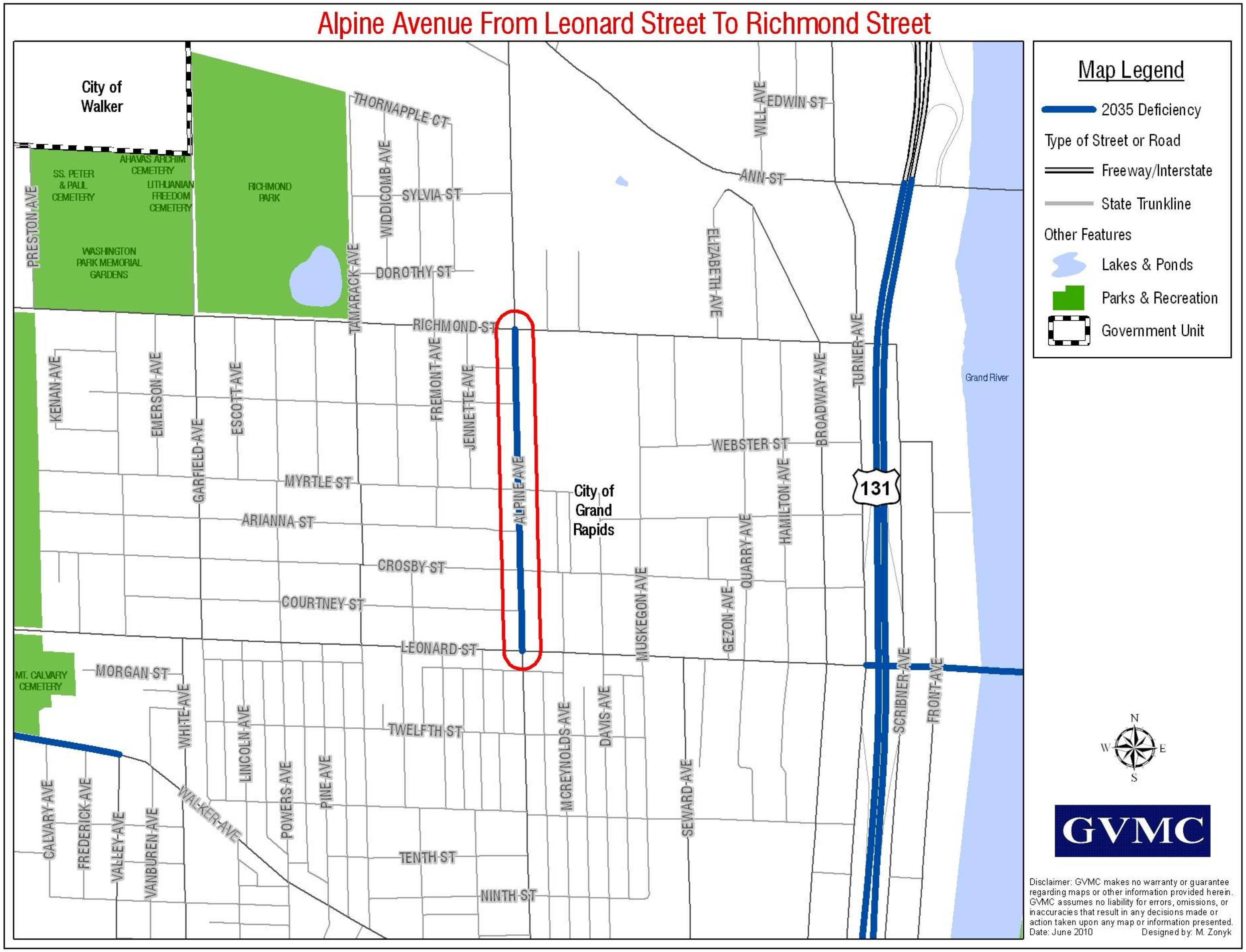
Transit Available: No Freight Route: Yes

Preferred Alternative: Monitor, Access Management Planning

CMP Analysis

Alden Nash Avenue is not only one of the few river crossing locations in eastern Kent County but the facility provides the moderately populated area near the City of Lowell access to the freeway system via I-96. The primary land use is Agricultural with some commercial near the freeway. Volumes along this corridor will continue to rise slightly over time as development occurs. However the growth that is projected is not expected to significantly contribute to congestion along this corridor. With proper access management planning, this facility should have sufficient capacity well into the distant future.

Deficiency Resolved? N/A


Alpine Avenue From Leonard Street To Richmond Street
City of Walker
City of Grand Rapids
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Grand River
131
GVMC
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Date: June 2010
Designed by: M. Zonyk

Alpine Avenue – Leonard Street to Richmond Street

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.50 miles Lanes: 2

Current ADT: 17,169 Current Capacity: 12,000

Proj. 2035 ADT: 18,219 Projected V/C: 1.52

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: Yes

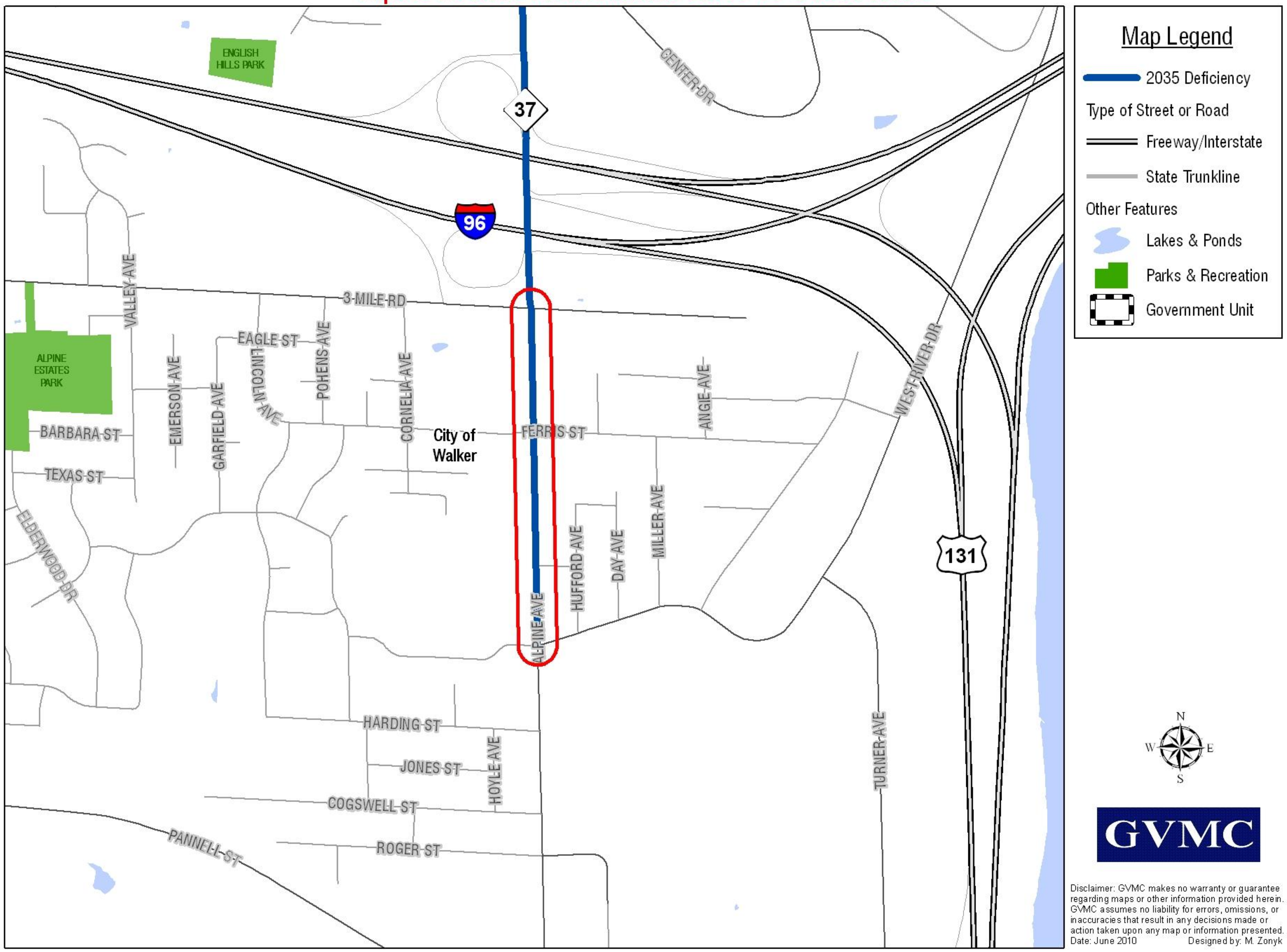
Preferred Alternative: Reconfigure within existing ROW to 3 or 4 lanes – Enhance Transit Capacity

<u>CMP Analysis</u>

Alpine Avenue serves as a secondary north-south corridor within the City of Grand Rapids. Alpine serves as a feeder corridor from the heavy residential areas in the southern end of the corridor to the dense commercial/retail development north of Hillside Drive. The primary land use along this portion of Alpine is commercial, some small retail and residential. The volumes currently make this facility capacity deficient. There is transit service in the corridor and on street parking is allowed. The ideal solution to this situation would be to reconfigure the facility to a 3 or 4 lane cross section during the peak periods. This would provide adequate capacity during these peak times. Any other more invasive action would require the demolition of many of the dwellings close to the road along with many of the businesses.

Deficiency Resolved? Yes, under a reconfigured cross section, the V/C could be as low as 0.76

Alpine Avenue From Hillside Drive To 3 Mile Road



Alpine Avenue – Hillside Drive to 3 Mile Road

Jurisdiction: City of Walker

NFC: Urban Principal Arterial

Length: 0.50 miles Lanes: 5

Current ADT: 28,648 Current Capacity: 34,800

Proj. 2035 ADT: 32,366 Projected V/C: 0.93

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

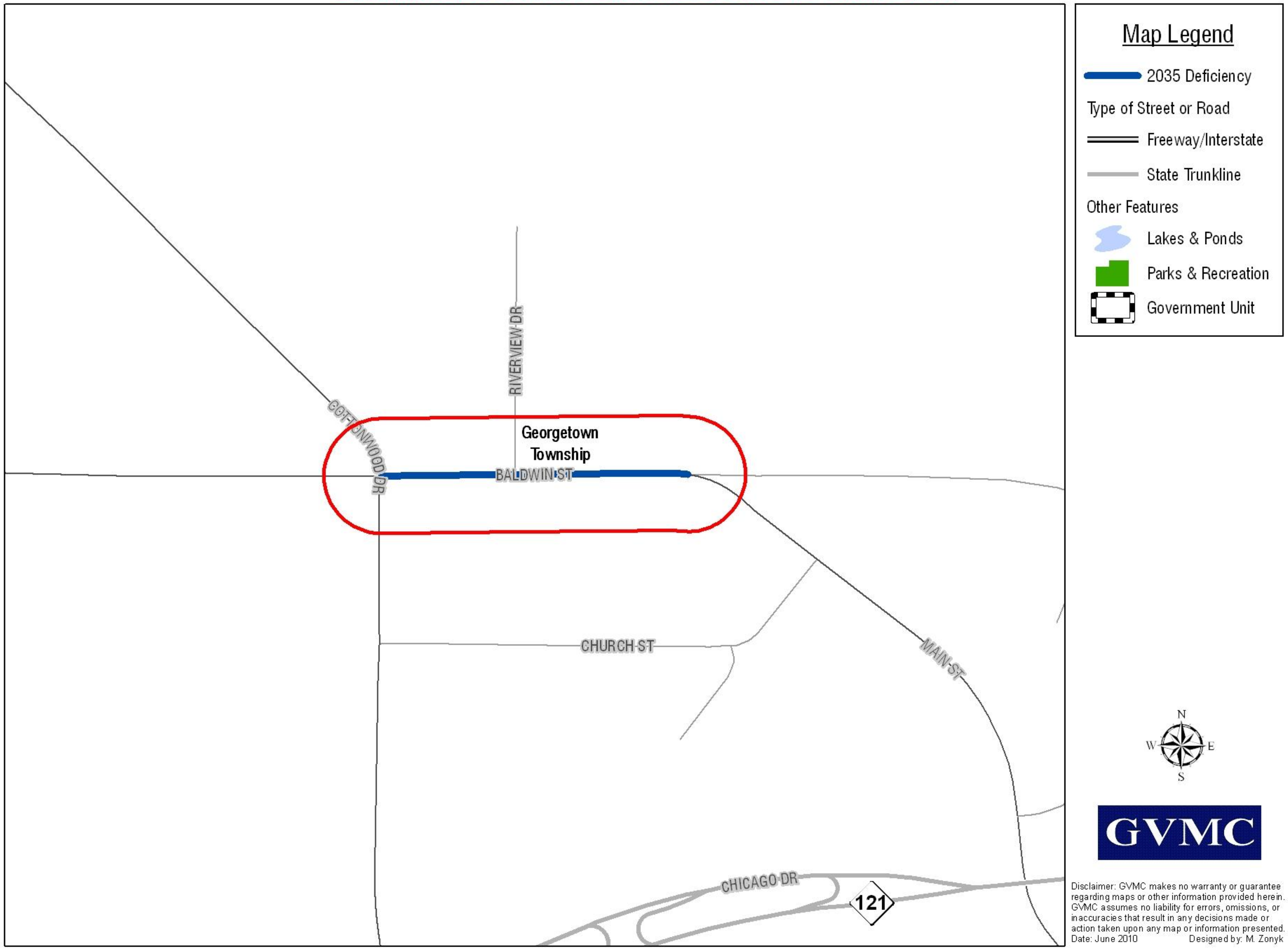
Preferred Alternative: Monitor, Access Management Planning, Transit Enhancement

CMP Analysis

Alpine Avenue serves as a secondary north-south corridor within the City of Grand Rapids. Alpine serves as a feeder corridor from the heavy residential areas in the southern end of the corridor to the dense commercial/retail development north of Hillside Drive. The primary land use along this portion of Alpine is commercial and large box retail (Meijer and Home Depot). The volumes along this section of Alpine do create daily congestion. However, as the former Delphi property is redeveloped this situation will have to be revisited. Most of the congestion experienced in the corridor is caused by the signalized intersections and access to local business. Driveway consolidation, continued attention to signal progression, and perhaps increased transit capacity will help this corridor operate as efficiently as possible without added capacity.

Deficiency Resolved? N/A

Baldwin Street From Cottonwood Drive To Main Street



Baldwin Street – CottonWood Drive to Main Street

Jurisdiction: OCRC/Georgetown Twp.

NFC: Urban Minor Arterial

Length: 0.16 miles Lanes: 5

Current ADT: 28,492 Current Capacity: 34,800

Proj. 2035 ADT: 30,555 Projected V/C: 0.88

Phase Deficient: Borderline by 2035

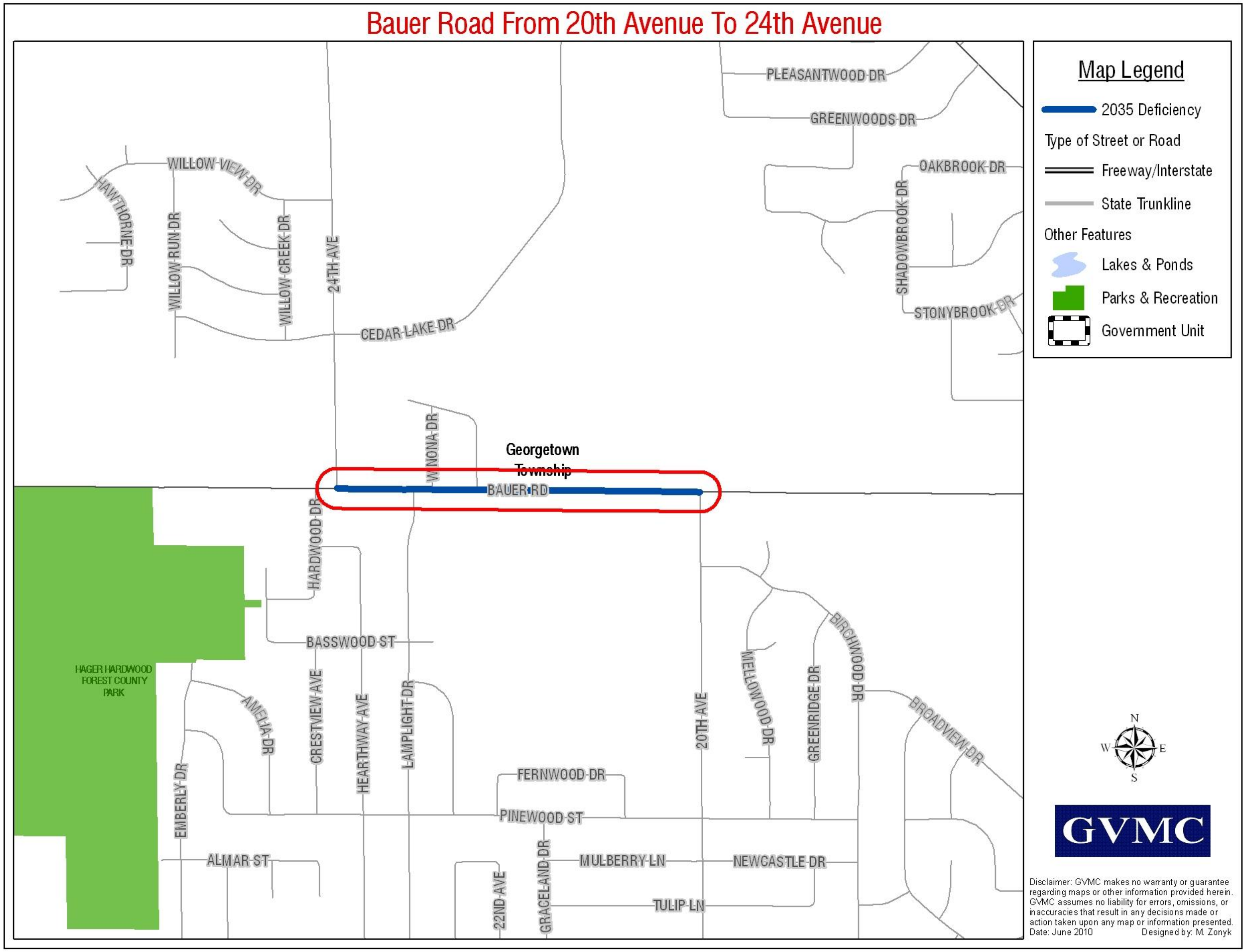
Transit Available: No Freight Route: Yes

Preferred Alternative: Monitoring, Access Management Planning

CMP Analysis

This section of Baldwin Street serves as a primary access corridor to/from eastern Ottawa County. Two access points to the interstate system (I-196) are within a short distance from this location. The recent completion of the new Baldwin Street interchange has focused more demand on this short stretch of the corridor. The primary land use is retail with some commercial. The current and projected volumes do not indicate a daily congestion issue. However congestion is already experienced in the corridor due to the number of driveway cuts and close proximity of the signals at main and Cottonwood. With continued attention to signal timing and access management planning the current cross section should be sufficient well into the future.

Deficiency Resolved? N/A


Bauer Road From 20th Avenue To 24th Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Georgetown Township
BAUER RD
24TH AVE
20TH AVE
22ND AVE
PLEASANTWOOD DR
GREENWOODS DR
OAKBROOK DR
SHADOWBROOK DR
STONYBROOK DR
WILLOW VIEW DR
HAWTHORNE DR
WILLOW RUN DR
WILLOW CREEK DR
CEDAR LAKE DR
WINONA DR
HARDWOOD DR
BASSWOOD ST
HAGER HARDWOOD FOREST COUNTY PARK
AMELIA DR
CRESTVIEW AVE
HEARTHWAY AVE
LAMPLIGHT DR
EMBERLY DR
ALMAR ST
FERNWOOD DR
PINEWOOD ST
GRACELAND DR
MULBERRY LN
TULIP LN
NEWCASTLE DR
MELLOWOOD DR
GREENRIDGE DR
BIRCHWOOD DR
BROADVIEW DR
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Date: June 2010
Designed by: M. Zonyk

Bauer Road – 20th Avenue to 24th Avenue

Jurisdiction: OCRC/Georgetown Twp.

NFC: Urban Minor Arterial

Length: 0.52 miles	Lanes: 2/3
Current ADT: 8,841	Current Capacity: 13,200
Proj. 2035 ADT: 12,614	Projected V/C: 0.96

Phase Deficient: Borderline by 2035

Transit Available: No	Freight Route: No

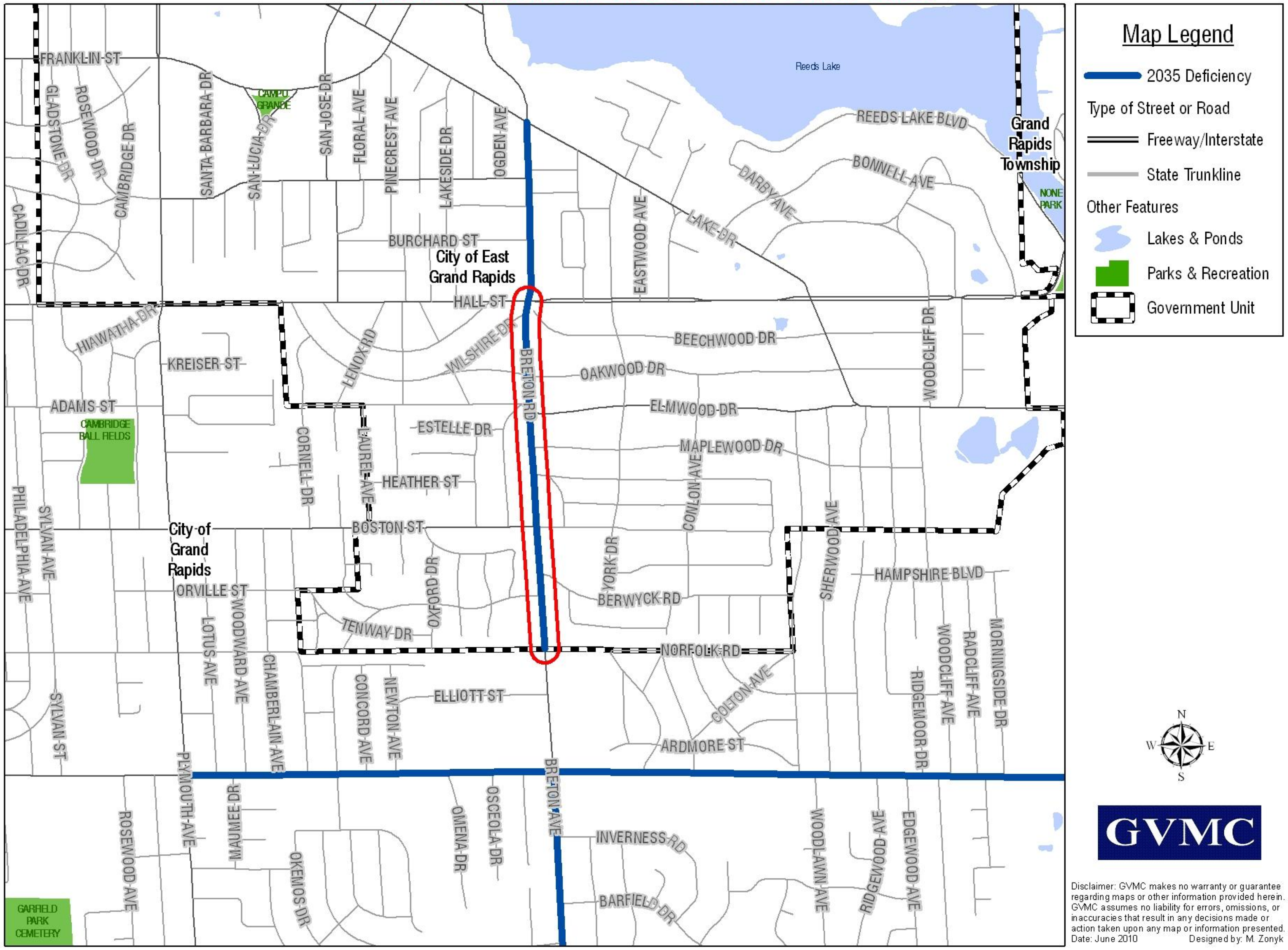
<u>CMP Analysis</u>

The Bauer Road Corridor serves as a secondary east-west access corridor in and out of eastern Ottawa County. The primary land use in this section is residential with a high school located on the eastern end of the segment. Growth in the adjacent area will be limited due to poor soil conditions. There should be sufficient capacity to adequately handle the projected volumes.

Preferred Alternative: Monitoring

Deficiency Resolved? N/A

Breton Avenue From East GR Limits To Hall Street



Breton Avenue – East GR Limits to Hall Street

Jurisdiction: City of East Grand Rapids

NFC: Urban Minor Arterial

Length: 0.72 miles Lanes: 2

Current ADT: 14,000 Current Capacity: 13,200

Proj. 2035 ADT: 14,900 Projected V/C: 1.13

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: No

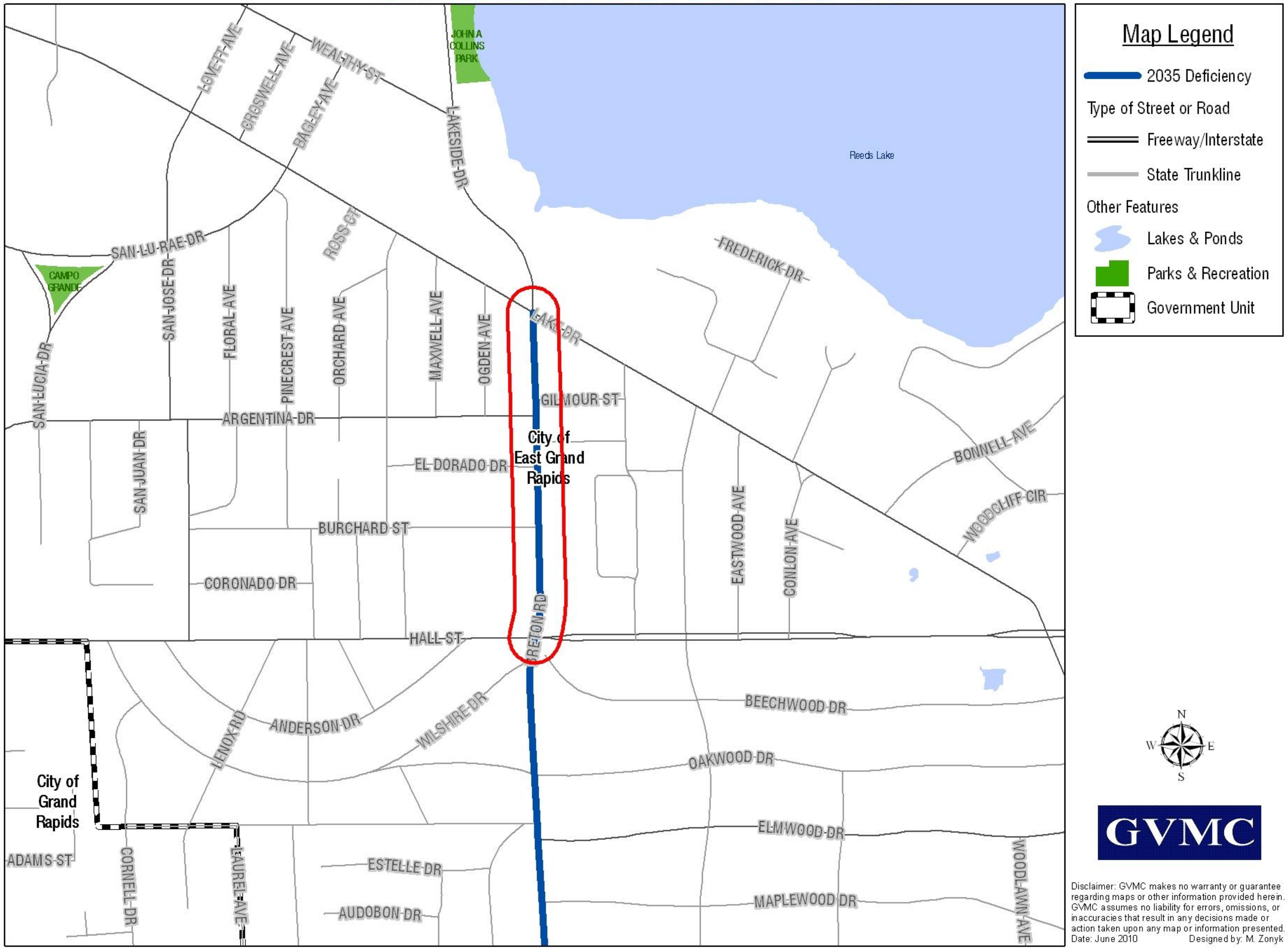
CMP Analysis

The Breton Avenue Corridor serves as a primary access from the City of East Grand Rapids to commercial areas in Grand Rapids and Kentwood. The primary land use is residential. Commercial traffic is localized. This corridor was the focus of traffic calming in recent years and seems to be widely accepted in the community. Continued attention to keeping traffic moving at key intersections and perhaps an increase in transit capacity are the primary options for reducing the impact of the congestion in this corridor. Widening is in all likelihood not an option that should be pursued.

Preferred Alternative: Monitoring, increased transit capacity

Deficiency Resolved? No. The congestion will remain at steady but acceptable levels. Non-invasive measures are preferred to adding capacity.

Breton Avenue From Lake Drive To Hall Street



Breton Avenue – Lake Drive to Hall Street

Jurisdiction: City of East Grand Rapids

NFC: Urban Minor Arterial

Length: 0.72 miles Lanes: 2

Current ADT: 14,000 Current Capacity: 13,200

Proj. 2035 ADT: 14,800 Projected V/C: 1.12

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: No

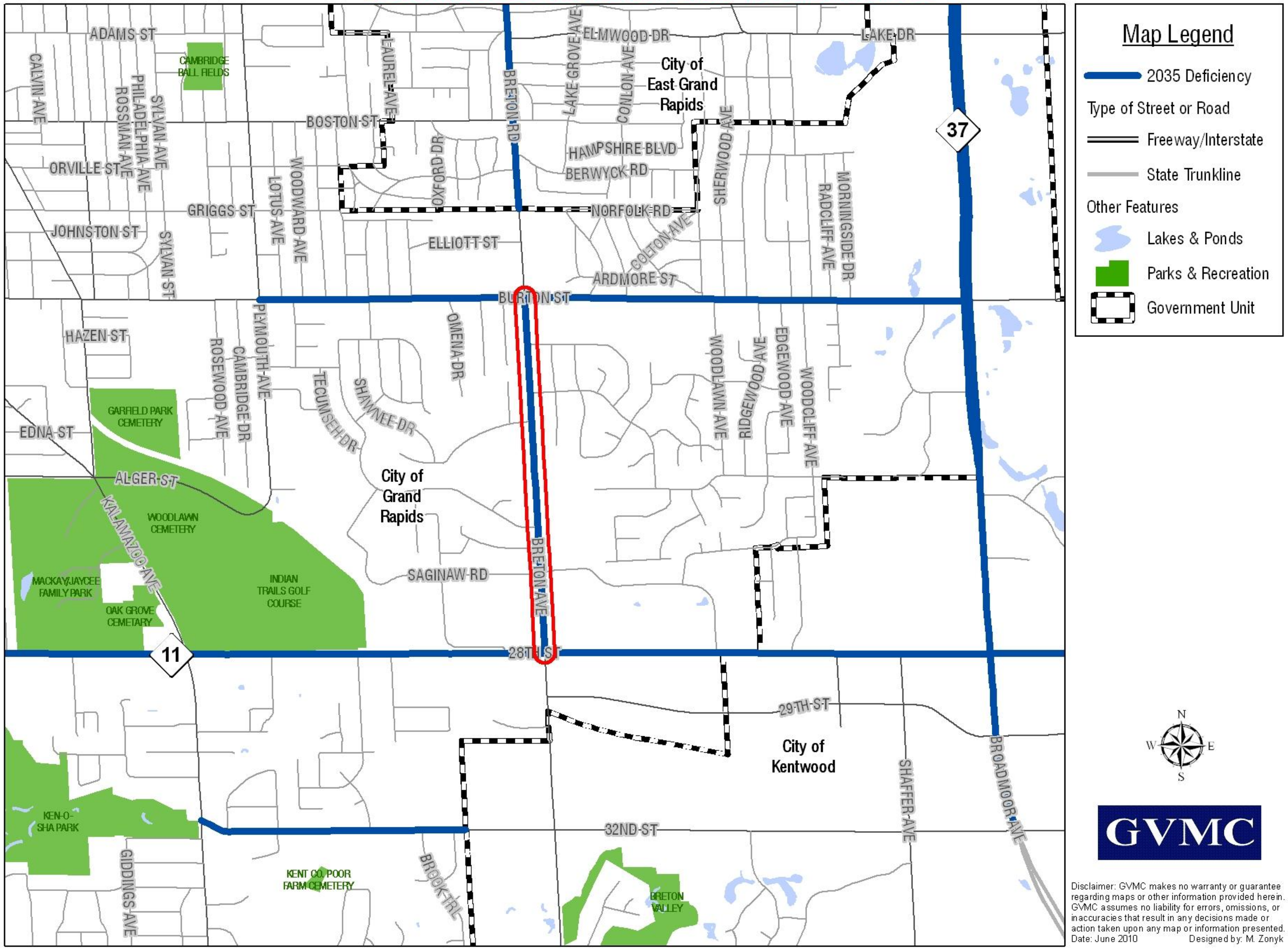
CMP Analysis

The Breton Avenue Corridor serves as a primary access from the City of East Grand Rapids to commercial areas in Grand Rapids and Kentwood. The primary land use is residential. Commercial traffic is localized. This corridor was the focus of traffic calming in recent years and seems to be widely accepted in the community. Continued attention to keeping traffic moving at key intersections and perhaps an increase in transit capacity are the primary options for reducing the impact of the congestion in this corridor. Widening is in all likelihood not an option that should be pursued.

Preferred Alternative: Monitoring, increased transit capacity

Deficiency Resolved? No

Breton Avenue From 28th Street To Burton Street



Breton Avenue – 28th Street to Burton Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 1.00 miles   Lanes: 4

Current ADT: 22,544   Current Capacity: 26,400

Proj. 2035 ADT: 28,110   Projected V/C: 1.06

Phase Deficient: Deficient by 2025

Transit Available: Yes   Freight Route: No

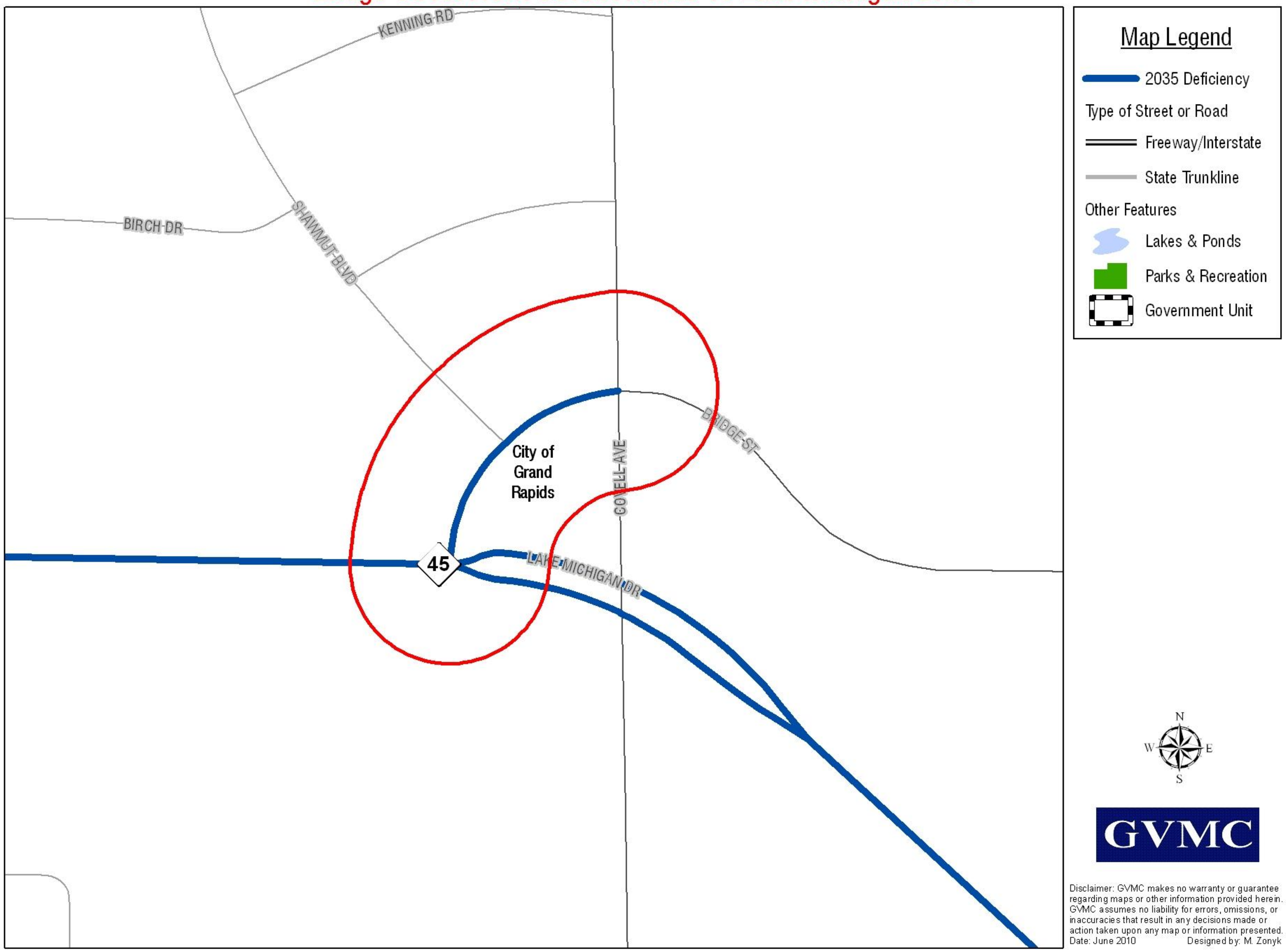
CMP Analysis

The Breton Avenue Corridor serves as a primary access from the City of East Grand Rapids to commercial areas in Grand Rapids and Kentwood. The primary land use is residential. Commercial traffic is localized. This corridor is listed on the list of segments that would receive a safety benefit from an added center turn lane. The number of driveways and side streets combined with the heavy volumes dictates that this corridor would benefit from an added center turn lane. This segment is scheduled for a resurfacing in FY 2011. The next time this facitlity is in need of a surface treatment consideration should be given to adding the center turn lane with T-EDFC funding.

Preferred Alternative: Reconstruct with an added center turn lane.

Deficiency Resolved? Yes, The V/C would be reduced to an acceptable 0.81 in 2035.

Bridge Street From Covell Avenue To Lake Michigan Drive



Bridge Street – Covell Avenue to Lake Michigan Drive

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.08 miles Lanes: 2

Current ADT: 6,800 Current Capacity: 12,000

Proj. 2035 ADT: 11,600 Projected V/C: 0.96

Phase Deficient: Borderline by 2035

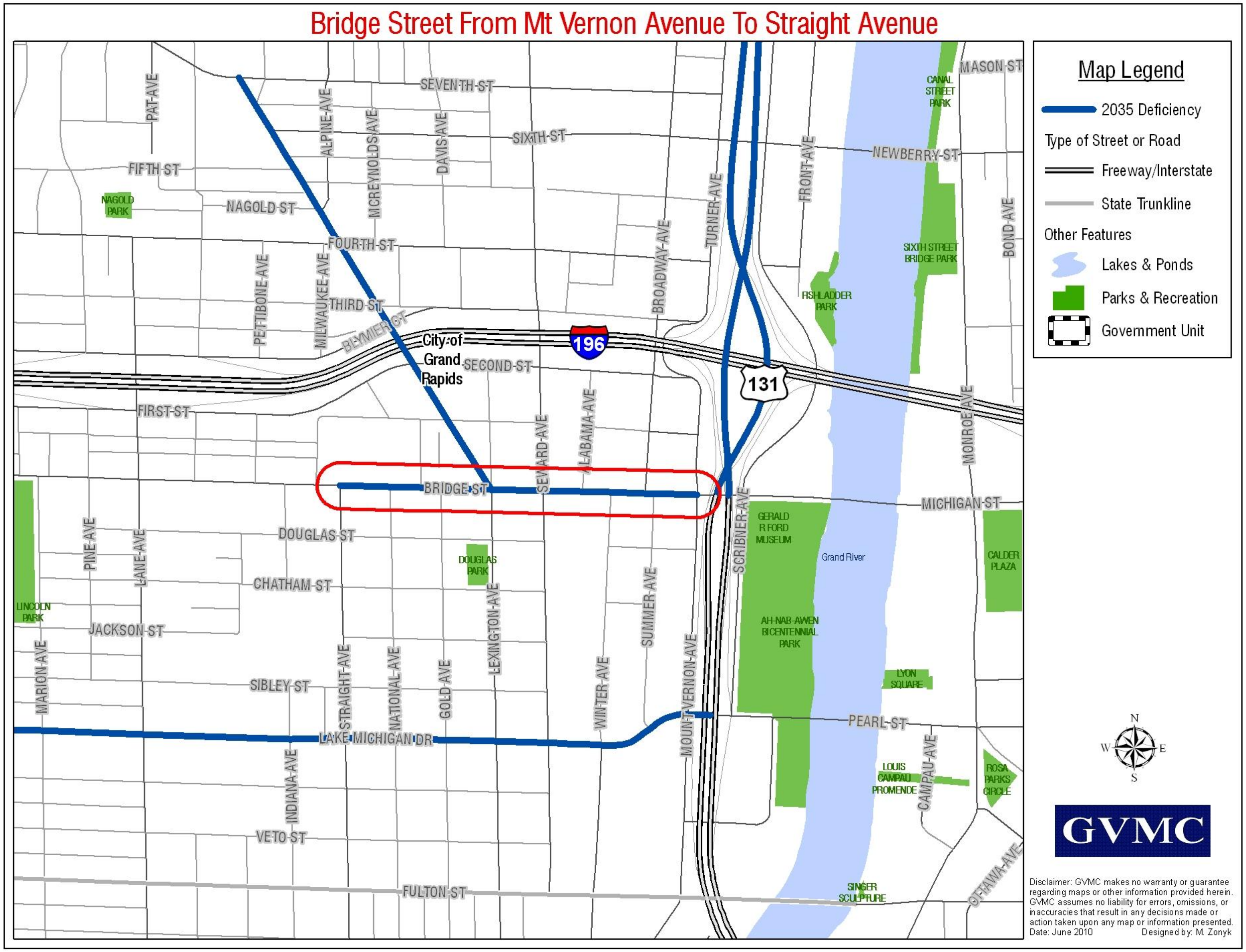
Transit Available: Yes Freight Route: No

CMP Analysis

This very short section of Bridge Street serves as access to Lake Michigan Drive. While the volumes are relatively low and projections show increases that will not technically push the corridor into a congested situation, the number of driveways and side streets in this section will create a high density of conflict points and opportunities for crashes due to driver confusion. The addition of a center turn lane within the current right-of-way is a low cost solution to this situation. Attention to new and existing driveway cuts will also help.

Preferred Alternative: Reconfigure and add a center turn lane within existing ROW.

Deficiency Resolved? N/A


Bridge Street From Mt Vernon Avenue To Straight Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grand Rapids
BRIDGE ST
Grand River
GVMC
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Date: June 2010
Designed by: M. Zonyk

Bridge Street – Mt Vernon Avenue to Straight Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.44 miles Lanes: 2

Current ADT: 9,000 Current Capacity: 12,000

Proj. 2035 ADT: 11,300 Projected V/C: 0.94

Phase Deficient: Borderline by 2035

Transit Available: Yes Freight Route: Yes

CMP Analysis

This section of Bridge Street serves as secondary east west corridor for the City of Grand Rapids. The primary land use is local commercial and small scale retail. Traffic volumes are expected to rise at a relatively low rate however with on street parking and the number of driveways and side streets the conflict points are numerous and tend to reduce the carrying capacity for this corridor. A variety of options can be applied to this section. Increased transit capacity and access management, would be beneficial. However, the most efficient method for solving congestion issues in this section may be to reconfigure the number of lanes from 2 with on street parking to three lanes with on street parking similar to the Leonard Street corridor to the north.

Preferred Alternative: Reconfigure and add a center turn lane within existing ROW.

Deficiency Resolved? N/A

Buchanan Avenue From Burton Street To Alger Street

Buchanan Avenue – Burton Street to Alger Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.49 miles	Lanes: 2
Current ADT: 9,200	Current Capacity: 12,000
Proj. 2035 ADT: 11,200	Projected V/C: 0.93

Phase Deficient: Borderline by 2035

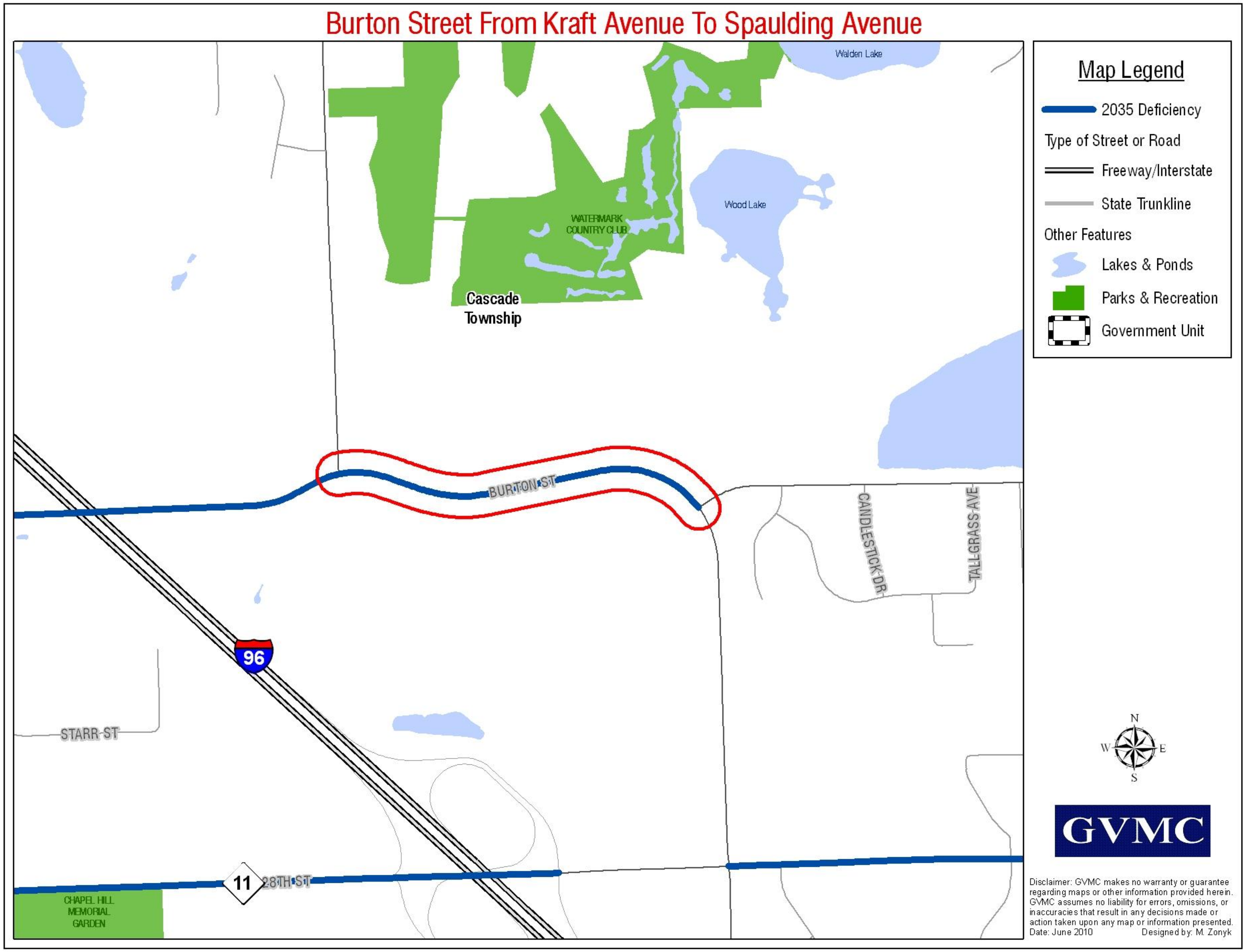
Transit Available: No	Freight Route: Yes

CMP Analysis

This section of Buchanan is a secondary north south corridor in the City of Grand Rapids. The primary land use if residential. Trips tend to be localized. Growth is projected to be relatively low. The projected volume does not put this corridor into a congested level. However, this corridor should be monitored and consideration should be given to making this a three lane cross section (maintaining the current pavement width) if major reconstruction work is completed.

Preferred Alternative: Reconfigure and add a center turn lane within existing pavement width.

Deficiency Resolved? N/A



Burton Street From Kraft Avenue To Spaulding Avenue
Walden Lake
Wood Lake
WATERMARK COUNTRY CLUB
Cascade Township
BURTON ST
CANDLESTICK DR
TALLGRASS AVE
96
STARR ST
11
28TH ST
CHAPEL HILL MEMORIAL GARDEN
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
N
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Date: June 2010
Designed by: M. Zonyk

Burton Street – Kraft Avenue to Spaulding Avenue

Jurisdiction: KCRC – Cascade Twp.

NFC: Urban Minor Arterial

Length: 0.50 miles Lanes: 3

Current ADT: 14,448 Current Capacity: 18,000

Proj. 2035 ADT: 16,726 Projected V/C: 0.93

Phase Deficient: Borderline by 2035

Transit Available: No Freight Route: Yes

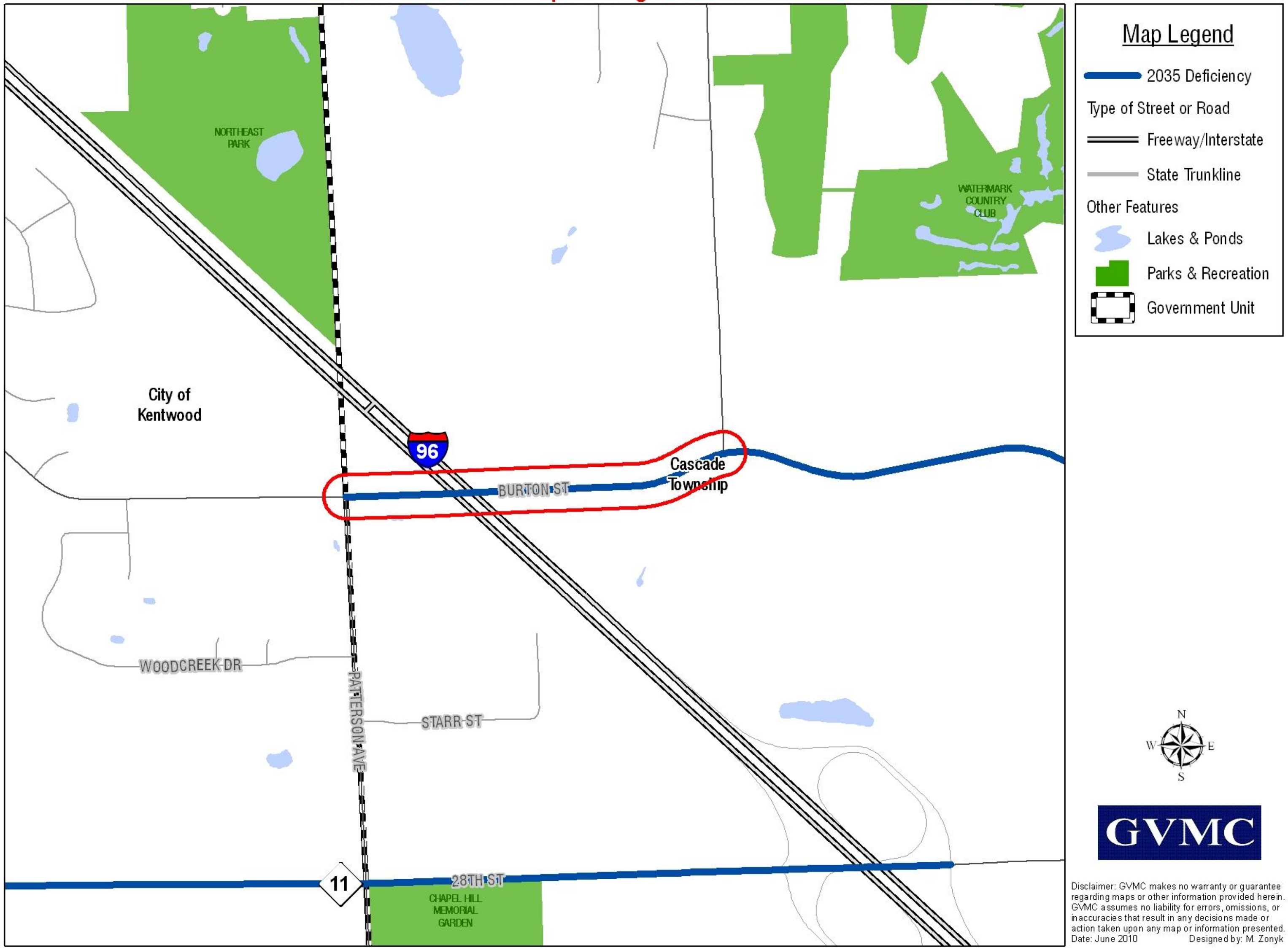
CMP Analysis

This section of Burton Street is a secondary east west route in Cascade Township. The primary land use is low density residential. The growth for this corridor is expected to be moderate. The existing 3 lane configuration should be sufficient to handle the projected volumes. As development occurs along this segment access management planning will help keep the turning volumes from having an adverse effect on this corridor.

Preferred Alternative: Continue monitoring, access management.

Deficiency Resolved? N/A

Burton Street From Spaulding Avenue To Patterson Avenue



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Date: June 2010 Designed by: M. Zonyk

Burton Street – Spaulding Avenue to Patterson Avenue

Jurisdiction: KCRC – Cascade Twp.

NFC: Urban Minor Arterial

Length: 0.50 miles Lanes: 2

Current ADT: 13,399 Current Capacity: 18,000

Proj. 2035 ADT: 15,000 Projected V/C: 1.25

Phase Deficient: Deficient by 2025

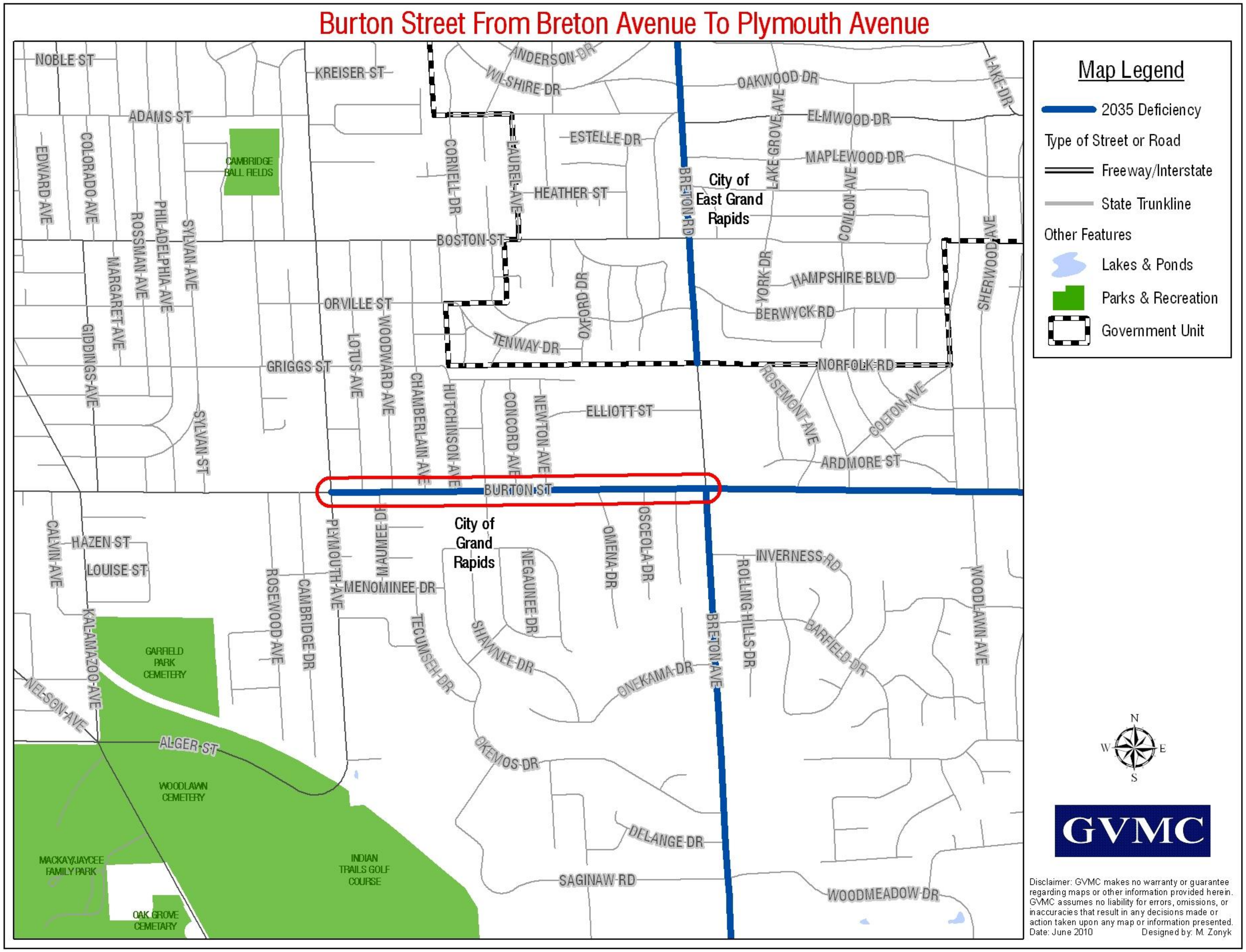
Transit Available: No Freight Route: Yes

CMP Analysis

This section of Burton Street is a secondary east west route in Cascade Township. The primary land use is low density residential. The growth for this corridor is expected to be moderate. The existing 2 lane configuration will not be sufficient to handle the projected traffic. All non-invasive options will not be sufficient to alleviate the projected congestion. The addition of a center turn lane and proper access management planning should provide capacity well into the future. There is a freeway overpass within this section. This should be taken into account in terms of timing the improvement. Also non-motorized options should be considered as this is one of a few freeway crossings in the general area.

Preferred Alternative: Reconstruct with added center turn lane, access management.

Deficiency Resolved? Yes, the V/C will be 0.83 in 2035


Burton Street From Breton Avenue To Plymouth Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of East Grand Rapids
City of Grand Rapids
BURTON ST
BRETON RD
BRETON AVE
PLYMOUTH AVE
NOBLE ST
KREISER ST
ANDERSON DR
WILSHIRE DR
OAKWOOD DR
LAKE DR
ADAMS ST
ELMWOOD DR
ESTELLE DR
MAPLEWOOD DR
CAMBRIDGE BALL FIELDS
EDWARD AVE
COLORADO AVE
ROSSMAN AVE
PHILADELPHIA AVE
SYLVAN AVE
CORNELL DR
LAUREL AVE
HEATHER ST
LAKE GROVE AVE
CONLON AVE
BOSTON ST
MARGARET AVE
GIDDINGS AVE
ORVILLE ST
OXFORD DR
YORK DR
HAMPSHIRE BLVD
SHERWOOD AVE
BERWYCK RD
TENWAY DR
LOTUS AVE
WOODWARD AVE
GRIGGS ST
NORFOLK RD
CHAMBERLAIN AVE
HUTCHINSON AVE
CONCORD AVE
NEWTON AVE
ELLIOTT ST
ROSEMONT AVE
COLTON AVE
SYLVAN ST
ARDMORE ST
MAUMEE DR
OMENA DR
OSCEOLA DR
CALVIN AVE
HAZEN ST
LOUISE ST
INVERNESS RD
ROSEWOOD AVE
CAMBRIDGE DR
MENOMINEE DR
NEGAUNEE DR
ROLLING HILLS DR
WOODLAWN AVE
KALAMAZOO AVE
GARFIELD PARK CEMETERY
TECUMSEH DR
SHAWNEE DR
BARFIELD DR
ONEKAMA DR
NELSON AVE
ALGER ST
OKEMOS DR
WOODLAWN CEMETERY
DELANGE DR
MACKAY/JAYCEE FAMILY PARK
INDIAN TRAILS GOLF COURSE
SAGINAW RD
WOODMEADOW DR
OAK GROVE CEMETERY
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Burton Street – Breton Avenue to Plymouth Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.75 miles Lanes: 4

Current ADT: 21,800 Current Capacity: 26,400

Proj. 2035 ADT: 23,400 Projected V/C: 0.89

Phase Deficient: Borderline Deficient by 2035

Transit Available: Yes Freight Route: Yes

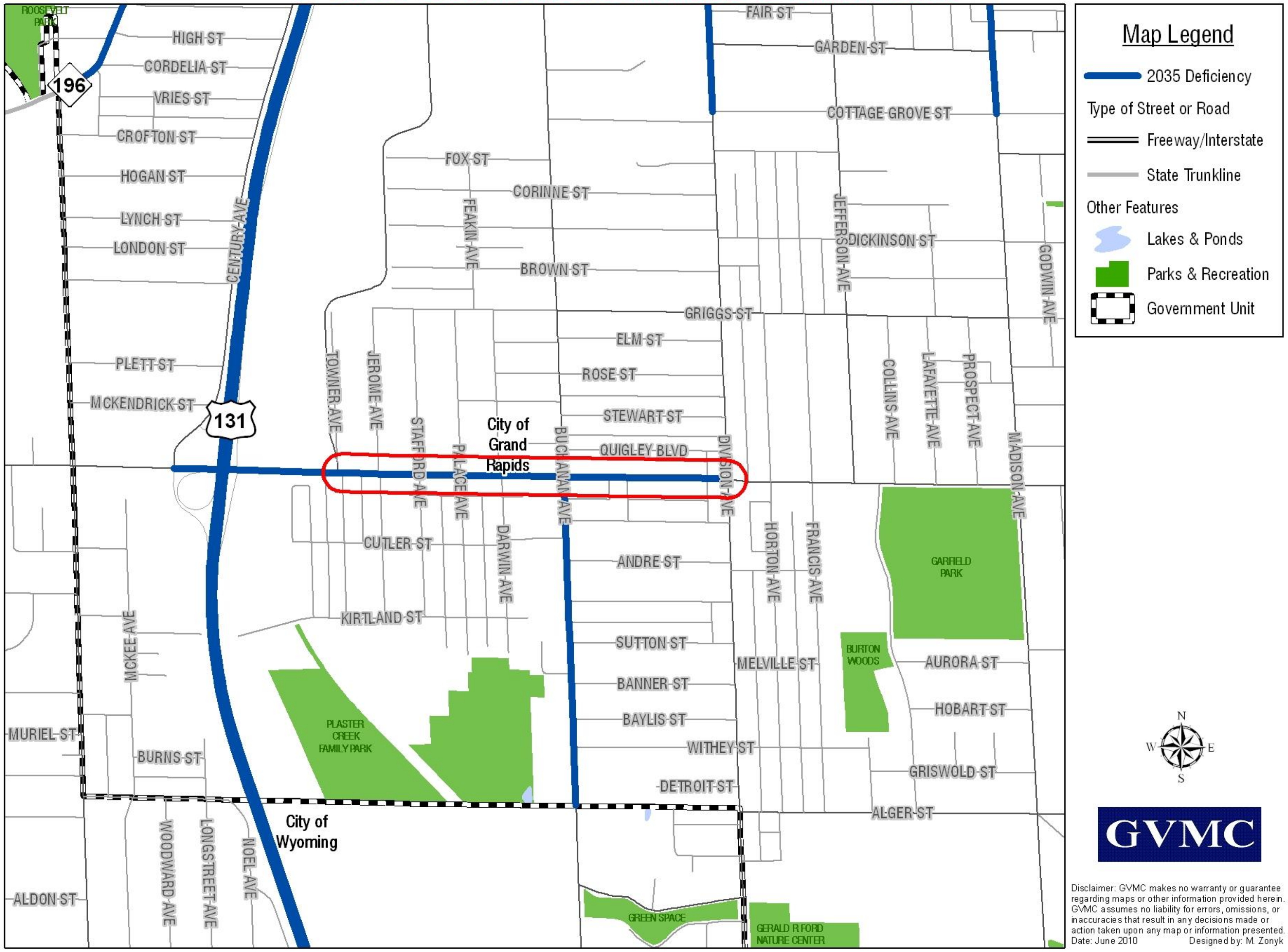
CMP Analysis

This section of Burton Street is a primary east west route in the City of Grand Rapids. The primary land use is residential with small areas for commercial and an elementary school. The growth rate for this segment is expected to be moderate through 2035. The projected volumes do not put this segment over capacity. However, as a primary corridor with borderline volumes this corridor should be closely monitored. Continued signal progression efforts and enhanced transit capacity along this corridor would be options for extending the current carrying capacity of the roadway

Preferred Alternative: Monitoring

Deficiency Resolved? N/A

Burton Street From Division Avenue To Towner Avenue



Burton Street – Division Avenue to Towner Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.59 miles | Lanes: 3

Current ADT: 20,500 | Current Capacity: 18,000

Proj. 2035 ADT: 22,300 | Projected V/C: 1.24

Phase Deficient: Currently Deficient

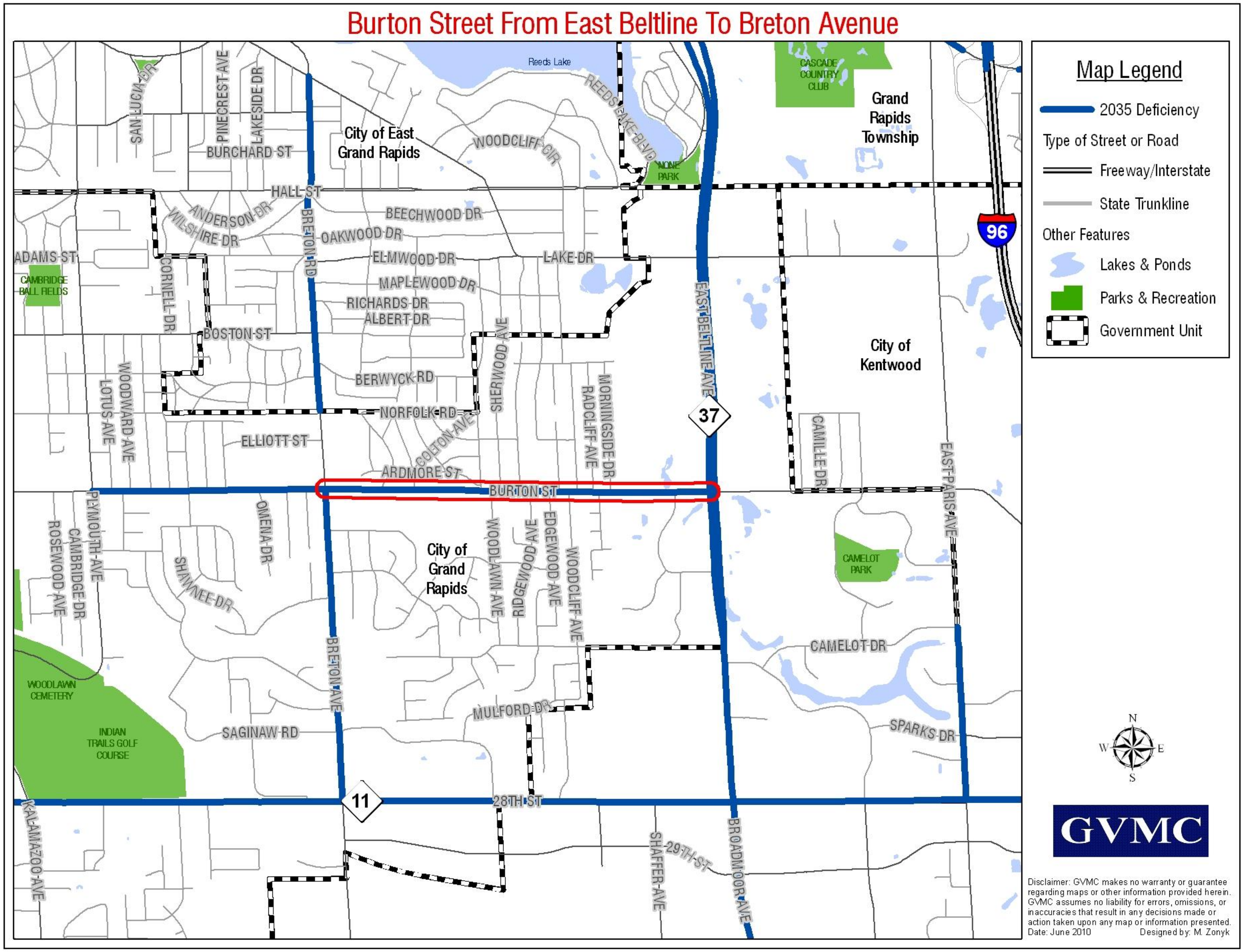
Transit Available: Yes | Freight Route: Yes

CMP Analysis

This section of Burton Street is a primary east west route in the City of Grand Rapids. The primary land use is residential with small areas for commercial. The growth rate for this segment is expected to be moderate through 2035. A few years ago this segment was reduced from 4 lanes to 3. The corresponding capacity was also reduced to 18,000. Due in large part to this reduction in lanes this segment is technically over capacity. The recommendation for this section is to continue monitoring, signal progression, and enhanced transit capacity efforts. A transition back to a four lane cross section needs to be evaluated after more time has passed to assess what an acceptable level of delay is for this segment.

Preferred Alternative: Monitoring, signal progression, enhanced transit.

Deficiency Resolved? No. The delays experienced in the corridor may be acceptable. When considering the left turn refuge area and bike lane.



Burton Street From East Beltline To Breton Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of East Grand Rapids
Grand Rapids Township
City of Kentwood
City of Grand Rapids
BURTON ST
EAST BELTLINE AVE
BRETON RD
BRETON AVE
HALL ST
28TH ST
EAST PARIS AVE
GVMC
Disclaimer: GVMC makes no warranty or guarantee regarding maps or other information provided herein. GVMC assumes no liability for errors, omissions, or inaccuracies that result in any decisions made or action taken upon any map or information presented.
Date: June 2010
Designed by: M. Zonyk

Burton Street – East Beltline to Breton Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 1.23 miles   Lanes: 4

Current ADT: 21,500   Current Capacity: 26,400

Proj. 2035 ADT: 23,450   Projected V/C: 0.89

Phase Deficient: Borderline by 2035

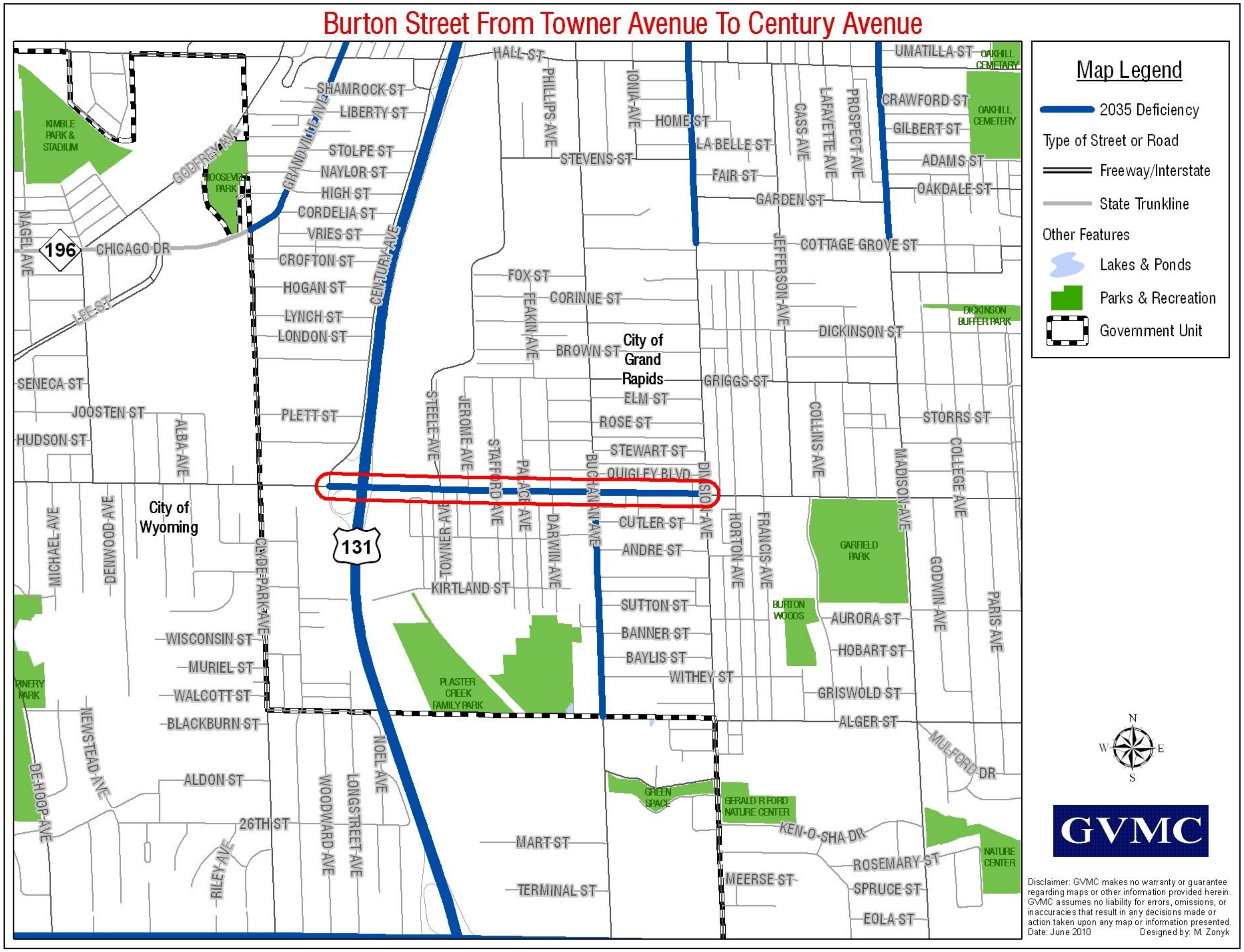
Transit Available: Yes   Freight Route: Yes

<u>CMP Analysis</u>

This section of Burton Street is a primary east west route in the City of Grand Rapids. The primary land use is residential with small areas for commercial. The growth rate for this segment is expected to be moderate through 2035. The projected volume is not expected to reach capacity by 2035 but monitoring should continue to assure that this remains the case. Continued corridor progression work should continue and enhanced transit activities may help improve travel conditions.

Preferred Alternative: Monitoring, signal progression, enhanced transit.

Deficiency Resolved? N/A


Burton Street From Towner Avenue To Century Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grand Rapids
City of Wyoming
GVMC
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Date: June 2010 Designed by: M. Zonyk

Burton Street – Towner Avenue to Century Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.26 miles	Lanes: 4
Current ADT: 43,400	Current Capacity: 26,400
Proj. 2035 ADT: 44,200	Projected V/C: 1.68

Phase Deficient: Currently Deficient

Transit Available: Yes	Freight Route: Yes

<u>CMP Analysis</u>

This very congested section of Burton Street is a primary east west route in the City of Grand Rapids. This section is primarily the interchange with US-131. Most of the segment is elevated over the freeway and a major railroad yard. Efforts over the years have focused on signal progression and transit enhancement. This approach has reached the point where additional efforts will not make a significant impact. A comprehensive study that looks at capacity, freight movements, and non-motorized flows should be undertaken.

Preferred Alternative: Comprehensive study.

Deficiency Resolved? No.

Buttrick Avenue From Grand River Drive To Thornapple River Drive

Buttrick Avenue – Grand River Drive to Thornapple River Drive

Jurisdiction: KCRC/Ada Twp.

NFC: Urban Collector

Length: 0.48 miles Lanes: 2

Current ADT: 11,000 Current Capacity: 13,600

Proj. 2035 ADT: 13,900 Projected V/C: 1.02

Phase Deficient: Borderline by 2035

Transit Available: No Freight Route: No

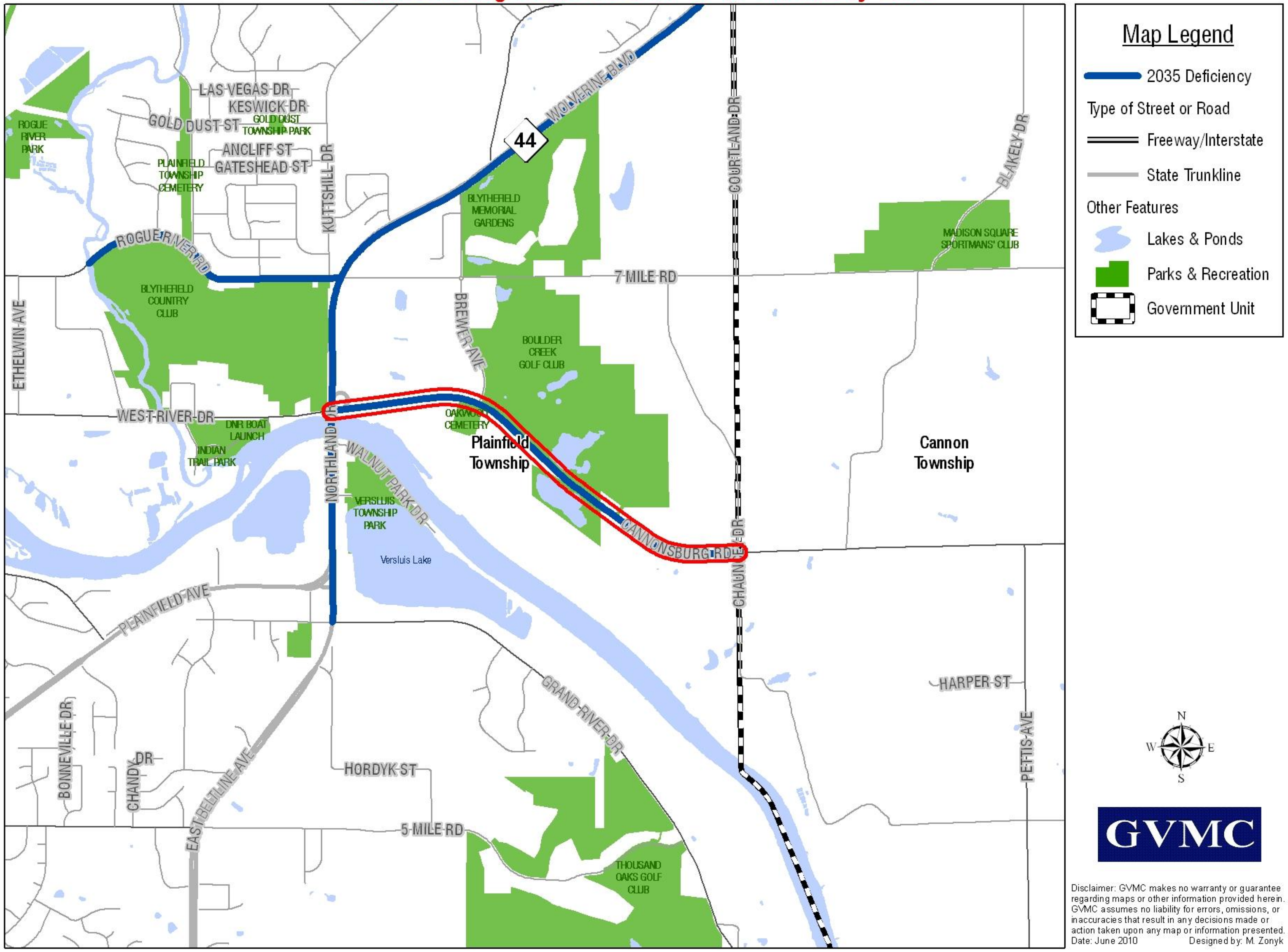
CMP Analysis

Buttrick Avenue in Ada Township serves as a feeder collector from rural Ada Township to the Ada Village and points beyond via M-21 and other arterials. The growth on this corridor is expected to be moderate over time. While the future volumes push the volumes over the designed capacity of the facility, the levels of the congestion will likely be acceptable when compared to an invasive widening project.

Preferred Alternative: Monitoring, Access Management Planning.

Deficiency Resolved? No. Low level of congestion deemed acceptable.

Cannonsburg Road From M-44 To Chauncey Drive



Cannonsburg Road – M-44 (Northland Dr) to Chauncey Drive

Jurisdiction: KCRC/Plainfield Twp.

NFC: Urban Collector

Length: 1.67 miles   Lanes: 2

Current ADT: 11,746   Current Capacity: 13,600

Proj. 2035 ADT: 14,300   Projected V/C: 1.05

Phase Deficient: Yes by 2035

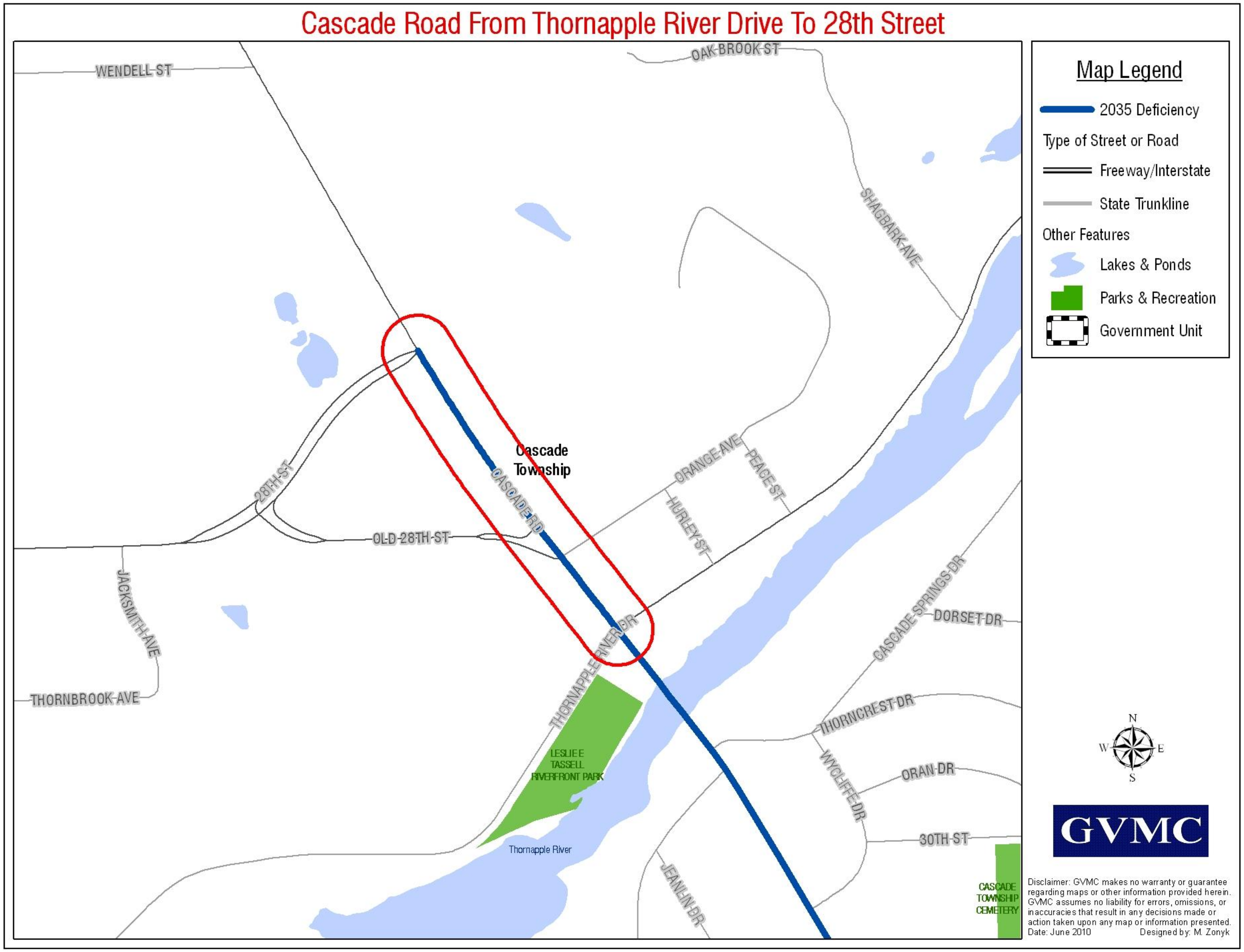
Transit Available: No   Freight Route: Yes

CMP Analysis

Cannonsburg Road in Plainfield Township serves as a secondary east west route. The primary land use is rural residential, with a golf course and gravel mining operation prevalent. The volumes are expected to increase moderately over the next 25 years putting the corridor slightly above the deficient stage by 2035. An assumption is made that the property south of the road will be developed as a medium density condominium complex in the near future. If/when this occurs and when the mining operations cease and that property is redeveloped, access management planning may be sufficient to address the additional volumes that are to be expected.

Preferred Alternative: Monitoring, Access Management Planning.

Deficiency Resolved? Low level of congestion deemed acceptable.


Cascade Road From Thornapple River Drive To 28th Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
WENDELL ST
OAK BROOK ST
SHAGBARK AVE
Cascade Township
CASCADE RD
28TH ST
OLD 28TH ST
ORANGE AVE
PEACE ST
HURLEY ST
JACKSMITH AVE
THORNBROOK AVE
THORNAPPLE RIVER DR
CASCADE SPRINGS DR
DORSET DR
THORNCREST DR
WYCLIFFE DR
ORAN DR
30TH ST
JEANLIN DR
LESLIE E TASSELL RIVERFRONT PARK
Thornapple River
CASCADE TOWNSHIP CEMETERY
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Cascade Road – Thornapple River Drive to 28th Street

Jurisdiction: KCRC/Cascade Twp.

NFC: Urban Minor Arterial

Length: 0.27 miles Lanes: 5

Current ADT: 32,000 Current Capacity: 34,800

Proj. 2035 ADT: 35,320 Projected V/C: 1.01

Phase Deficient: Borderline by 2035

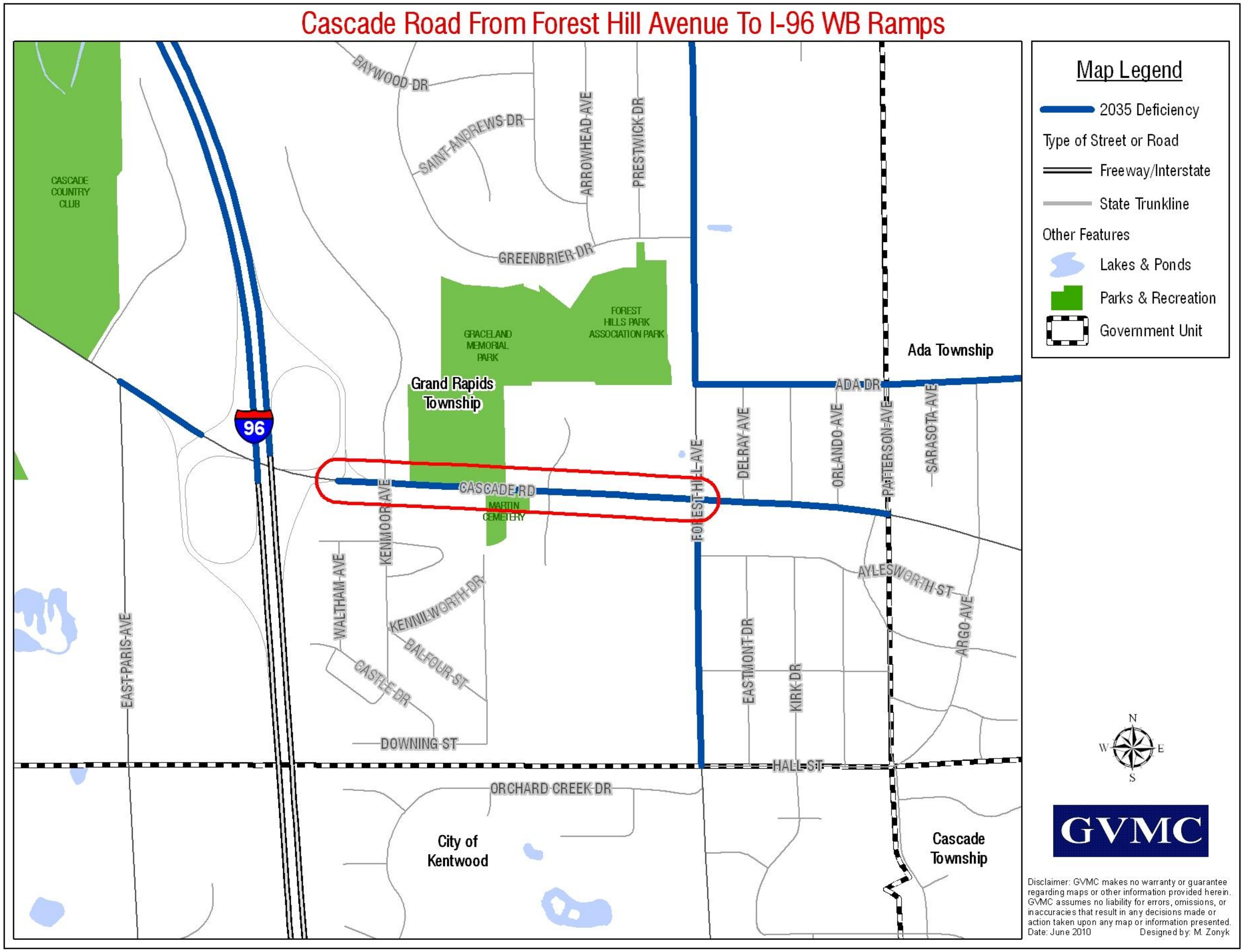
Transit Available: No Freight Route: Yes

CMP Analysis

Cascade Road in Cascade Township serves as a primary north south facility. The primary land use along his section is retail and commercial. The projected growth in this corridor is projected to be moderate. Volumes are expected to exceed congested levels only slightly by 2035. Enhanced access management planning and perhaps adding transit in the corridor can put off any invasive capacity adding alternatives indefinitely.

Preferred Alternative: Monitoring, Access Management Planning.

Deficiency Resolved? Low level of congestion deemed acceptable.



Cascade Road From Forest Hill Avenue To I-96 WB Ramps
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
CASCADE COUNTRY CLUB
BAYWOOD DR
SAINT ANDREWS DR
ARROWHEAD AVE
PRESTWICK DR
GREENBRIER DR
GRACELAND MEMORIAL PARK
FOREST HILLS PARK ASSOCIATION PARK
Grand Rapids Township
Ada Township
ADA DR
96
CASCADE RD
MARTIN CEMETERY
KENMOOR AVE
FOREST HILL AVE
DELRAY AVE
ORLANDO AVE
PATTERSON AVE
SARASOTA AVE
AYLESWORTH ST
ARGO AVE
WALTHAM AVE
KENNILWORTH DR
BALFOUR ST
CASTLE DR
EAST PARIS AVE
EASTMONT DR
KIRK DR
DOWNING ST
HALL ST
ORCHARD CREEK DR
City of Kentwood
Cascade Township
GVMC
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Date: June 2010
Designed by: M. Zonyk

Cascade Road – Forest Hill Avenue to I-96 WB Ramps

Jurisdiction: KCRC/Grand Rapids Twp.

NFC: Urban Minor Arterial

Length: 0.46 miles Lanes: 5

Current ADT: 29,900 Current Capacity: 34,800

Proj. 2035 ADT: 35,300 Projected V/C: 1.01

Phase Deficient: Borderline by 2035

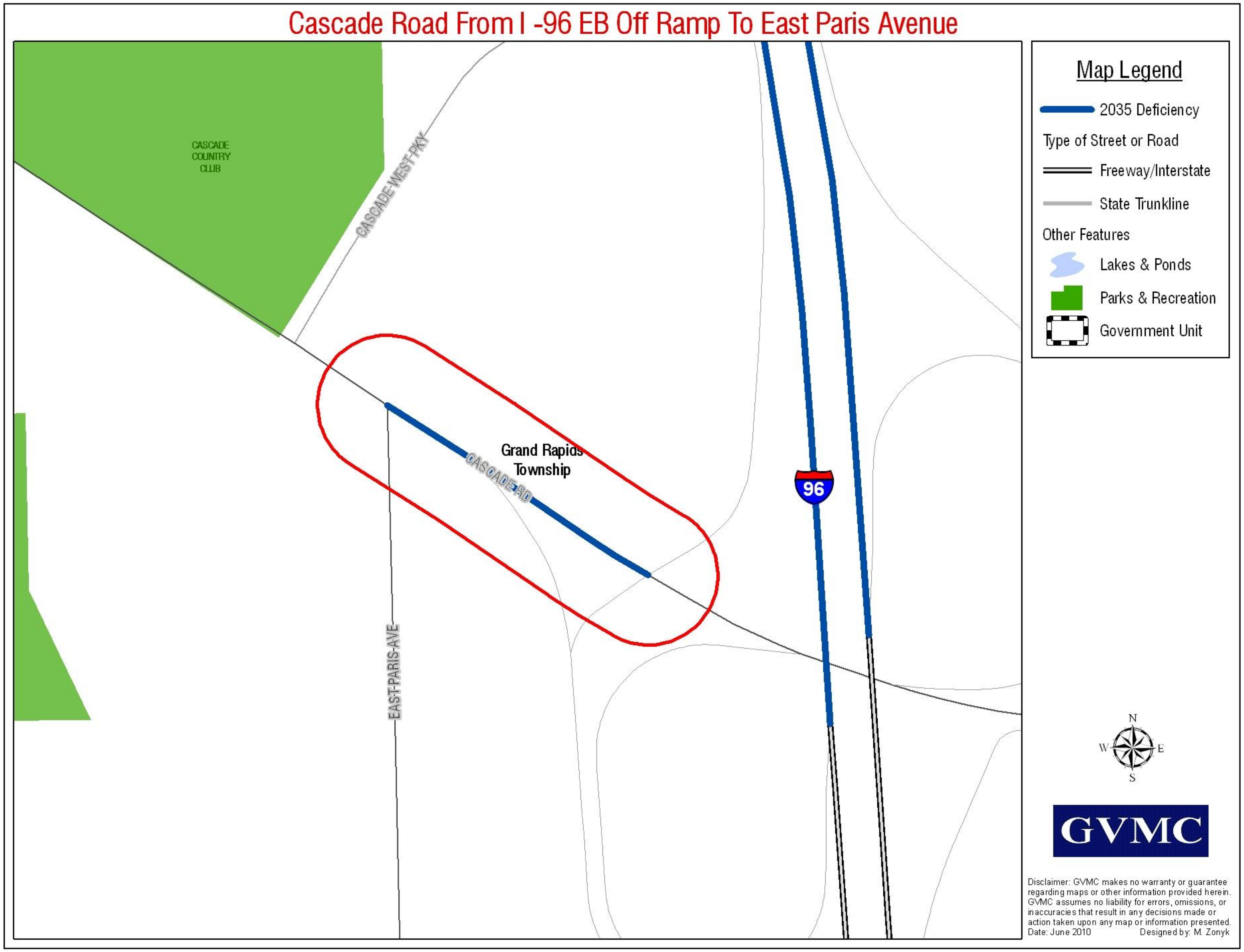
Transit Available: No Freight Route: Yes

CMP Analysis

Cascade Road in Cascade Township serves as a primary north south facility. The primary land use along his section is retail and commercial. The projected growth in this corridor is projected to be moderate. Volumes are expected to exceed congested levels only slightly by 2035. Enhanced access management planning and perhaps adding transit in the corridor can put off any invasive capacity adding alternatives indefinitely.

Preferred Alternative: Monitoring, Access Management Planning.

Deficiency Resolved? Low level of congestion deemed acceptable.


Cascade Road From I -96 EB Off Ramp To East Paris Avenue
CASCADE COUNTRY CLUB
CASCADE-WEST-PKY
Grand Rapids Township
CASCADE-RD
EAST-PARIS-AVE
96
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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Disclaimer: GVMC makes no warranty or guarantee regarding maps or other information provided herein. GVMC assumes no liability for errors, omissions, or inaccuracies that result in any decisions made or action taken upon any map or information presented.
Date: June 2010
Designed by: M. Zonyk

Cascade Road – I-96 EB Ramps to East Paris Avenue

Jurisdiction: KCRC/Grand Rapids Twp.

NFC: Urban Minor Arterial

Length: 0.05 miles   Lanes: 6

Current ADT: 27,635   Current Capacity: 34,800

Proj. 2035 ADT: 34,400   Projected V/C: 0.99

Phase Deficient: Borderline by 2035

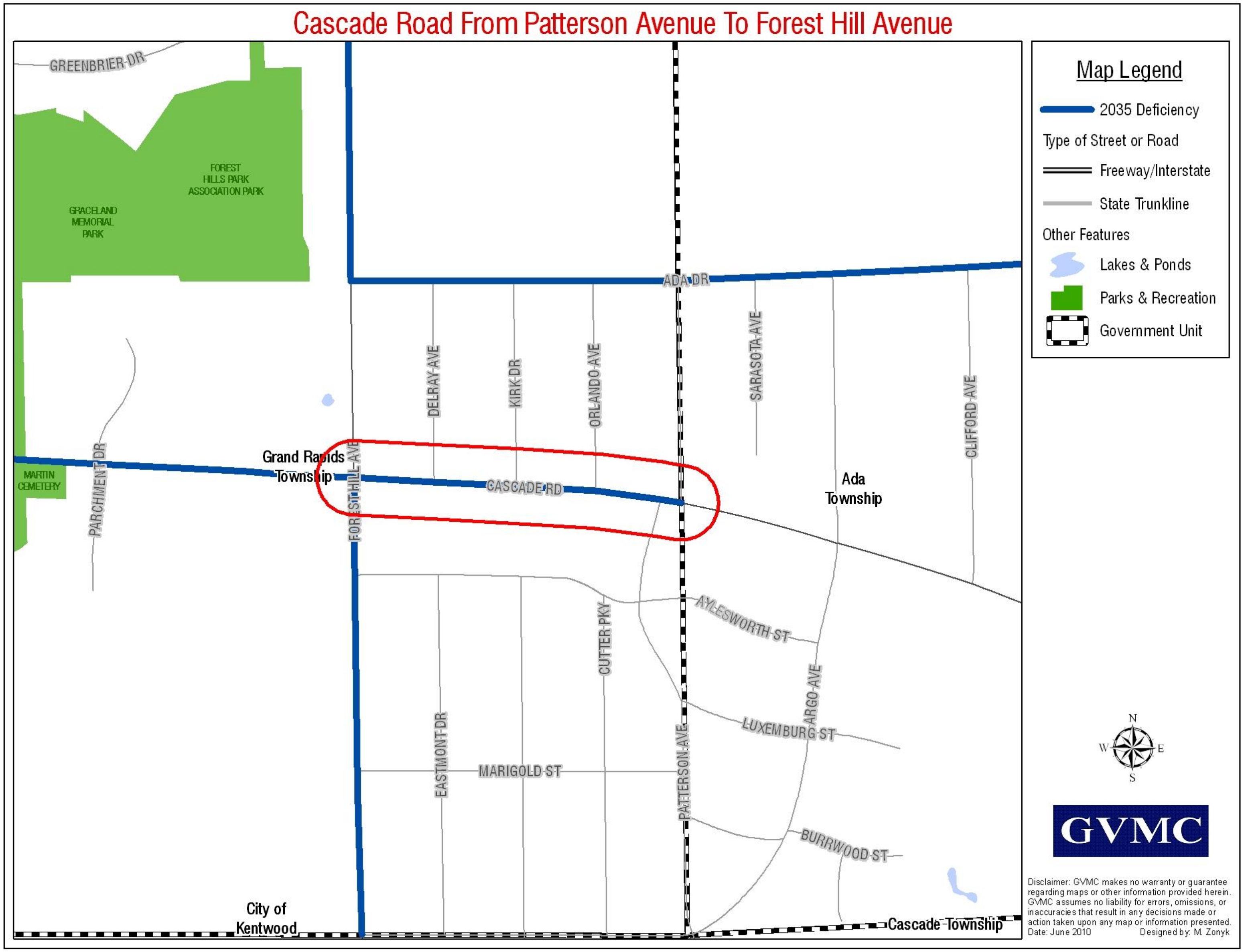
Transit Available: No   Freight Route: Yes

CMP Analysis

Cascade Road in Cascade Township serves as a primary north south facility. The primary land use along his section is retail and commercial. The projected growth in this corridor is projected to be moderate. Volumes are expected to exceed congested levels only slightly by 2035. This very short segment is in essence the intersection of Cascade Road at East Paris Avenue. Any improvement made to relieve congestion would be intersection related. Most access management/land use improvements have already been made.

Preferred Alternative: Monitoring, Intersection Upgrade where possible..

Deficiency Resolved? N/A


Cascade Road From Patterson Avenue To Forest Hill Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
GREENBRIER DR
FOREST HILLS PARK ASSOCIATION PARK
GRACELAND MEMORIAL PARK
MARTIN CEMETERY
PARCHMENT DR
Grand Rapids Township
FOREST HILL AVE
DELRAY AVE
KIRK DR
ORLANDO AVE
ADA DR
SARASOTA AVE
CLIFFORD AVE
CASCADE RD
Ada Township
AYLESWORTH ST
CUTTER PKY
ARGO AVE
LUXEMBURG ST
EASTMONT DR
MARIGOLD ST
PATTERSON AVE
BURRWOOD ST
City of Kentwood
Cascade Township
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GVMC
Disclaimer: GVMC makes no warranty or guarantee regarding maps or other information provided herein. GVMC assumes no liability for errors, omissions, or inaccuracies that result in any decisions made or action taken upon any map or information presented.
Date: June 2010
Designed by: M. Zonyk

Cascade Road – Patterson Avenue to Forest Hill Avenue

Jurisdiction: KCRC/Grand Rapids Twp.

NFC: Urban Minor Arterial

Length: 0.24 miles	Lanes: 5
Current ADT: 33,800	Current Capacity: 34,800
Proj. 2035 ADT: 37,600	Projected V/C: 1.08

Phase Deficient: Borderline Deficient by 2025

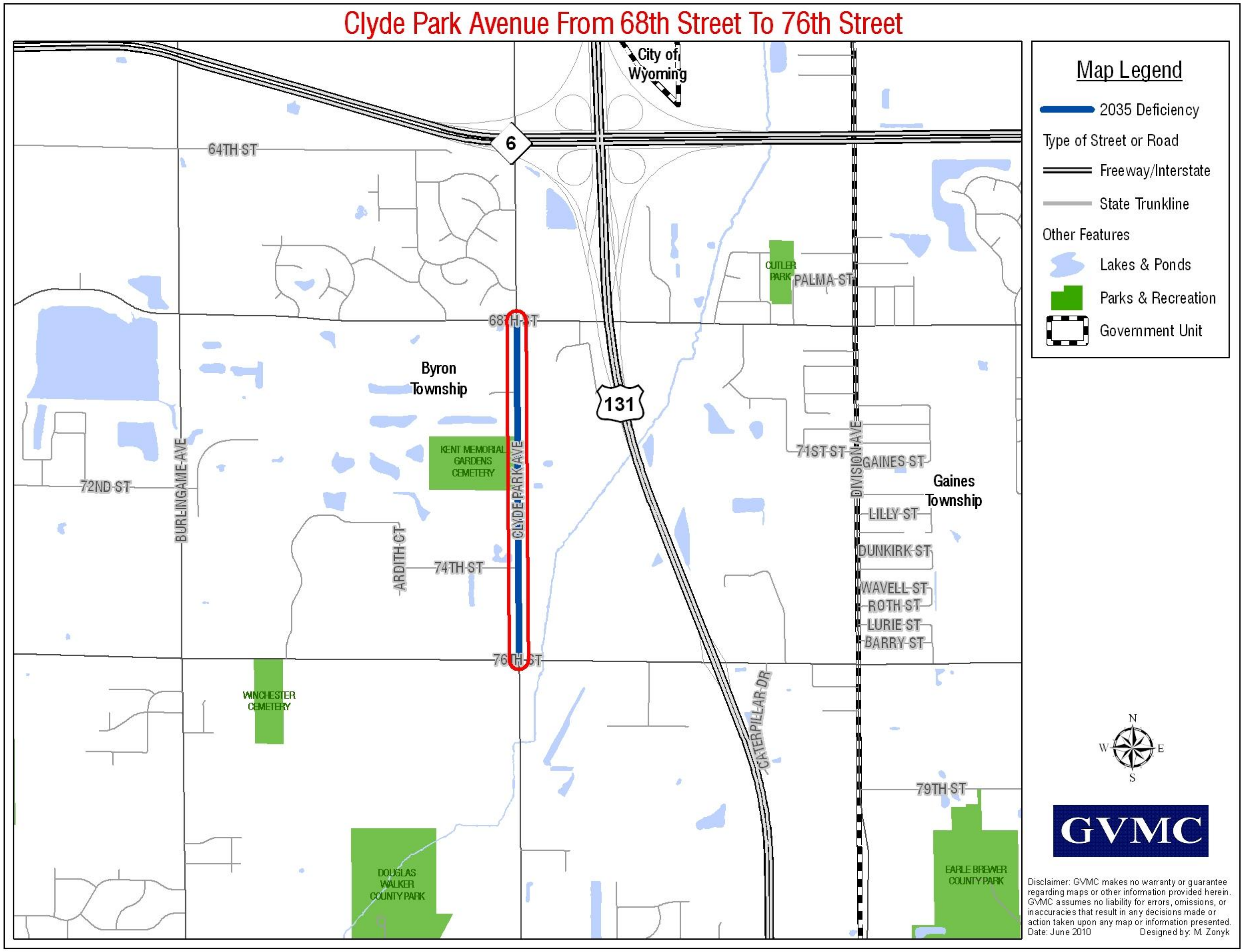
Transit Available: No	Freight Route: Yes

<u>CMP Analysis</u>

Cascade Road in Cascade Township serves as a primary north south facility. The primary land use along his section is retail and commercial. The projected growth in this corridor is projected to be moderate. Volumes are expected to exceed congested levels only slightly by 2035. Enhanced access management planning and perhaps adding transit in the corridor can put off any invasive capacity adding alternatives indefinitely.

Preferred Alternative: Monitoring, Enhanced Access Management Planning, Transit

Deficiency Resolved? No, the level of congestion is acceptable when compared to the more invasive capacity adding alternatives.



Clyde Park Avenue From 68th Street To 76th Street
City of Wyoming
6
64TH ST
68TH ST
PALMA ST
CUTLER PARK
Byron Township
131
KENT MEMORIAL GARDENS CEMETERY
CLYDE PARK AVE
71ST ST
GAINES ST
DIVISION AVE
Gaines Township
72ND ST
BURLINGAME AVE
LILLY ST
DUNKIRK ST
ARDITH CT
74TH ST
WAVELL ST
ROTH ST
LURIE ST
BARRY ST
76TH ST
WINCHESTER CEMETERY
CATERPILLAR DR
79TH ST
DOUGLAS WALKER COUNTY PARK
EARLE BREWER COUNTY PARK
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
N
W
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S
GVMC
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Date: June 2010
Designed by: M. Zonyk

Clyde Park Avenue – 68th Street to 76th Street

Jurisdiction: KCRC/Byron Twp

NFC: Urban Minor Arterial

Length: 1.00 mile   Lanes: 2

Current ADT: 10,852   Current Capacity: 13,200

Proj. 2035 ADT: 11,877   Projected V/C: 0.90

Phase Deficient: Borderline by 2035

Transit Available: Yes   Freight Route: Yes

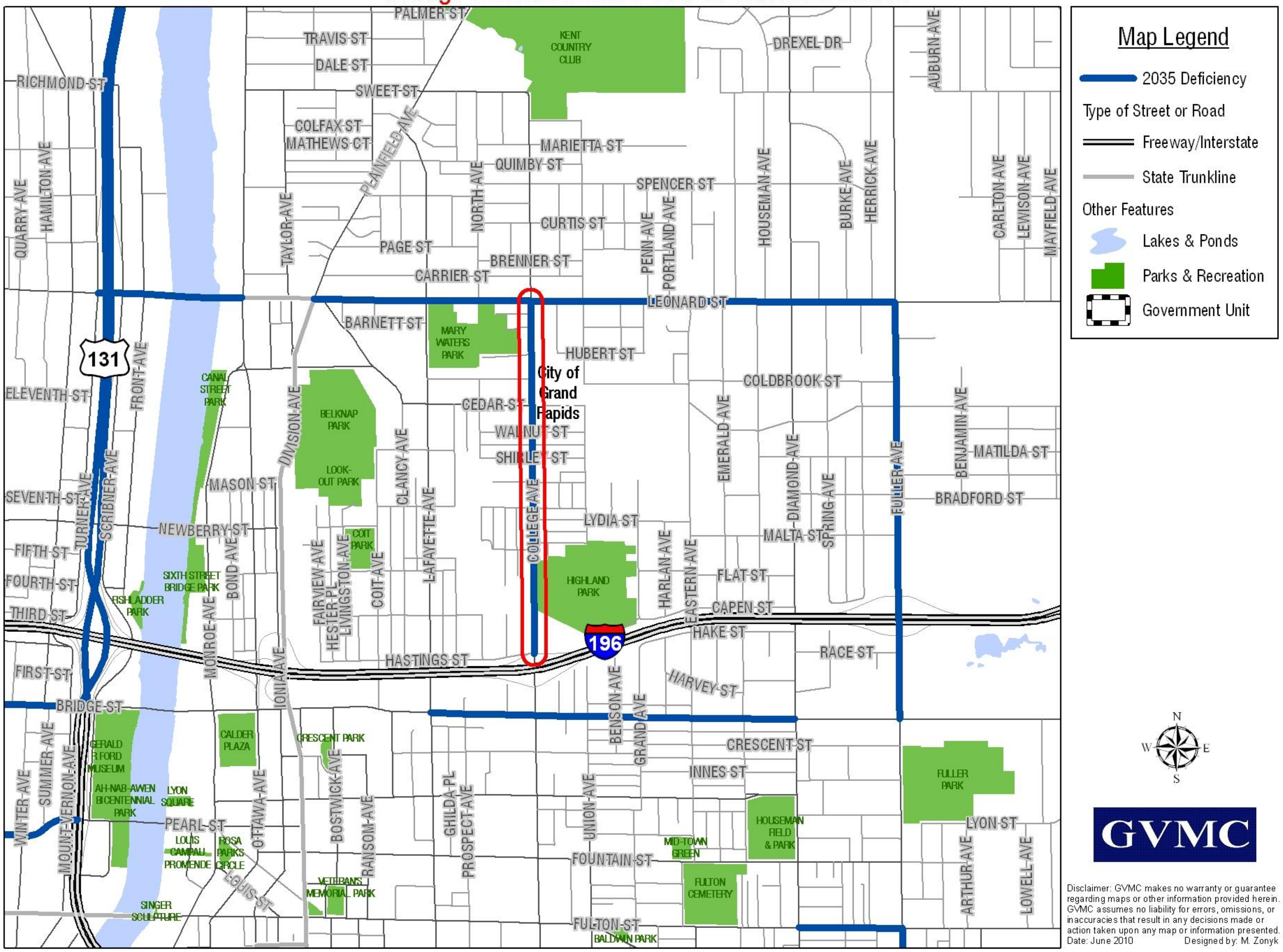
<u>CMP Analysis</u>

This north south facility in Byron Township serves as a localized connector from the light industrial/ commercial area adjacent to US-131 to the freeway system. This segment is not currently, nor is it projected to be capacity deficient in 2035. However, this segment was selected for an added center turn lane and thus is included in this analysis. Ideally, given the volumes and lack of safety issues present, this segment would have received additional access management and continued monitoring.

Selected Alternative: Reconstruct with added center turn lane

Deficiency Resolved? Segment is not deficient.

College Avenue From I-196 To Leonard Street



College Avenue – I-196 to Leonard Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.89 miles	Lanes: 2
Current ADT: 11,900	Current Capacity: 12,000
Proj. 2035 ADT: 12,525	Projected V/C: 1.04

Phase Deficient: Deficient by 2035

Transit Available: Yes	Freight Route: Yes

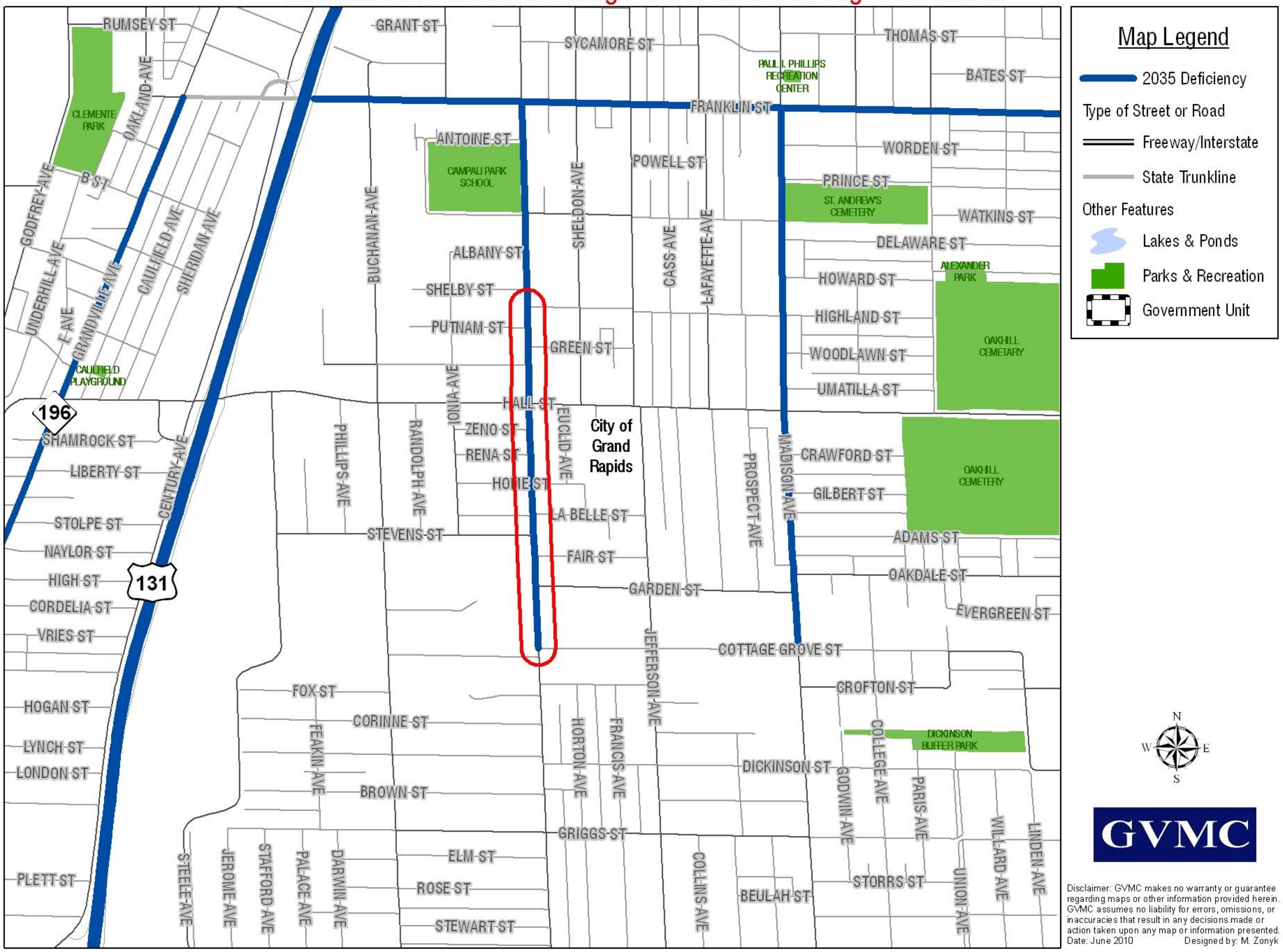
<u>CMP Analysis</u>

This section of College Avenue serves as a primary route between the residential areas within the City of Grand Rapids and the freeway system via I-196 and the medical and educational facilities along the Michigan Street Corridor. There is sufficient width in the current cross section to provide a dedicated center turn lane. The addition of this lane may provide enough capacity to alleviate future congestion issues along this corridor.

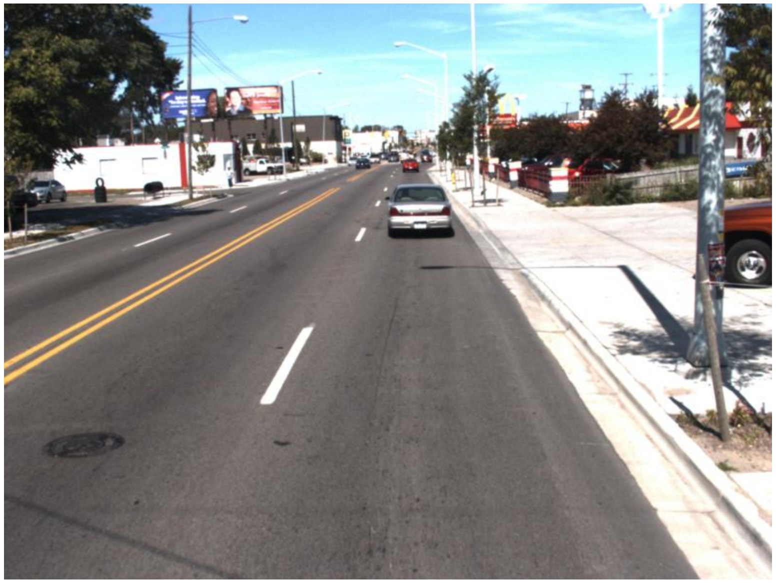
Preferred Alternative: Reconfigure to 3 lanes within existing cross section.

Deficiency Resolved? Yes, the V/C would be 0.70 in 2035

Division Avenue From Cottage Grove Street To Highland Street



Division Avenue – Cottage Grove Street to Highland Street



Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.59 miles Lanes: 4

Current ADT: 23,300 Current Capacity: 26,400

Proj. 2035 ADT: 30,900 Projected V/C: 1.17

Phase Deficient: Deficient by 2025

Transit Available: Yes (BRT Planned) Freight Route: Yes

CMP Analysis

This section of Division Avenue serves as a primary north south route within the City of Grand Rapids and also is a dedicated alternate route from US-131 a short distance to the West. This corridor is the location of a planned Bus Rapid Transit (BRT) service. Typically the growth in this corridor would be significantly lower than is being shown with this LRP effort. The growth can be directly attributed to the projected growth that is being associated with the development that can occur adjacent to a BRT route. For this reason, analysis is being delegated to the BRT effort. If growth does not occur due to the development of the BRT as is being projected, the existing cross section should be sufficient to handle the volumes that can be expected. It should be noted that in the event that travel lanes are dedicated to the BRT service, consideration should be given to maintaining enough capacity for the corridor to continue to serve as an alternate route of US-131.

Preferred Alternative: BRT is planned.

Deficiency Resolved? Analysis deferred to BRT planning effort.

Division Avenue From Highland Street To Franklin Street

Division Avenue – Highland Street to Franklin Street

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.31 miles	Lanes: 4 divided

Current ADT: 17,611	Current Capacity: 32,400

Proj. 2035 ADT: 24,500	Projected V/C: 0.77

Phase Deficient: Borderline by 2035

Transit Available: Yes (BRT Planned) Freight Route: Yes

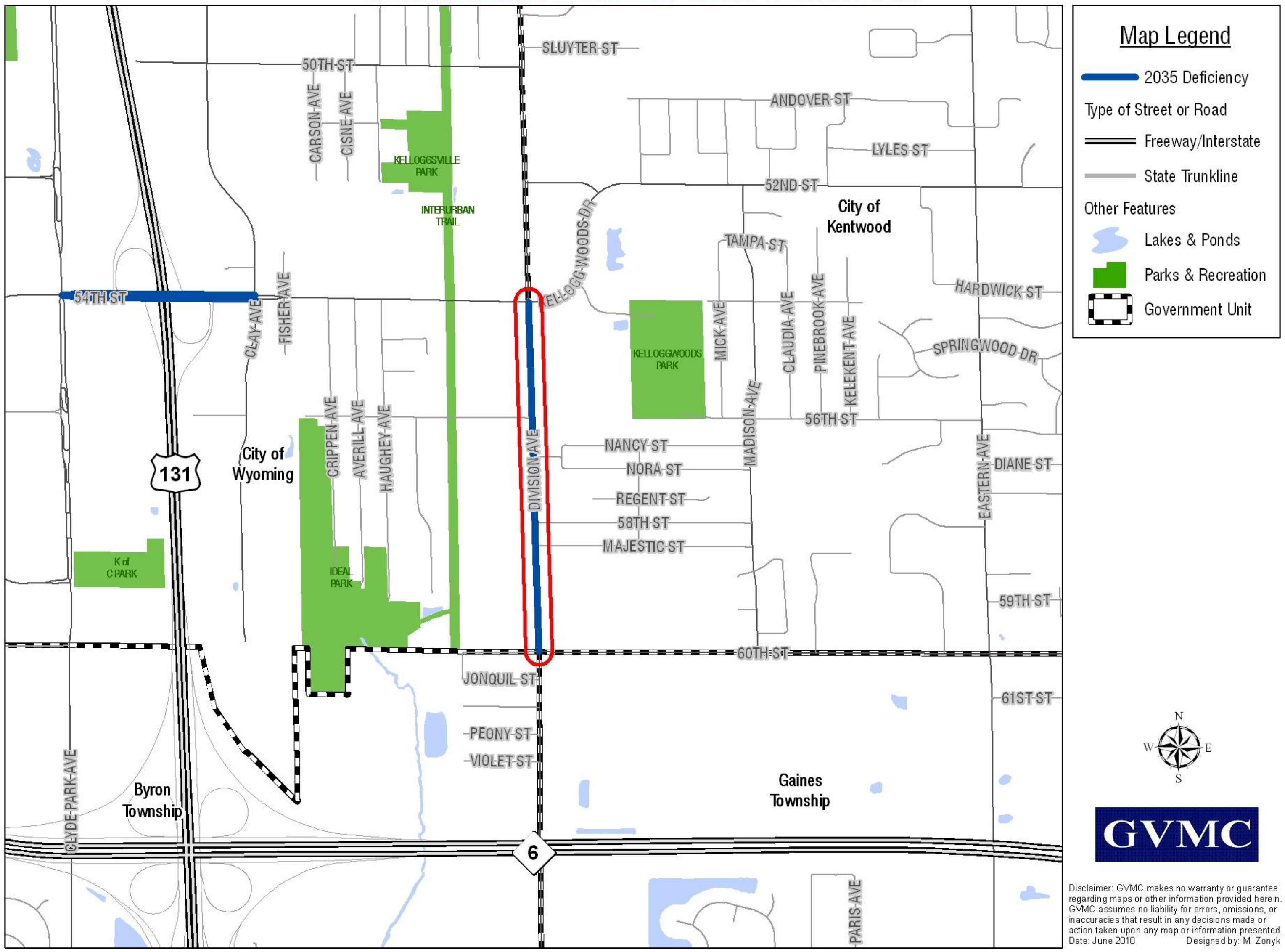
CMP Analysis

This section of Division Avenue serves as a primary north south route within the City of Grand Rapids and also is a dedicated alternate route from US-131 a short distance to the West. This corridor is the location of a planned Bus Rapid Transit (BRT) service. Typically the growth in this corridor would be significantly lower than is being shown with this LRP effort. The growth can be directly attributed to the projected growth that is being associated with the development that can occur adjacent to a BRT route. For this reason, analysis is being delegated to the BRT effort. If growth does not occur due to the development of the BRT as is being projected, the existing cross section should be sufficient to handle the volumes that can be expected. It should be noted that in the event that travel lanes are dedicated to the BRT service, consideration should be given to maintaining enough capacity for the corridor to continue to serve as an alternate route of US-131.

Preferred Alternative: BRT is planned.

Deficiency Resolved? Analysis deferred to BRT planning effort.

Division Avenue From 54th Street To 60th Street



Division Avenue – 54th Street to 60th Street

Jurisdiction: City of Wyoming/Kentwood

NFC: Urban Principal Arterial

Length: 0.75 miles Lanes: 4

Current ADT: 19,922 Current Capacity: 26,400

Proj. 2035 ADT: 24,000 Projected V/C: 0.91

Phase Deficient: Borderline by 2035

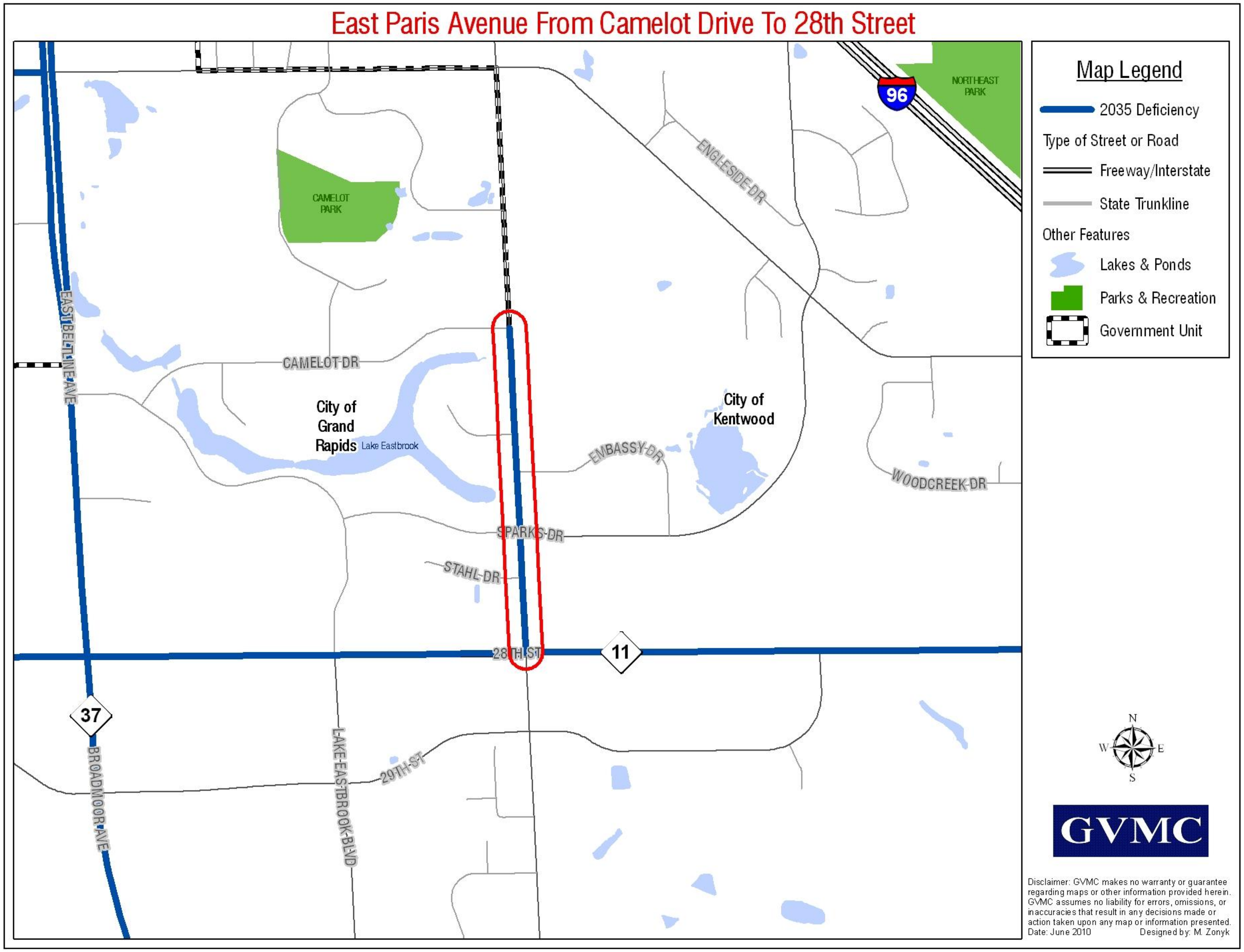
Transit Available: Yes (BRT Planned) Freight Route: Yes

CMP Analysis

This section of Division Avenue serves as a primary north south route within the Cities of Wyoming and Kentwood and also is a dedicated alternate route from US-131 a short distance to the West. This corridor is the location of a planned Bus Rapid Transit (BRT) service. Typically the growth in this corridor would be significantly lower than is being shown with this LRP effort. The growth can be directly attributed to the projected growth that is being associated with the development that can occur adjacent to a BRT route. There is a center turn lane planed for this segment in FY 2014. This section is also listed as a facility that would potentially benefit from a center turn lane from a safety standpoint. It should be noted that in the event that travel lanes are dedicated to the BRT service, consideration should be given to maintaining enough capacity for the corridor to continue to serve as an alternate route of US-131.

Preferred Alternative: Add Center turn lane in FY 2014. BRT is planned.

Deficiency Resolved? Yes.


East Paris Avenue From Camelot Drive To 28th Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
NORTHEAST PARK
96
CAMELOT PARK
ENGLESIDE DR
EAST BELTLINE AVE
CAMELOT DR
City of Grand Rapids
Lake Eastbrook
City of Kentwood
EMBASSY DR
WOODCREEK DR
SPARKS DR
STAHL DR
28TH ST
11
37
BROADMOOR AVE
LAKE EASTBROOK BLVD
29TH ST
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GVMC
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Date: June 2010
Designed by: M. Zonyk

East Paris Avenue – Camelot Drive to 28th Street

Jurisdiction: City of Grand Rapids/Kentwood

NFC: Urban Principal Arterial

Length: 0.56 miles Lanes: 5

Current ADT: 36,726 Current Capacity: 34,800

Proj. 2035 ADT: 38,400 Projected V/C: 1.10

Phase Deficient: Deficient by 2025

Transit Available: Yes Freight Route: Yes

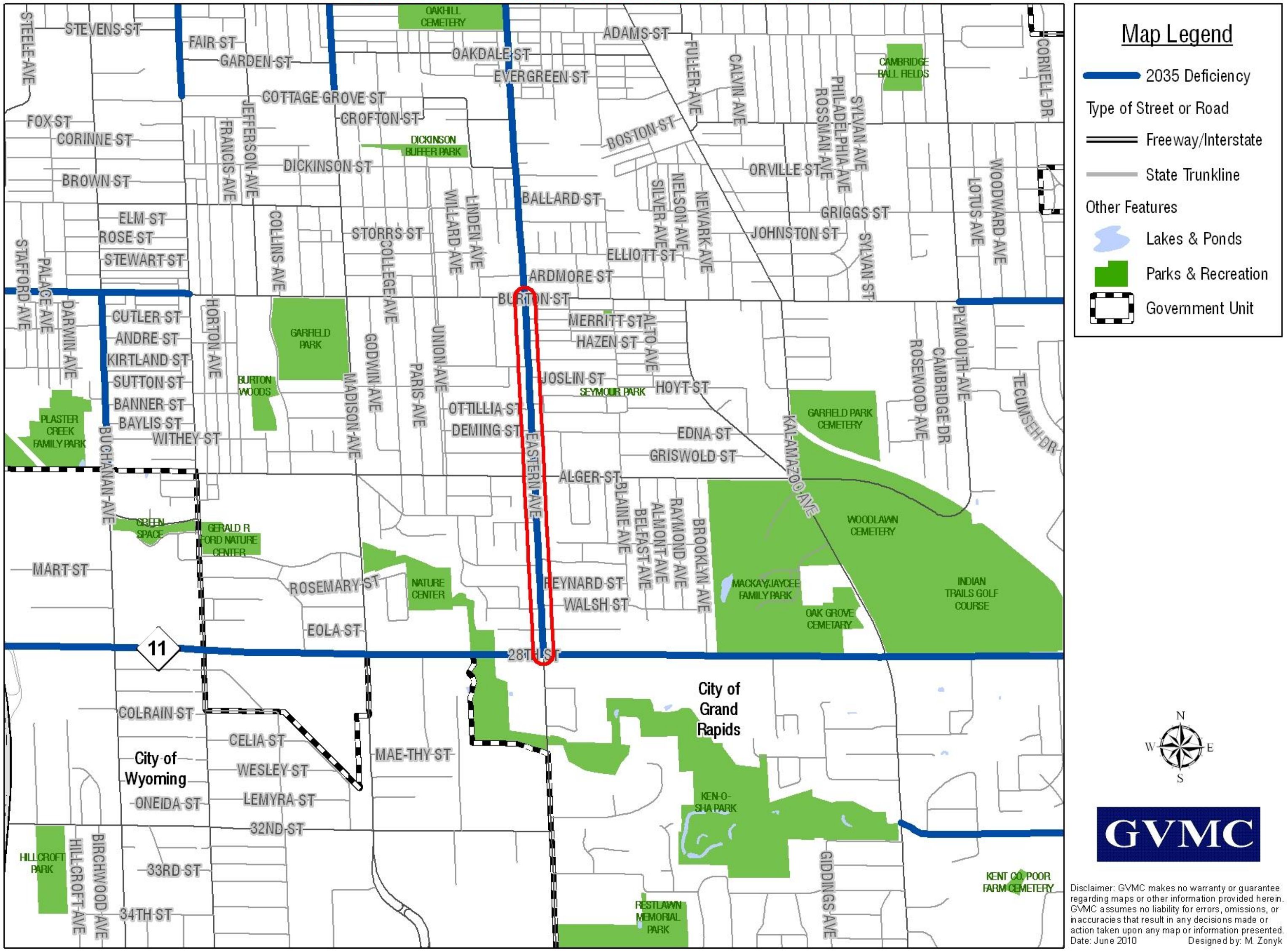
<u>CMP Analysis</u>

This section of East Paris Avenue serves as a primary corridor for the Cities of Kentwood and Grand Rapids. The primary land use is commercial with medium density residential. Access management has been implemented along this section. The primary choke point is the intersection at 28th Street. Short of a grade separation at that location, no significant progress can be made on the delays being experienced along this section of East Paris.

Preferred Alternative: Continued signal progression, Enhanced Transit

Deficiency Resolved? No, much of the delay is attributed to the 28th Street intersection.

Eastern Avenue From Burton Street To 28th Street



Eastern Avenue – Burton Street to 28th Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 1.00 miles Lanes: 3

Current ADT: 21,300 Current Capacity: 18,000

Proj. 2035 ADT: 22,268 Projected V/C: 1.24

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: Yes

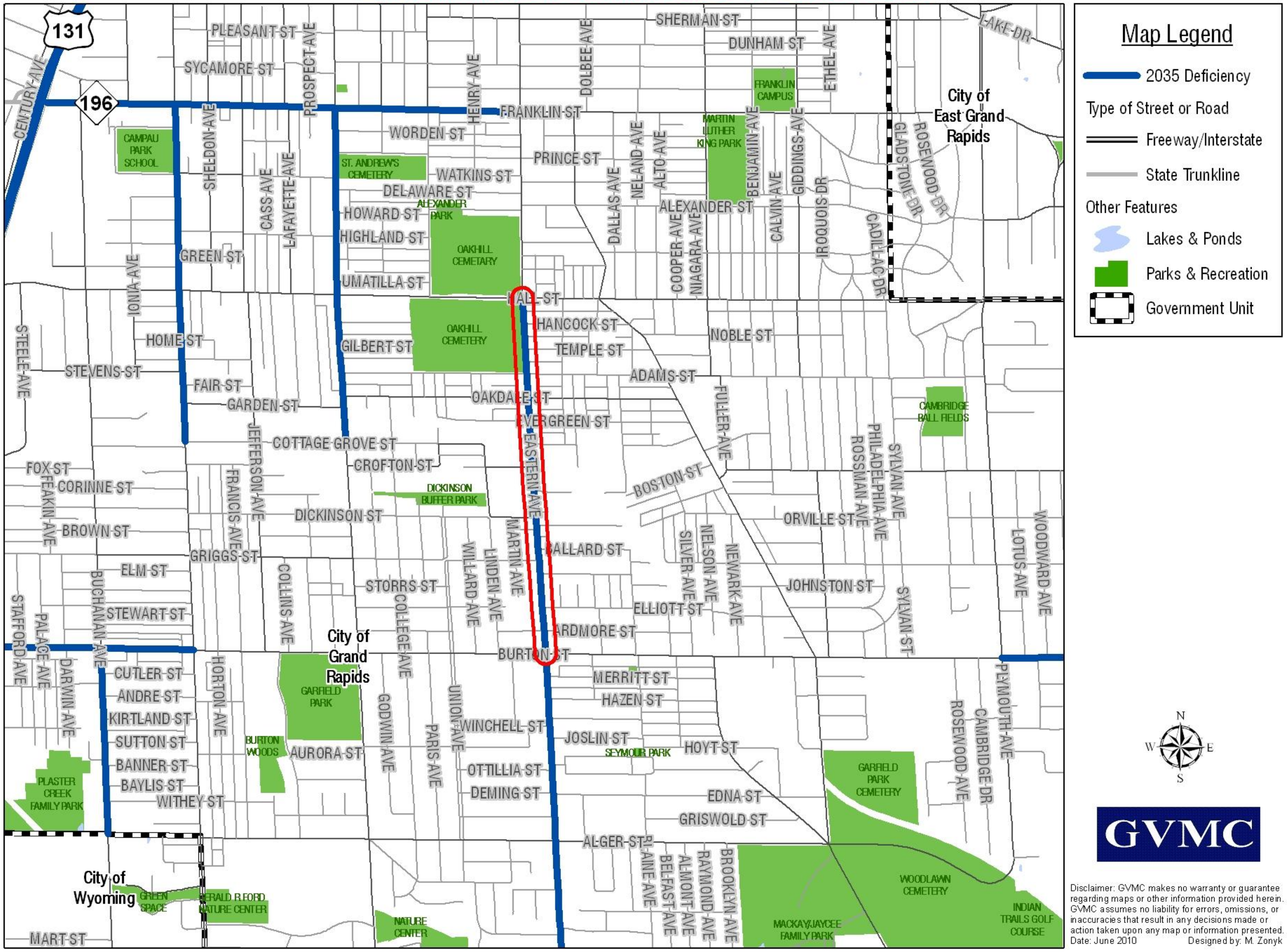
<u>CMP Analysis</u>

Eastern Avenue serves as a continuous north south corridor within the City of Grand Rapids. The primary land use along this segment is a mix of residential, schools, and local retail. The existing volumes create a congested condition. The projected volume while not significant will only make the situation worse. Access management and other non-invasive alternatives will not produce the significant reduction in delays necessary to completely resolve the issues experienced along this section of Eastern Avenue. Adding capacity through the expansion of the pavement surface is not a viable alternative as many of the commercial and residential units are physically too close to the street and it would be necessary to remove many of the structures thus creating a disruption to the community that at this point is unacceptable.

Preferred Alternative: Continued signal progression, Enhanced Transit

Deficiency Resolved? No, the facility is physically constrained.

Eastern Avenue From Hall Street To Burton Street



Eastern Avenue – Hall Street to Burton Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.95 miles Lanes: 2

Current ADT: 16,714 Current Capacity: 13,200

Proj. 2035 ADT: 17,420 Projected V/C: 1.32

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: Yes

CMP Analysis

Eastern Avenue serves as a continuous north south corridor within the City of Grand Rapids. The primary land use along this segment is a mix of residential, and local retail. The existing volumes create a congested condition. The projected volume while not significant will only make the situation worse. The simple re-striping of the current pavement to include a continuous center turn lane could alleviate most of the delay experienced. Enhanced transit capacity may also be beneficial.

Preferred Alternative: Reconfigure within existing ROW to a three lane cross section, enhanced transit

Deficiency Resolved? Yes, the future V/C would be under congested levels.

Forest Hill Avenue From Cascade Road To Twp Limits

Forest Hill Avenue - Cascade Road to Twp Limits

Jurisdiction: KCRC/Grand Rapids Twp.

NFC: Urban Collector

Length: 0.35 miles Lanes: 2

Current ADT: 12,131 Current Capacity: 12,150

Proj. 2035 ADT: 15,119 Projected V/C: 1.24

Phase Deficient: Nearly Currently Deficient

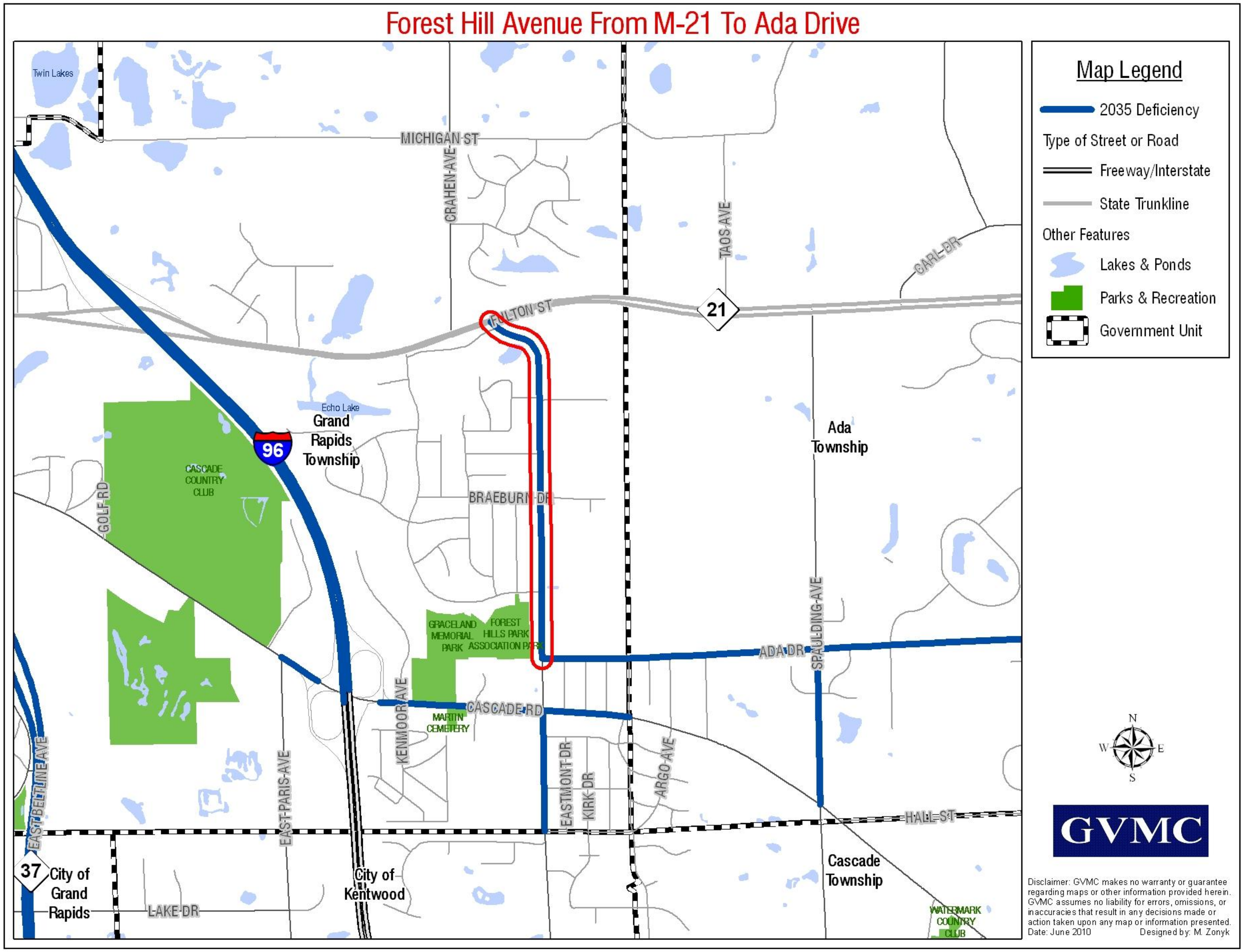
Transit Available: No Freight Route: No

CMP Analysis

Forest Hill Avenue serves as a primary north south corridor between the City of Kentwood in the southern end and Grand Rapids Township to the north. The primary land use in the corridor is residential with a mix of commercial and retail at major intersections. Today this segment has nearly reached its designed capacity. Non-invasive measures may delay the need to add capacity temporarily, however, this section has been identified to benefit from an added center turn lane for safety reasons. In FY 2011, a project is planned to reconstruct and add a center turn lane to this segment of Forest Hill Avenue.

Preferred Alternative: Reconstruct and add center turn lane in FY 2011

Deficiency Resolved? Yes, the future V/C would be under congested levels.


Forest Hill Avenue From M-21 To Ada Drive
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Twin Lakes
MICHIGAN ST
CRAHEN AVE
TAOS AVE
CARL DR
FULTON ST
21
Echo Lake
Grand Rapids Township
96
CASCADE COUNTRY CLUB
GOLF RD
BRAEBURN DR
Ada Township
GRACELAND MEMORIAL PARK
FOREST HILLS PARK ASSOCIATION PARK
ADA DR
SPAULDING AVE
CASCADE RD
MARTIN CEMETERY
KENMOOR AVE
EAST BELTLINE AVE
EAST PARIS AVE
EASTMONT DR
KIRK DR
ARGO AVE
HALL ST
37
City of Grand Rapids
LAKE DR
City of Kentwood
Cascade Township
WATERMARK COUNTRY CLUB
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Designed by: M. Zonyk

Forest Hill Avenue – M-21 to Ada Drive

Jurisdiction: KCRC/Grand Rapids Twp.

NFC: Urban Collector

Length: 1.05 miles Lanes: 2

Current ADT: 17,829 Current Capacity: 12,150

Proj. 2035 ADT: 19,000 Projected V/C: 1.56

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: No

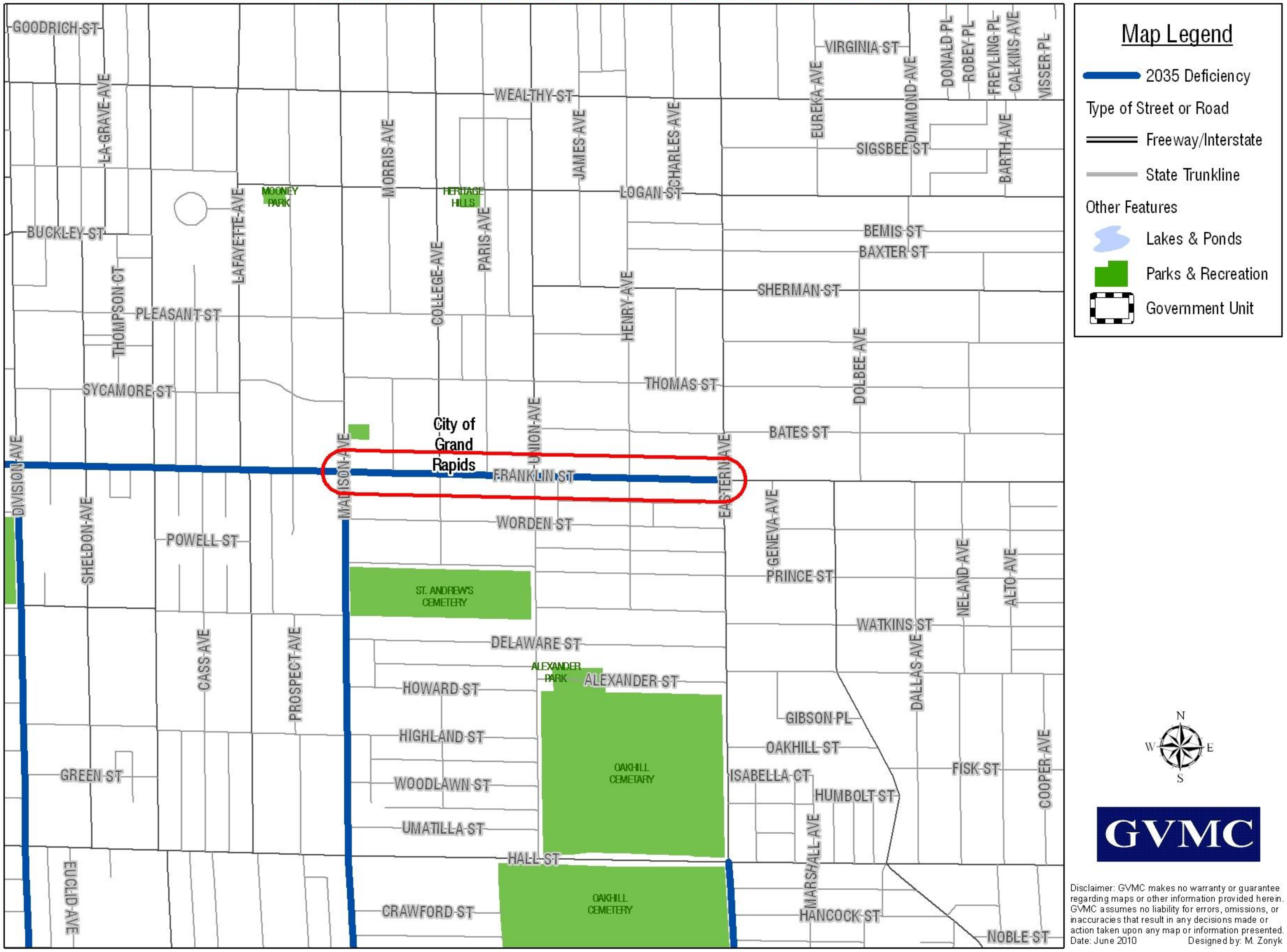
CMP Analysis

Forest Hill Avenue serves as a primary north south corridor between the City of Kentwood in the southern end and Grand Rapids Township to the north. The primary land use in the corridor is residential with a mix of commercial and retail at major intersections. Today this segment has reached its designed capacity. Non-invasive measures may delay the need to add capacity temporarily. In FY 2012 a project is planned to reconstruct and add a center turn lane to this segment of Forest Hill Avenue.

Preferred Alternative: Reconstruct and add center turn lane in FY 2012.

Deficiency Resolved? Yes, the future V/C would be under congested levels.

Franklin Street From Eastern Avenue To Madison Avenue



Franklin Street – Eastern Avenue to Madison Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.50 miles	Lanes: 2
Current ADT: 16,055	Current Capacity: 12,000
Proj. 2035 ADT: 16,700	Projected V/C: 1.39

Phase Deficient: Currently Deficient

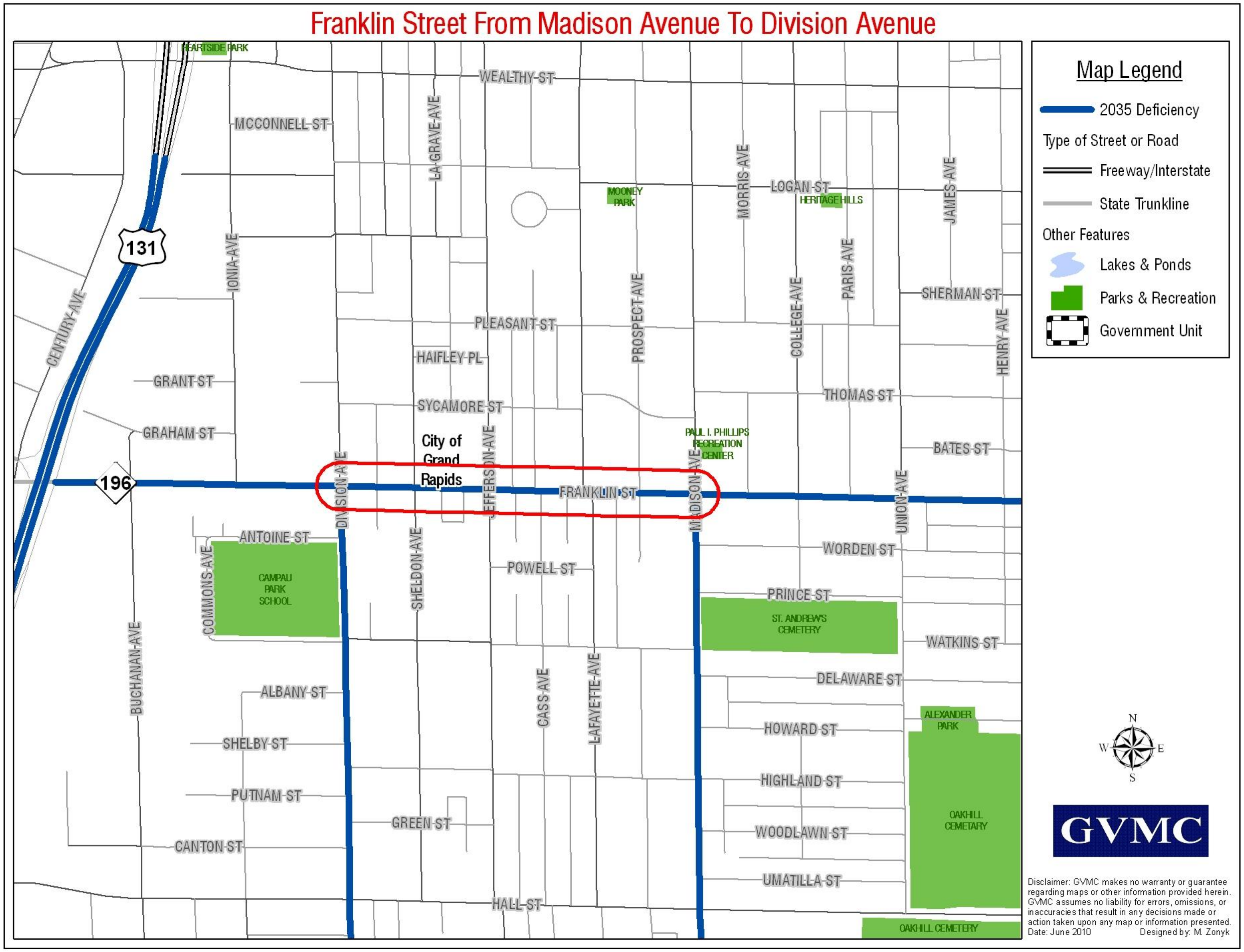
Transit Available: Yes	Freight Route: No

CMP Analysis

Franklin Street provides a significant east west corridor within the City of Grand Rapids. The primary land use is residential with local commercial mixed in. The current volume in the corridor creates delay and congestion. The projection has a relatively low growth rate but this growth will only add to the delay and congestion at key locations. The corridor does have transit available, but increasing transit capacity will not sufficiently solve the delays projected to occur. A non-invasive measure that should be considered is providing a continuous center turn lane within the existing pavement width. This cross section will provide adequate capacity that should reduce most if not all delay in the corridor.

Preferred Alternative: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity

Deficiency Resolved? Yes, the future V/C would be under congested levels.


Franklin Street From Madison Avenue To Division Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grand Rapids
FRANKLIN ST
DIVISION AVE
MADISON AVE
WEALTHY ST
MCCONNELL ST
LOGAN ST
SHERMAN ST
PLEASANT ST
HAIFLEY PL
SYCAMORE ST
THOMAS ST
GRANT ST
GRAHAM ST
BATES ST
ANTOINE ST
WORDEN ST
POWELL ST
PRINCE ST
WATKINS ST
DELAWARE ST
ALBANY ST
HOWARD ST
SHELBY ST
HIGHLAND ST
PUTNAM ST
GREEN ST
WOODLAWN ST
CANTON ST
UMATILLA ST
HALL ST
CENTURY AVE
IONIA AVE
LA GRAVE AVE
JEFFERSON AVE
PROSPECT AVE
MORRIS AVE
COLLEGE AVE
PARIS AVE
JAMES AVE
HENRY AVE
UNION AVE
SHELDON AVE
COMMONS AVE
BUCHANAN AVE
CASS AVE
LAFAYETTE AVE
131
196
HEARTSIDE PARK
MOONEY PARK
HERITAGE HILLS
PAUL I. PHILLIPS RECREATION CENTER
CAMPAU PARK SCHOOL
ST. ANDREW'S CEMETERY
ALEXANDER PARK
OAKHILL CEMETARY
OAKHILL CEMETERY
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Franklin Street – Madison Avenue to Division Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.43 miles	Lanes: 2
Current ADT: 16,500	Current Capacity: 12,000
Proj. 2035 ADT: 17,200	Projected V/C: 1.43

Phase Deficient: Currently Deficient

Transit Available: Yes	Freight Route: No

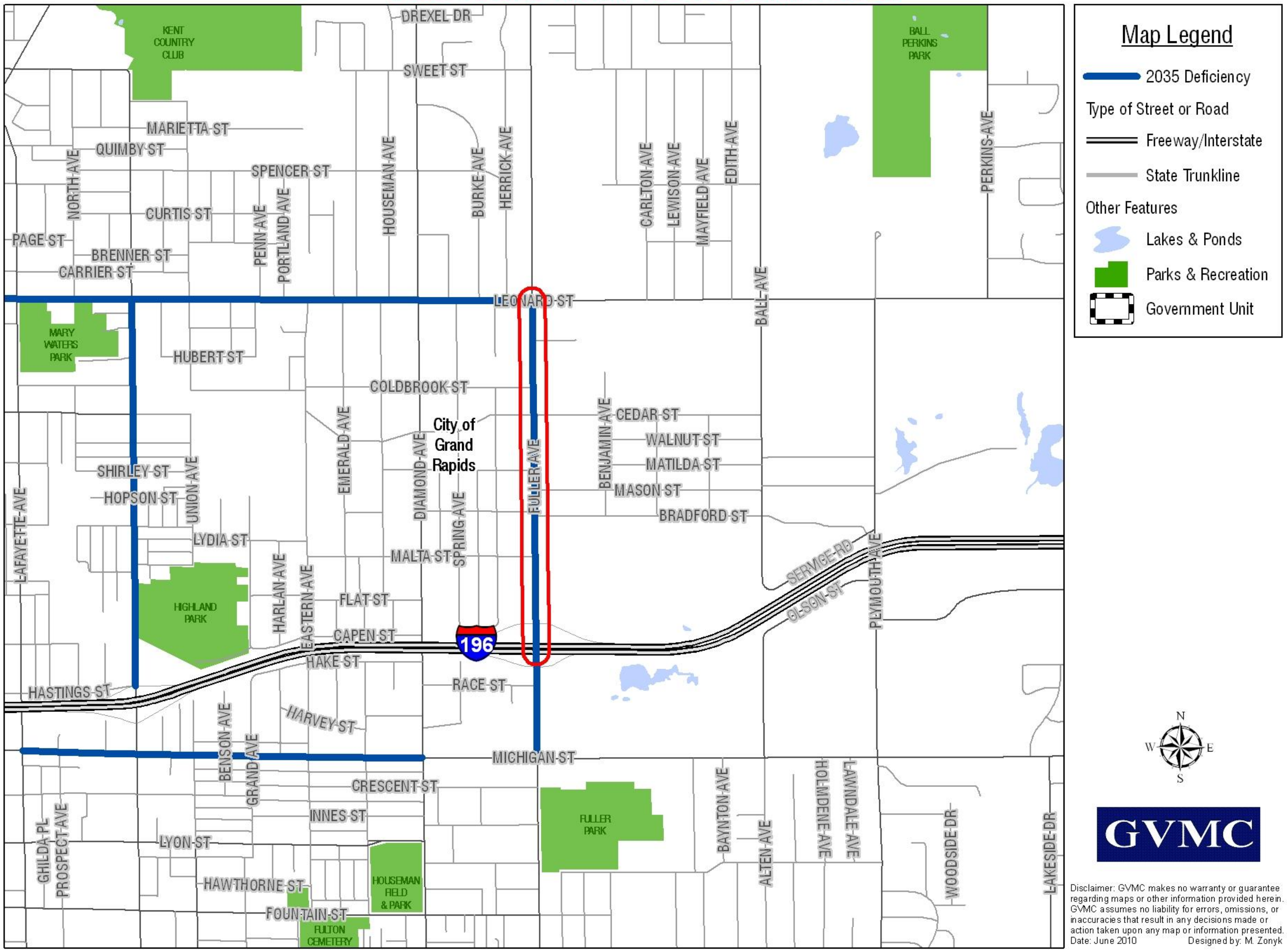
CMP Analysis

Franklin Street provides a significant east west corridor within the City of Grand Rapids. The primary land use is residential with local commercial mixed in. The current volume in the corridor creates delay and congestion. The projection has a relatively low growth rate but this growth will only add to the delay and congestion at key locations. The corridor does have transit available, but increasing transit capacity will not sufficiently solve the delays projected to occur. A non-invasive measure that should be considered is providing a continuous center turn lane within the existing pavement width. This cross section will provide adequate capacity that should reduce most if not all delay in the corridor.

Preferred Alternative: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity

Deficiency Resolved? Yes, the future V/C would be under congested levels.

Fuller Avenue From I-196 To Leonard Street



Fuller Avenue – I-196 to Leonard Street

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.76 miles	Lanes: 3
Current ADT: 23,200	Current Capacity: 18,000
Proj. 2035 ADT: 24,740	Projected V/C: 1.37

Phase Deficient: Currently Deficient

Transit Available: Yes	Freight Route: Yes

CMP Analysis

Fuller Avenue serves as a primary north south corridor in the City of Grand Rapids. The primary land uses are commercial, retail and residential with a major government complex anchoring the southern end of the corridor. In an effort to reduce rear end accidents the city reconfigured the cross section from 4 lanes down to 3 lanes. From a capacity stand point this reduced the amount of available capacity.   The changes in the number of lanes is a relatively recent event and should be evaluated when some time has passed. In the mean time, continued signal progression and enhanced transit capacity should help. The original four lane cross section would address most of the delay issues in the corridor. Ideally, a 5 lane cross section would be implemented, but this would be a very disruptive alternative that may prove devastating to the immediate neighborhood and should only be considered under extreme circumstances.

Preferred Alternative: Continued monitoring, Signal progression work, Enhance transit capacity

Deficiency Resolved? Yes, the future V/C would be under congested levels.


Fuller Avenue From Lake Drive To Fulton Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grand Rapids
FULTON ST
FULLER AVE
LAKE DR
WEALTHY ST
ROBINSON RD
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Fuller Avenue – Lake Drive to Fulton Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.30 miles Lanes: 2

Current ADT: 14,800 Current Capacity: 12,000

Proj. 2035 ADT: 15,600 Projected V/C: 1.30

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: No

CMP Analysis

Fuller Avenue serves as a primary north south corridor in the City of Grand Rapids. The primary land use along this segment of Fuller is residential. There is not currently a transit route present. Non-invasive measures would not be sufficient to adequately address the level of congestion projected to be present in this corridor in 2035. However, there is an opportunity to reconfigure the existing number of lanes as already been done on segments north of I-196 with some success. This alternative may require the restriction of on-street parking. Also, the traffic calming measures that were implemented along this section would need to be removed.

Preferred Alternative: Reconfigure within Existing ROW to 3 lanes

Deficiency Resolved? Yes, the future V/C would be under congested levels.

Fuller Avenue From Michigan Street To I-196

Fuller Avenue – Michigan Street to I-196

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.23 miles   Lanes: 5

Current ADT: 28,700   Current Capacity: 26,400

Proj. 2035 ADT: 23,000   Projected V/C: 1.00

Phase Deficient: Currently Deficient

Transit Available: Yes   Freight Route: No

<u>CMP Analysis</u>

Fuller Avenue serves as a primary north south corridor in the City of Grand Rapids. The primary land use along this segment of Fuller is retail and commercial. There is currently a transit route present. Non-invasive measures would not be sufficient to adequately address the level of congestion projected to be present in this corridor in 2035. There are plans to rebuild the interchange at I-196. When the configuration is known further study should be given to this short section of Fuller to address delay and congestion.

Preferred Alternative: Further Study - Access Management Planning - New Interchange Pending

Deficiency Resolved? N/A

Fulton Street From Fuller Avenue To Diamond Avenue

Fulton Street – Fuller Avenue to Diamond Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.25 miles Lanes: 3

Current ADT: 16,500 Current Capacity: 12,000

Proj. 2035 ADT: 18,005 Projected V/C: 1.50

Phase Deficient: Currently Deficient

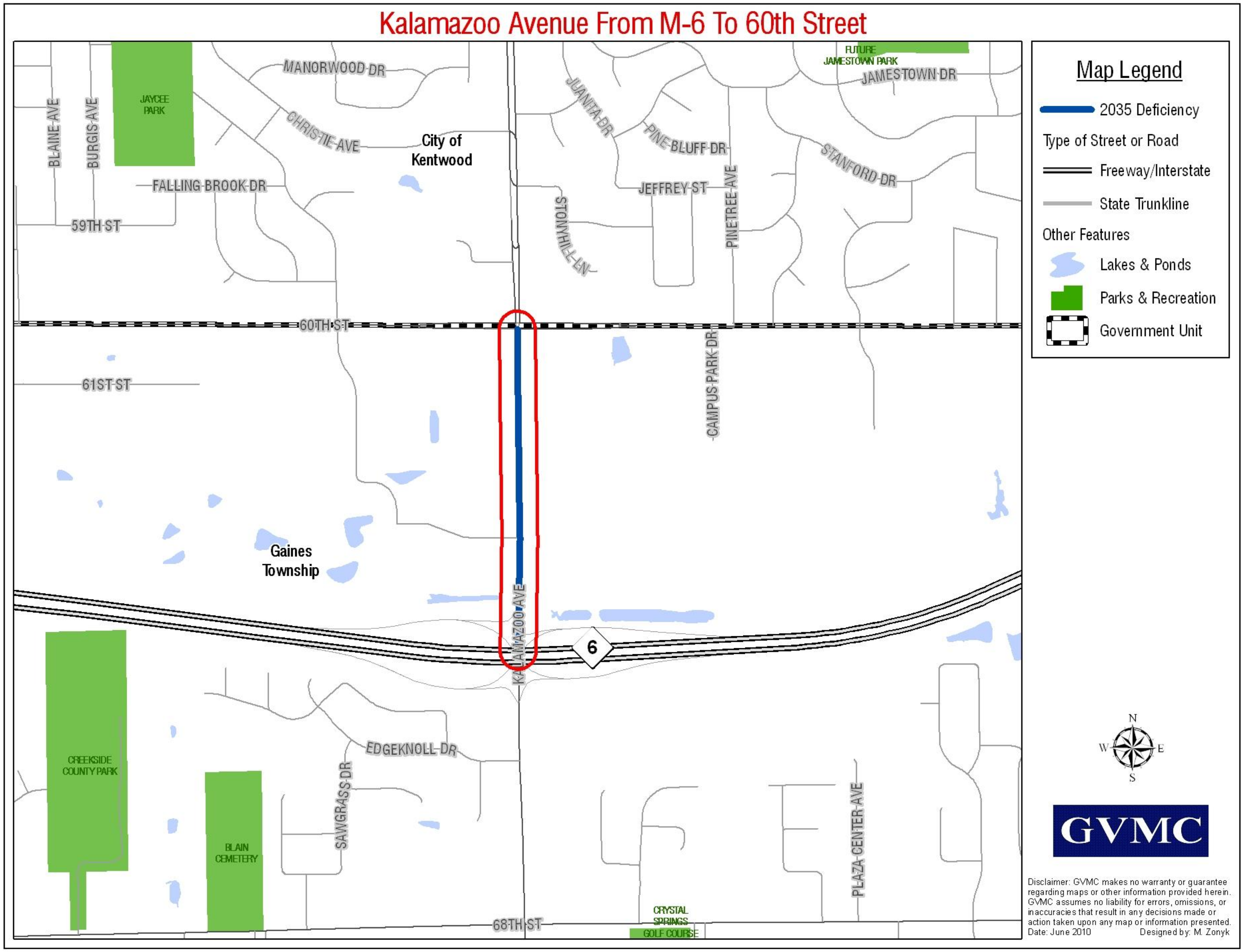
Transit Available: Yes Freight Route: Yes

CMP Analysis

Fulton Street is a primary access point from the freeway system to Heritage Hill, the Medical Mile, and GRCC. The primary land use is local commercial/retail. Volumes along the corridor are beyond the deigned capacity for the facility. There aren't a lot of options for reducing congestion in the corridor beyond enhancing transit capacity and continued signal progression efforts. Widening is not a viable option as the street is physically constrained by the close proximity of the surrounding buildings.

Preferred Alternative: Further Study - Physically Constrained - Signal Progression - Enhanced Transit

Deficiency Resolved? No. Physically constrained.



Kalamazoo Avenue From M-6 To 60th Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Kentwood
Gaines Township
MANORWOOD DR
CHRISTIE AVE
FALLING BROOK DR
59TH ST
60TH ST
61ST ST
68TH ST
BLAINE AVE
BURGIS AVE
JAYCEE PARK
JUANITA DR
PINE BLUFF DR
JEFFREY ST
PINETREE AVE
STONYHILL LN
STANFORD DR
JAMESTOWN DR
FUTURE JAMESTOWN PARK
CAMPUS PARK DR
KALAMAZOO AVE
6
EDGEKNOLL DR
SAWGRASS DR
PLAZA CENTER AVE
CREEKSIDE COUNTY PARK
BLAIN CEMETERY
CRYSTAL SPRINGS GOLF COURSE
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Kalamazoo Avenue – M-6 to 60th Street

Jurisdiction: KCRC/Gaines Twp.

NFC: Urban Principal Arterial

Length: 0.52 miles   Lanes: 5

Current ADT: 29,838   Current Capacity: 34,800

Proj. 2035 ADT: 36,500   Projected V/C: 1.05

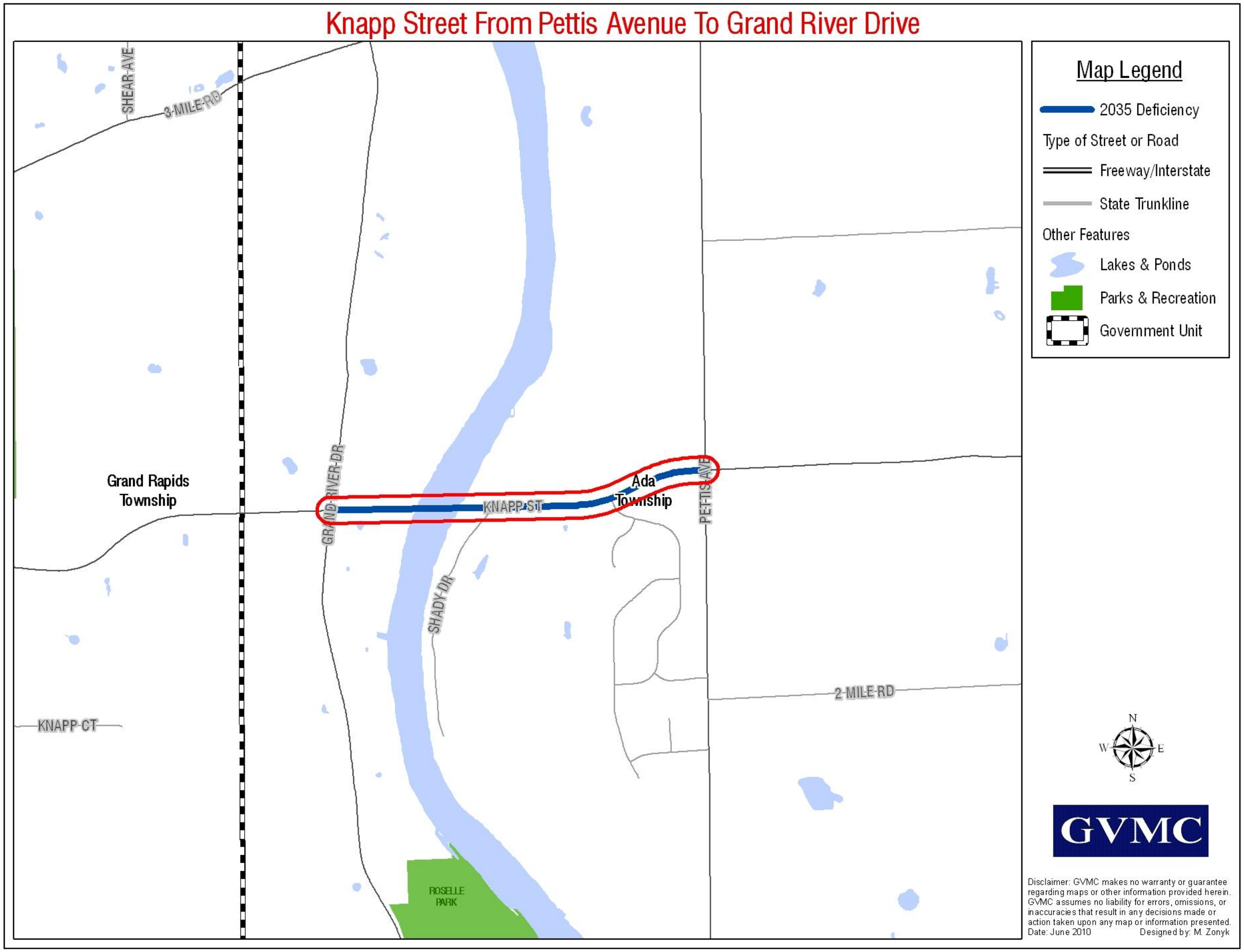
Phase Deficient: Slightly Deficient by 2035

Transit Available: No   Freight Route: Yes

CMP Analysis
Kalamazoo Avenue provides an primary north south access point to the freeway system for the City of Kentwood and the heavily populated Gaines Township via M-6. The primary land uses include retail, commercial and a major high school. With the opening of M-6 in the last few years traffic shifts have occurred from the primary east west movements turning to north south in nature to access the freeway system. This section of Kalamazoo has developed as many of the interchanges with M-6 have over time. The density for this section is much greater than most due to the anticipation of access to the freeway system even before M-6 was completed. The projection for this section does not put the corridor into a severe category of delay or congestion. Widening this facility for this increase would be premature. Access management seems to have been done in a proactive manner. Few improvements can be made in this area.

Preferred Alternative: Continue Monitoring - Access Management Planning

Deficiency Resolved? No. Anticipated congestion levels within acceptable limits.



Knapp Street From Pettis Avenue To Grand River Drive
SHEAR-AVE
3-MILE-RD
Grand Rapids Township
GRAND-RIVER-DR
KNAPP-ST
Ada Township
PETTIS-AVE
SHADY-DR
2-MILE-RD
KNAPP-CT
ROSELLE PARK
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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Date: June 2010
Designed by: M. Zonyk

Knapp Street – Pettis Avenue to Grand River Drive

Jurisdiction: KCRC/Ada Twp.

NFC: Urban Minor Arterial

Length: 0.84 miles	Lanes: 2
Current ADT: 11,663	Current Capacity: 13,600
Proj. 2035 ADT: 14,941	Projected V/C: 1.10

Phase Deficient: Deficient by 2035

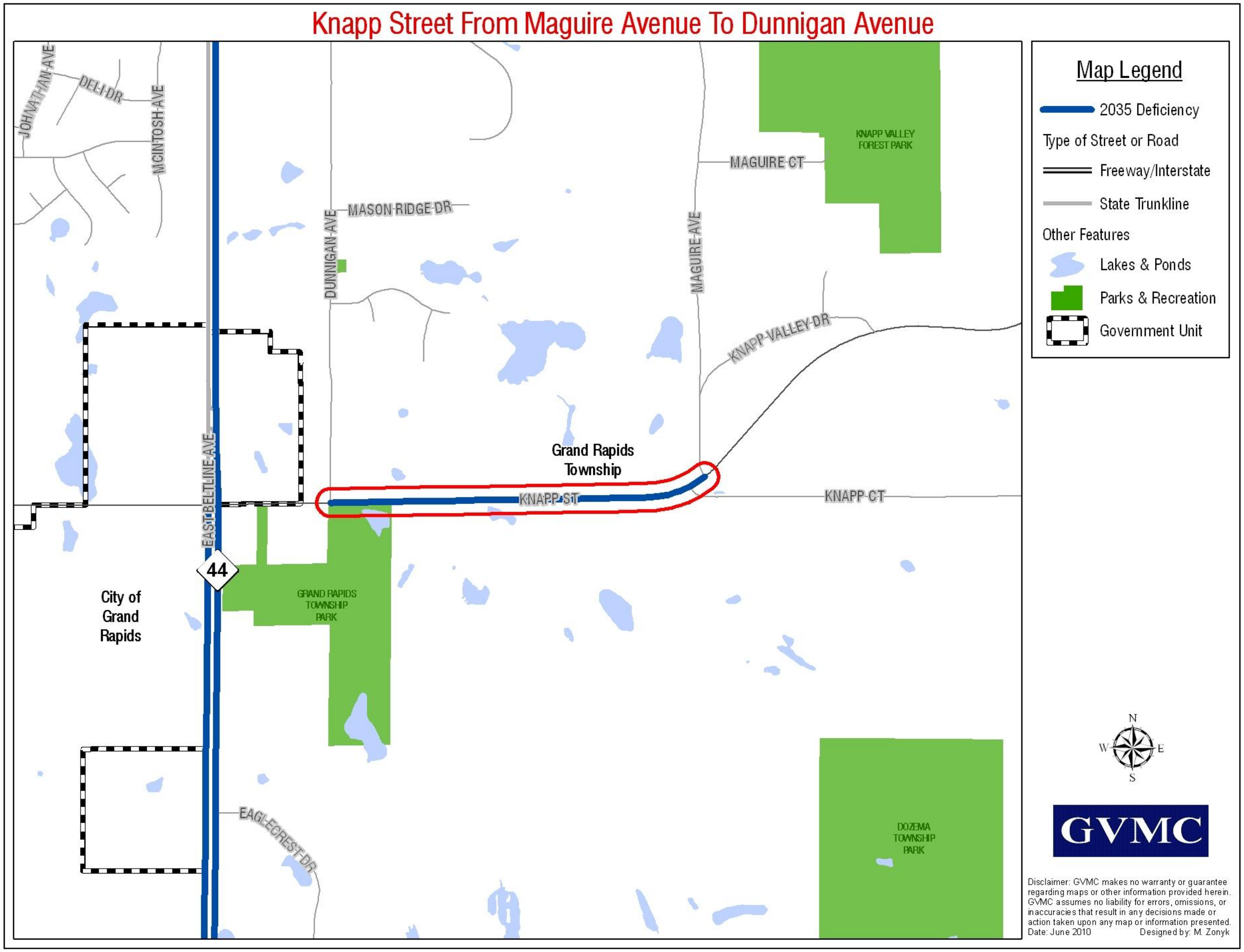
Transit Available: No	Freight Route: Yes

<u>CMP Analysis</u>

Knapp Street is a primary access point to the urbanized area from rural eastern Kent County. The primary land use is rural residential. Growth in volume is primarily the result of growth in the rural areas projected in 2035. Transit is not available and other non-invasive measures would be insufficient to address the projected congestion. However it is not recommended that an increase in capacity be planned for this corridor. A three lane cross section would not add significant capacity to the corridor as the number of left turns in the corridor is relatively low. The next viable cross section would be a 4 lane facility. This is not being considered at this time. Continued monitoring and access management planning should continue. If significant delay is experienced, perhaps a capacity enhancing project could be considered at that time.

Preferred Alternative: Continue Monitoring - Access Management Planning

Deficiency Resolved? No. Anticipated congestion levels within acceptable limits.


Knapp Street From Maguire Avenue To Dunnigan Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
JOHNATHAN AVE
DELI DR
MCINTOSH AVE
MASON RIDGE DR
DUNNIGAN AVE
MAGUIRE CT
MAGUIRE AVE
KNAPP VALLEY FOREST PARK
KNAPP VALLEY DR
Grand Rapids Township
KNAPP ST
KNAPP CT
EAST BELTLINE AVE
44
City of Grand Rapids
GRAND RAPIDS TOWNSHIP PARK
EAGLECREST DR
DOZEMA TOWNSHIP PARK
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Date: June 2010
Designed by: M. Zonyk

Knapp Street – Maguire Avenue to Dunnigan Avenue

Jurisdiction: KCRC/Grand Rapids Twp.

NFC: Urban Minor Arterial

Length: 0.78 miles Lanes: 2

Current ADT: 11,941 Current Capacity: 13,600

Proj. 2035 ADT: 14,422 Projected V/C: 1.06

Phase Deficient: Deficient by 2035

Transit Available: No Freight Route: Yes

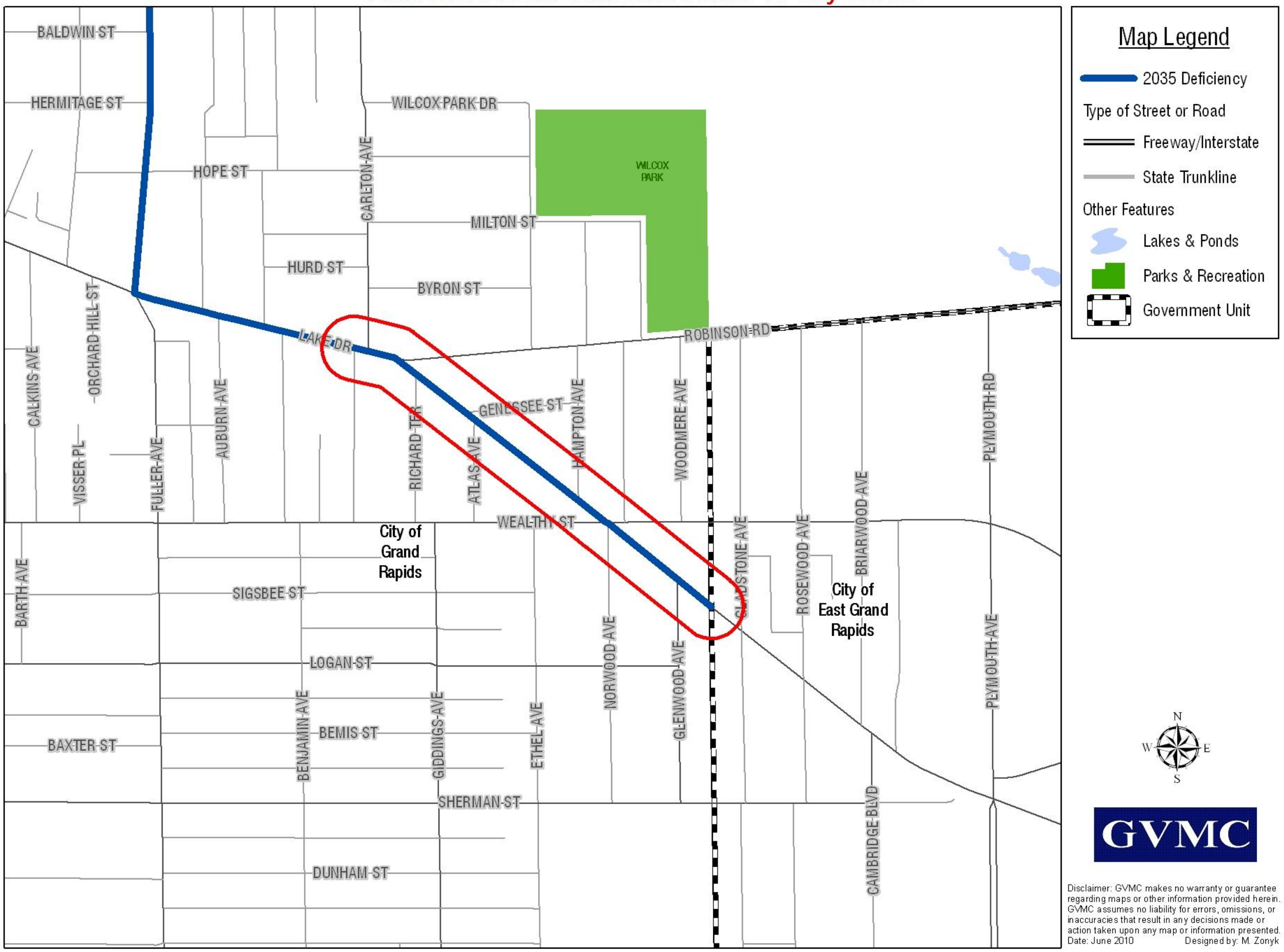
CMP Analysis

Knapp Street is a primary access point to the urbanized area from rural eastern Kent County. The primary land use is rural residential. Growth in volume is primarily the result of growth in the rural areas projected in 2035. Transit is not available and other non-invasive measures would be insufficient to address the projected congestion. However it is not recommended that an increase in capacity be planned for this corridor. A three lane cross section would not add significant capacity to the corridor as the number of left turns in the corridor is relatively low. The next viable cross section would be a 4 lane facility. This is not being considered at this time. Continued monitoring and access management planning should continue. If significant delay is experienced, perhaps a capacity enhancing project could be considered at that time.

Preferred Alternative: Continue Monitoring - Access Management Planning

Deficiency Resolved? No. Anticipated congestion levels within acceptable limits.

Lake Drive From Carleton Avenue To City Limits



Lake Drive – Carleton Avenue to City Limits

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.37 miles Lanes: 2

Current ADT: 15,100 Current Capacity: 12,000

Proj. 2035 ADT: 16,443 Projected V/C: 1.37

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: Yes

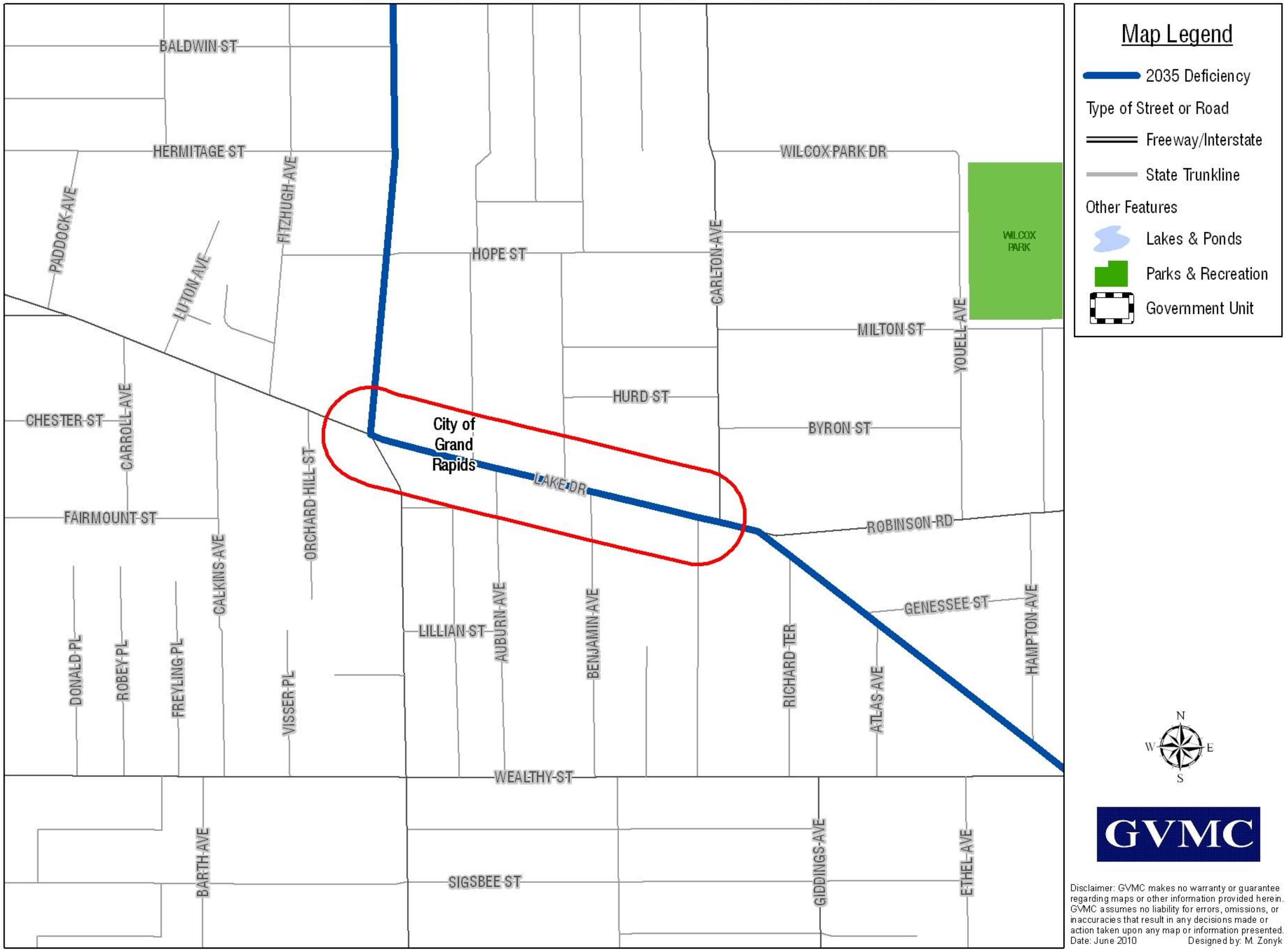
CMP Analysis

Lake Drive provides access between the residential areas in Grand Rapids and East Grand Rapids and the commercial/retail areas in "East Town". For some this corridor is used to make longer trips from Kentwood and downtown Grand Rapids. The primary land use for this section is commercial. While transit is available in the corridor, it is not anticipated that increased transit capacity would provide the relief necessary to completely alleviate delays. The most viable option for this segment may be a reconfiguration of the existing cross section from a 2 lane to a 3 lane facility. This would provide more capacity without adversely effecting the local community.

Preferred Alternative: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity

Deficiency Resolved? Yes.

Lake Drive From Fuller Avenue To Carleton Avenue



Lake Drive – Fuller Avenue to Carleton Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.21 miles   Lanes: 2

Current ADT: 18,000   Current Capacity: 12,000

Proj. 2035 ADT: 18,356   Projected V/C: 1.53

Phase Deficient: Currently Deficient

Transit Available: Yes   Freight Route: Yes

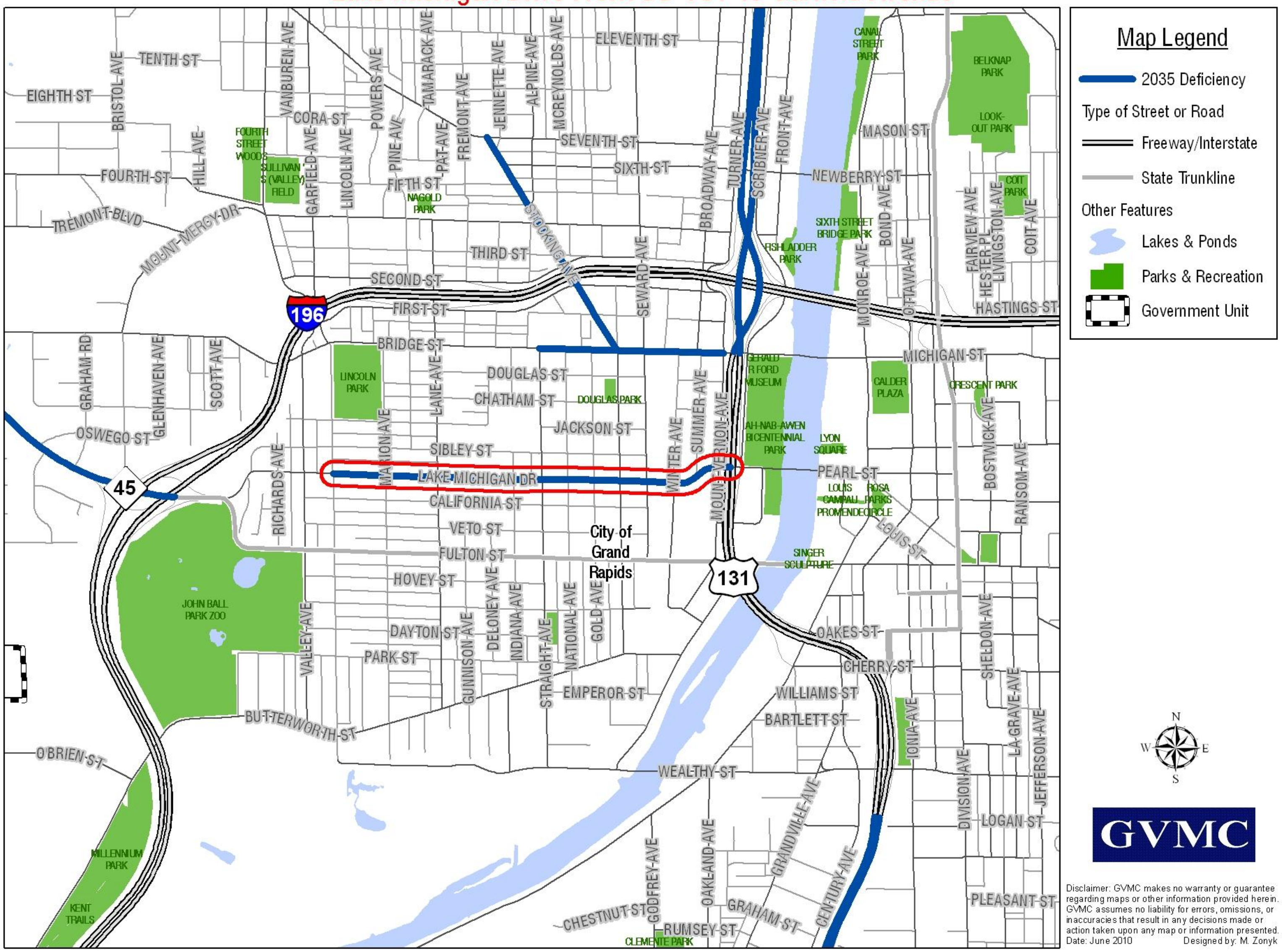
CMP Analysis

Lake Drive provides access between the residential areas in Grand Rapids and East Grand Rapids and the commercial/retail areas in "East Town". For some this corridor is used to make longer trips from Kentwood and downtown Grand Rapids. The primary land use for this section is commercial. While transit is available in the corridor, it is not anticipated that increased transit capacity would provide the relief necessary to completely alleviate delays. The most viable option for this segment may be a reconfiguration of the existing cross section from a 2 lane to a 3 lane facility. This would provide more capacity without adversely affecting the local community.

Preferred Alternative: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity

Deficiency Resolved? Yes.

Lake Michigan Drive From US-131 To Garfield Avenue



Lake Michigan Drive – US-131 to Garfield Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 1.06 miles Lanes: 2

Current ADT: 13,650 Current Capacity: 12,000

Proj. 2035 ADT: 15,236 Projected V/C: 1.27

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: Yes

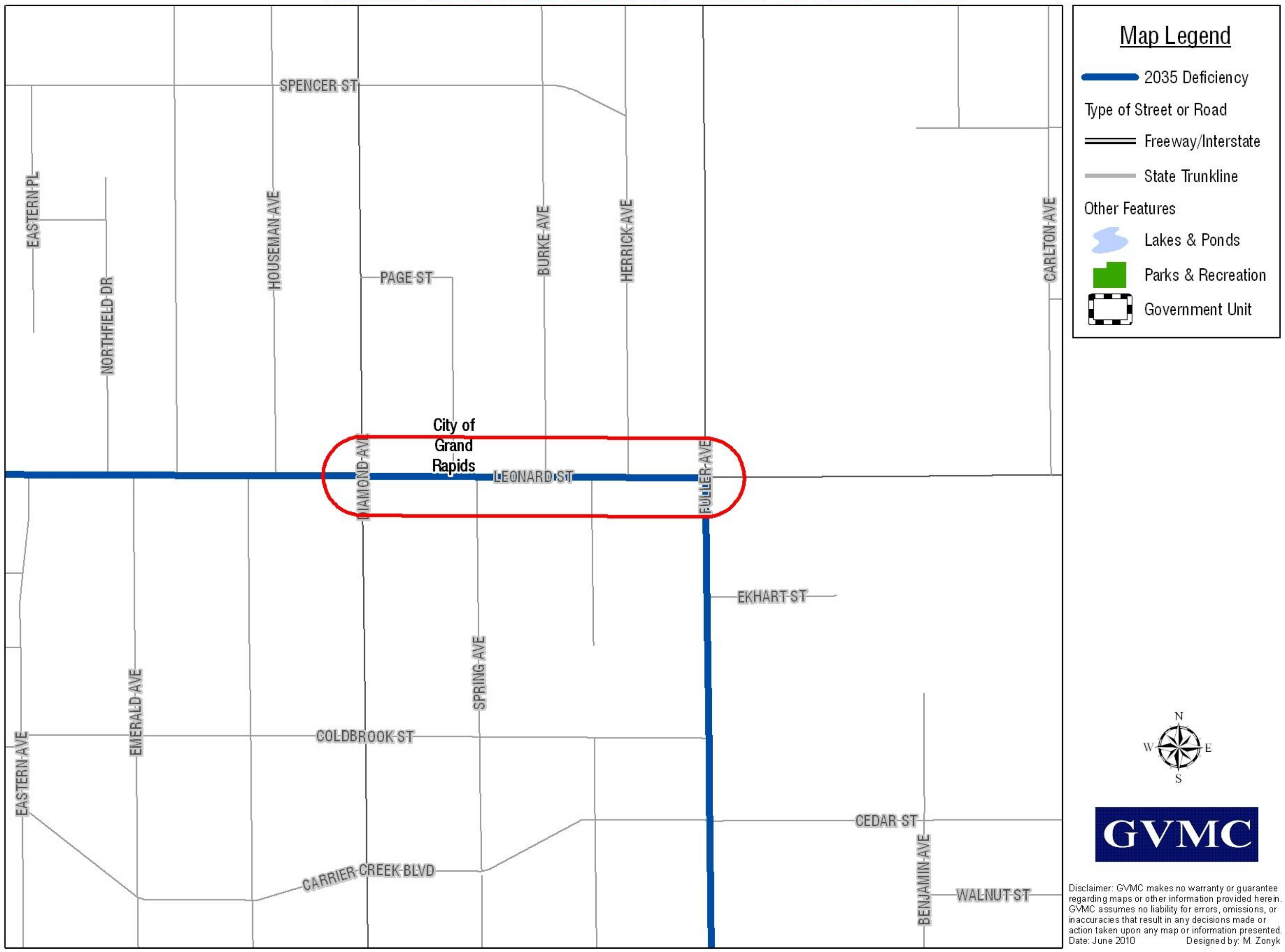
<u>CMP Analysis</u>

Lake Michigan Drive provides primary access from the west side of the City of Grand Rapids, Kent County, and Grand Valley State University in Allendale. The primary land use is residential. While transit is available in the corridor, it is not anticipated that increased transit capacity would provide the relief necessary to completely alleviate delay. The most viable option for this segment may be a reconfiguration of the existing cross section from a 2 lane to a 3 lane facility. This would provide more capacity without adversely affecting the local community. Consideration should also be given to providing designated bike lanes where space permits.

Preferred Alternative: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity

Deficiency Resolved? Yes.

Leonard Street From Diamond Avenue To Fuller Avenue



Leonard Street – Diamond Avenue to Fuller Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.25 miles Lanes: 3

Current ADT: 18,900 Current Capacity: 18,000

Proj. 2035 ADT: 19,169 Projected V/C: 1.06

Phase Deficient: Currently Deficient

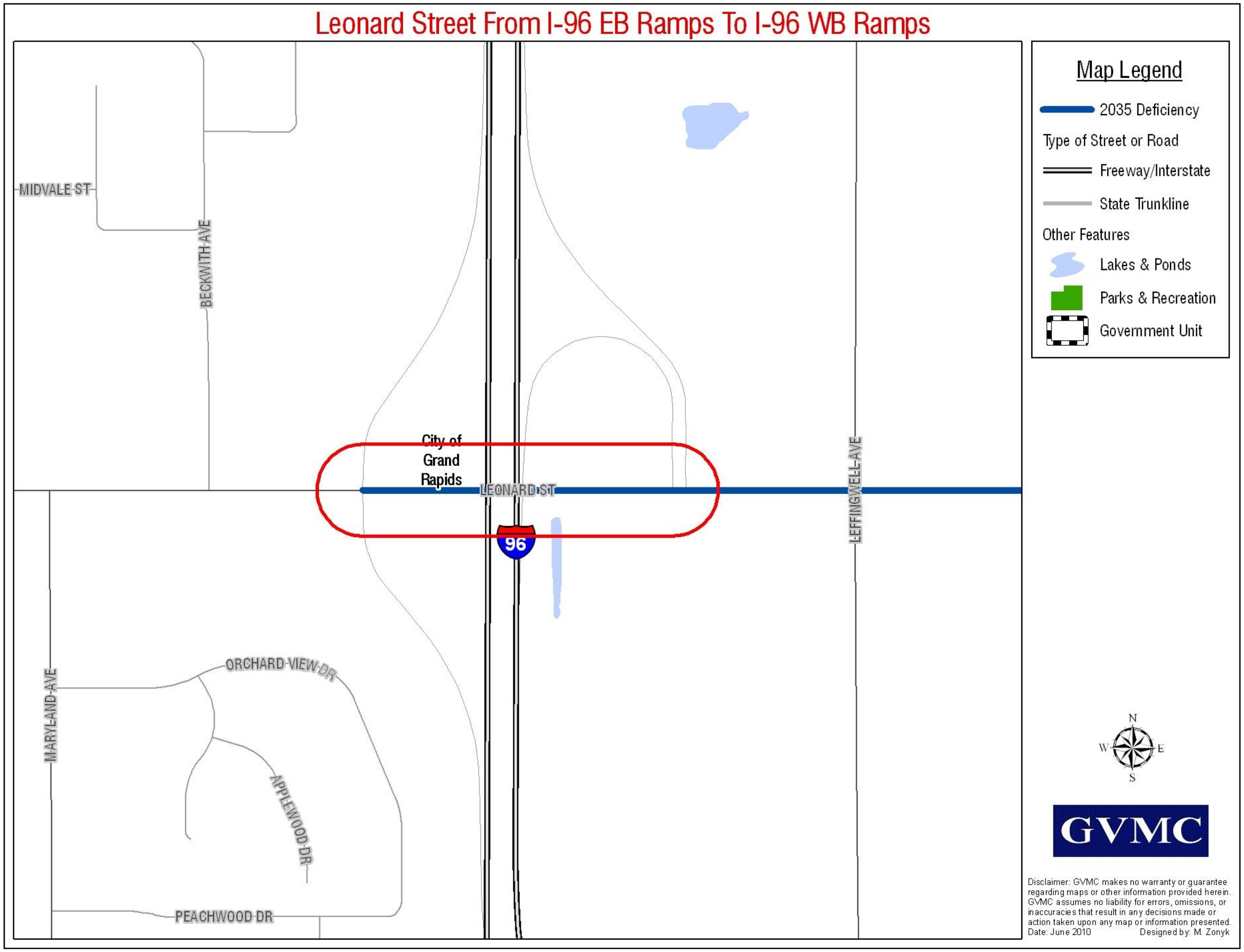
Transit Available: Yes Freight Route: Yes

<u>CMP Analysis</u>

Leonard Street is a primary east west corridor in the City of Grand Rapids. The primary land use along this section is residential with localized spots of commercial and retail. The current 3 lane configuration is sufficient to handle the existing volumes and likely can handle the volumes projected for 2035. With continued efforts focused on corridor progression and the enhancement of transit capacity along the corridor invasive widening can be avoided.

Preferred Alternative: Continued Corridor Progression - Enhance Transit Capacity

Deficiency Resolved? Congestion levels will be within acceptable limits.


Leonard Street From I-96 EB Ramps To I-96 WB Ramps
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
MIDVALE ST
BECKWITH AVE
City of Grand Rapids
LEONARD ST
96
LEFFINGWELL AVE
MARYLAND AVE
ORCHARD VIEW DR
APPLEWOOD DR
PEACHWOOD DR
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Date: June 2010
Designed by: M. Zonyk

Leonard Street – I-96 EB Ramps to I-96 WB Ramps

Jurisdiction: City of Grand Rapids (MDOT)

NFC: Urban Principal Arterial

Length: 0.20 miles Lanes: 4

Current ADT: 25,200 Current Capacity: 26,400

Proj. 2035 ADT: 28,100 Projected V/C: 1.07

Phase Deficient: SlightlyDeficient by 2025

Transit Available: Yes Freight Route: Yes

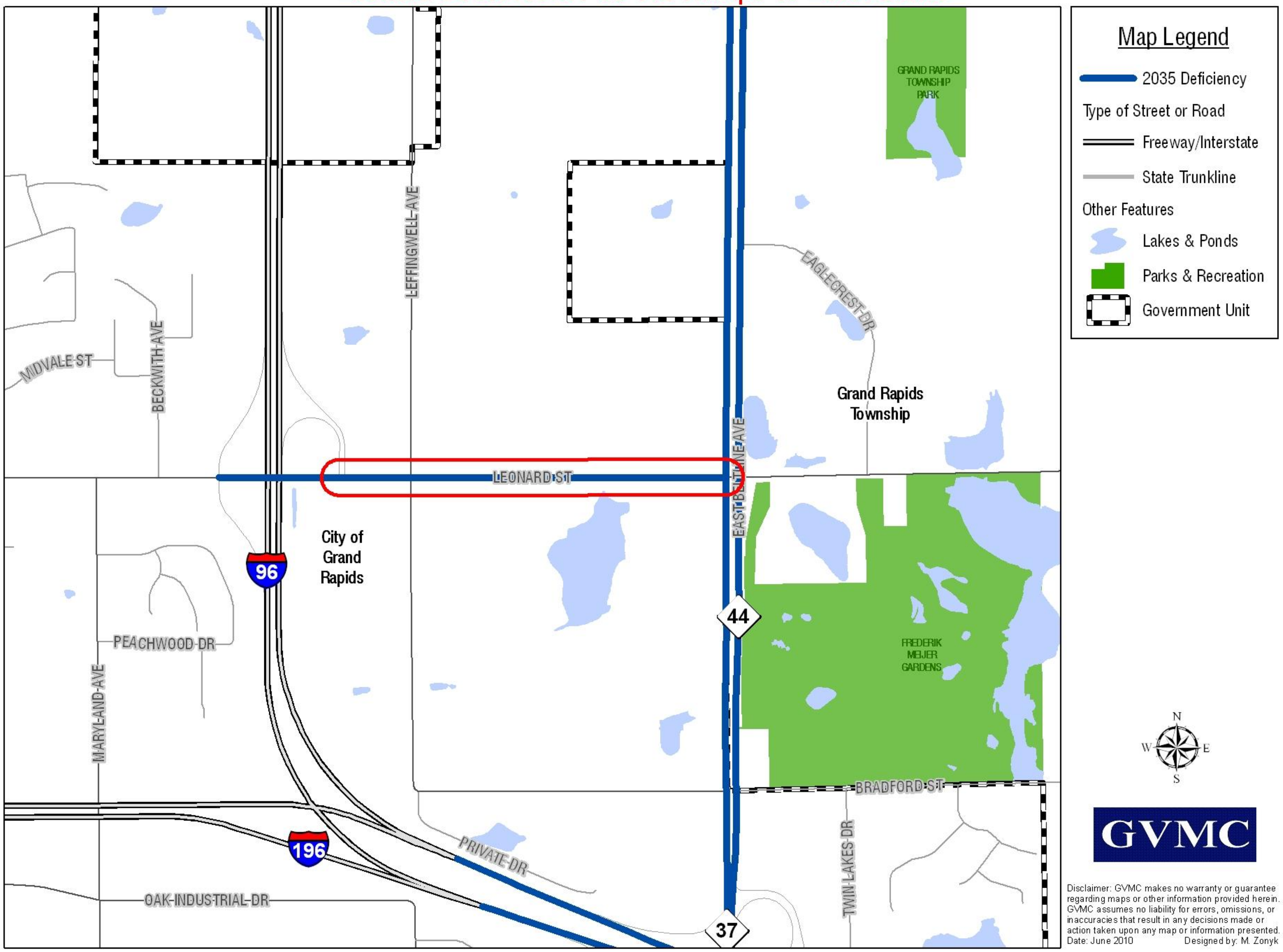
<u>CMP Analysis</u>

Leonard Street is a primary east west corridor in the City of Grand Rapids. This section is essentially the bridge over I-96. Left turn bays are provided for the turns to the ramps from Leonard. The remaining section operates with little or no delay. This section has been identified as potentially benefiting from the addition of a center turn lane for safety reasons. A complete analysis should be completed to confirm this benefit and determine where this additional lane would be placed. If the bridge is reconstructed consideration should be given to providing additional space on the bridge deck for the que that may develop as a result of the left turn demand.

***Preferred Alternative*: Further Study**

Deficiency Resolved? N/A

Leonard Street From I-96 WB Ramps To East Beltline



Leonard Street – I-96 WB Ramps to East Beltline Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.63 miles Lanes: 4

Current ADT: 28,400 Current Capacity: 26,400

Proj. 2035 ADT: 29,000 Projected V/C: 1.10

Phase Deficient: Currently Deficient

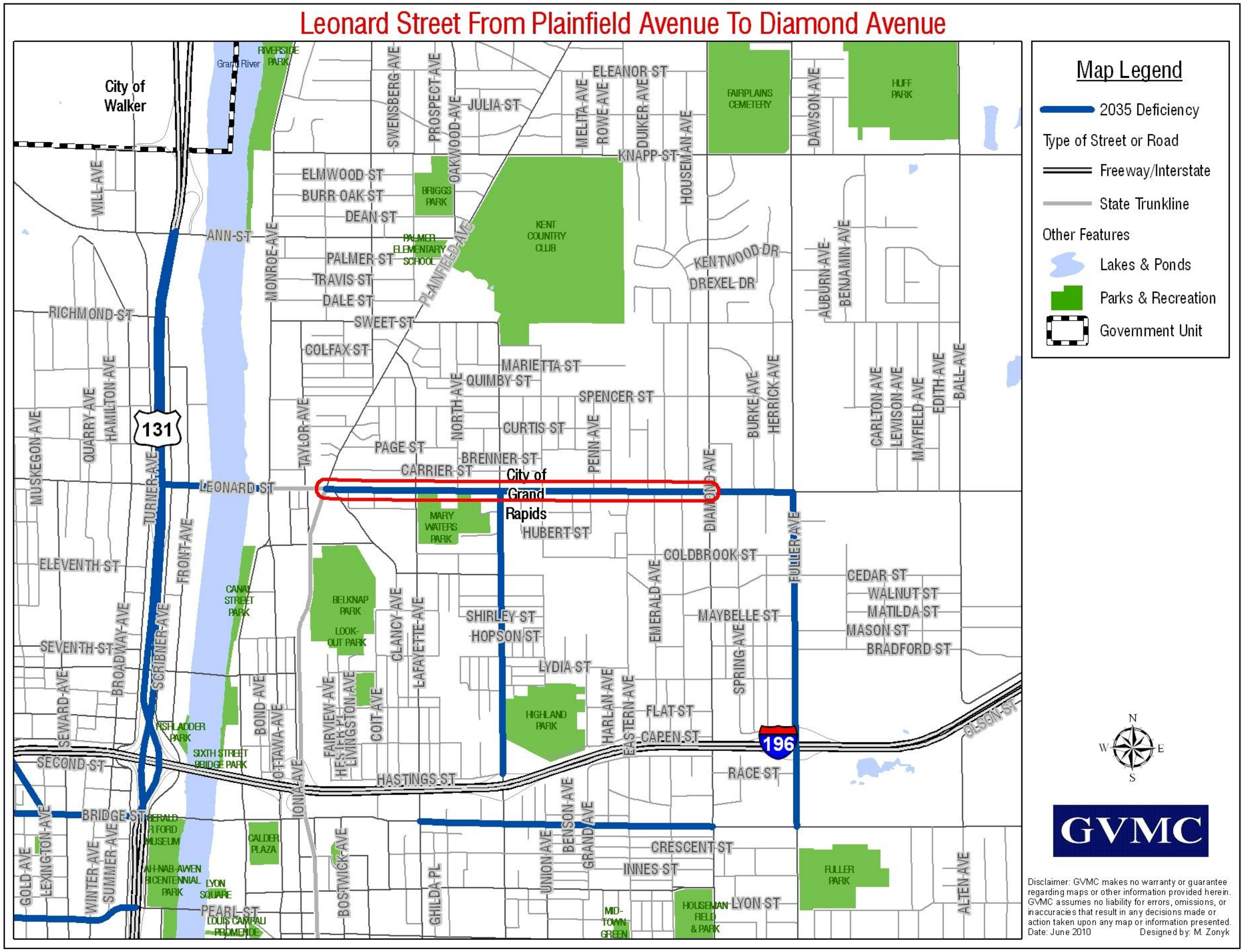
Transit Available: Yes Freight Route: Yes

CMP Analysis

Leonard Street is a primary east west corridor in the City of Grand Rapids. The predominant land use along this section of Leonard is residential with churches and schools. The current volume puts this section over capacity. The projected increase in volumes will only make the situation worse. While transit is available in this area, it is not considered a viable option for completely reducing the delay. Adding a continuous center turn lane will not only address the capacity issue but may also provide improved safety with a dedicated turn lane.

***Preferred Alternative*: Reconstruct and Add Center Turn lane (4-5)**

Deficiency Resolved? Yes.


Leonard Street From Plainfield Avenue To Diamond Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Walker
City of Grand Rapids
GVMC
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Date: June 2010
Designed by: M. Zonyk

Leonard Street – Plainfield Avenue to Diamond Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 1.14 miles Lanes: 2

Current ADT: 19,427 Current Capacity: 12,000

Proj. 2035 ADT: 20,100 Projected V/C: 1.68

Phase Deficient: Currently Deficient

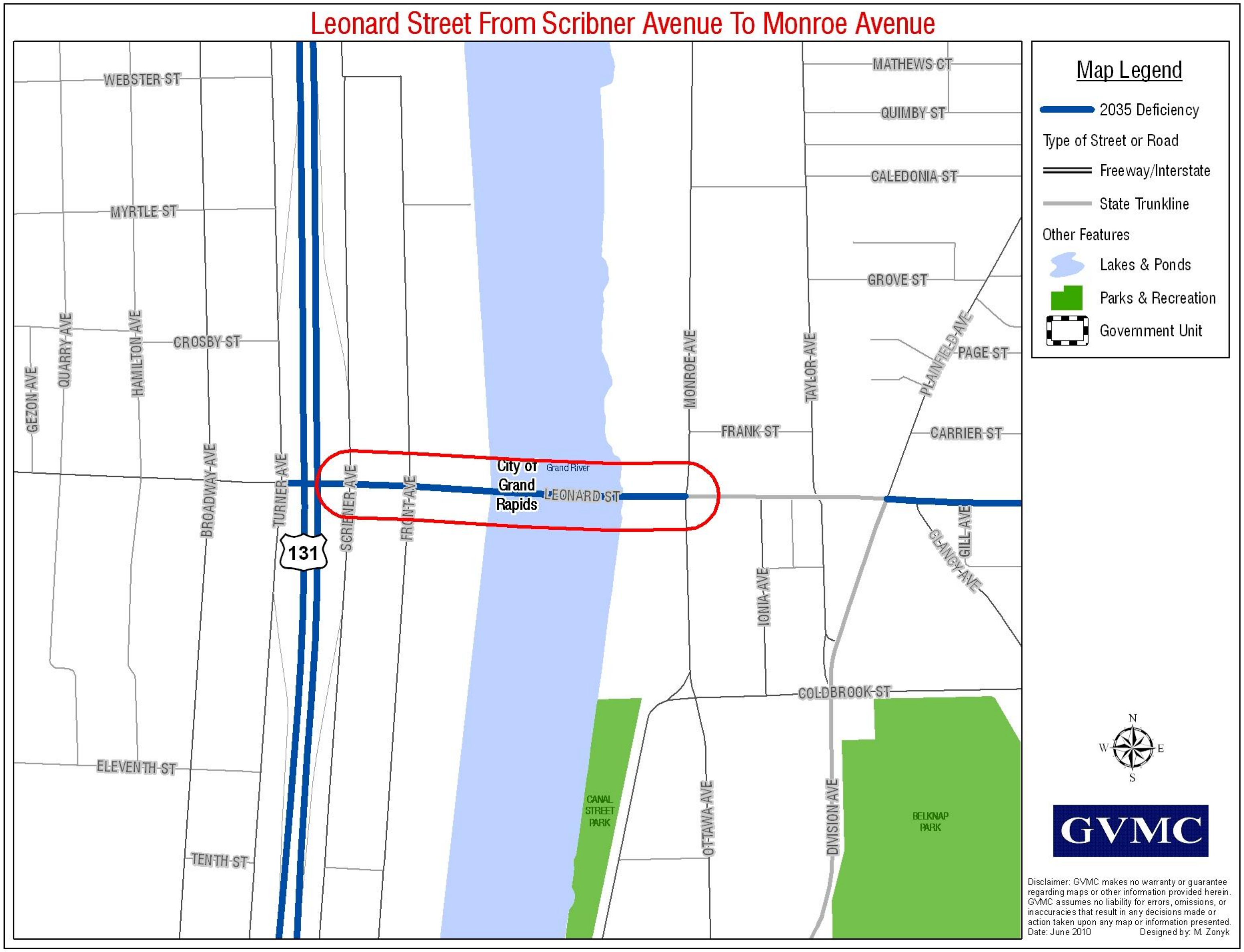
Transit Available: No Freight Route: Yes

CMP Analysis

Leonard Street is a primary east west corridor in the City of Grand Rapids. The predominant land use along this section of Leonard is residential. Transit Service is not available. There is ample space within the existing curb and gutter to reconfigure the number of lanes to include a center turn lane. While a continuous center turn lane may not completely resolve the congestion, the level of delay into the future should be acceptable. This in combination with signal progression work should alleviate most congestion issues within this section of Leonard well into the future.

***Preferred Alternative*: Reconfigure within Existing ROW to 3 lanes – Signal Progression**

Deficiency Resolved? Not completely but congestion levels should be acceptable.



Leonard Street From Scribner Avenue To Monroe Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
WEBSTER ST
MYRTLE ST
CROSBY ST
ELEVENTH ST
TENTH ST
GEZON AVE
QUARRY AVE
HAMILTON AVE
BROADWAY AVE
TURNER AVE
SCRIBNER AVE
FRONT AVE
131
City of Grand Rapids
Grand River
LEONARD ST
MONROE AVE
MATHEWS CT
QUIMBY ST
CALEDONIA ST
GROVE ST
FRANK ST
TAYLOR AVE
PLAINFIELD AVE
PAGE ST
CARRIER ST
GILL AVE
CLANCY AVE
IONIA AVE
COLDBROOK ST
OTTAWA AVE
DIVISION AVE
CANAL STREET PARK
BELKNAP PARK
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Leonard Street – Scribner Avenue to Monroe Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.46 miles Lanes: 5

Current ADT: 28,900 Current Capacity: 34,800

Proj. 2035 ADT: 31,200 Projected V/C: 0.90

Phase Deficient: Borderline by 2035

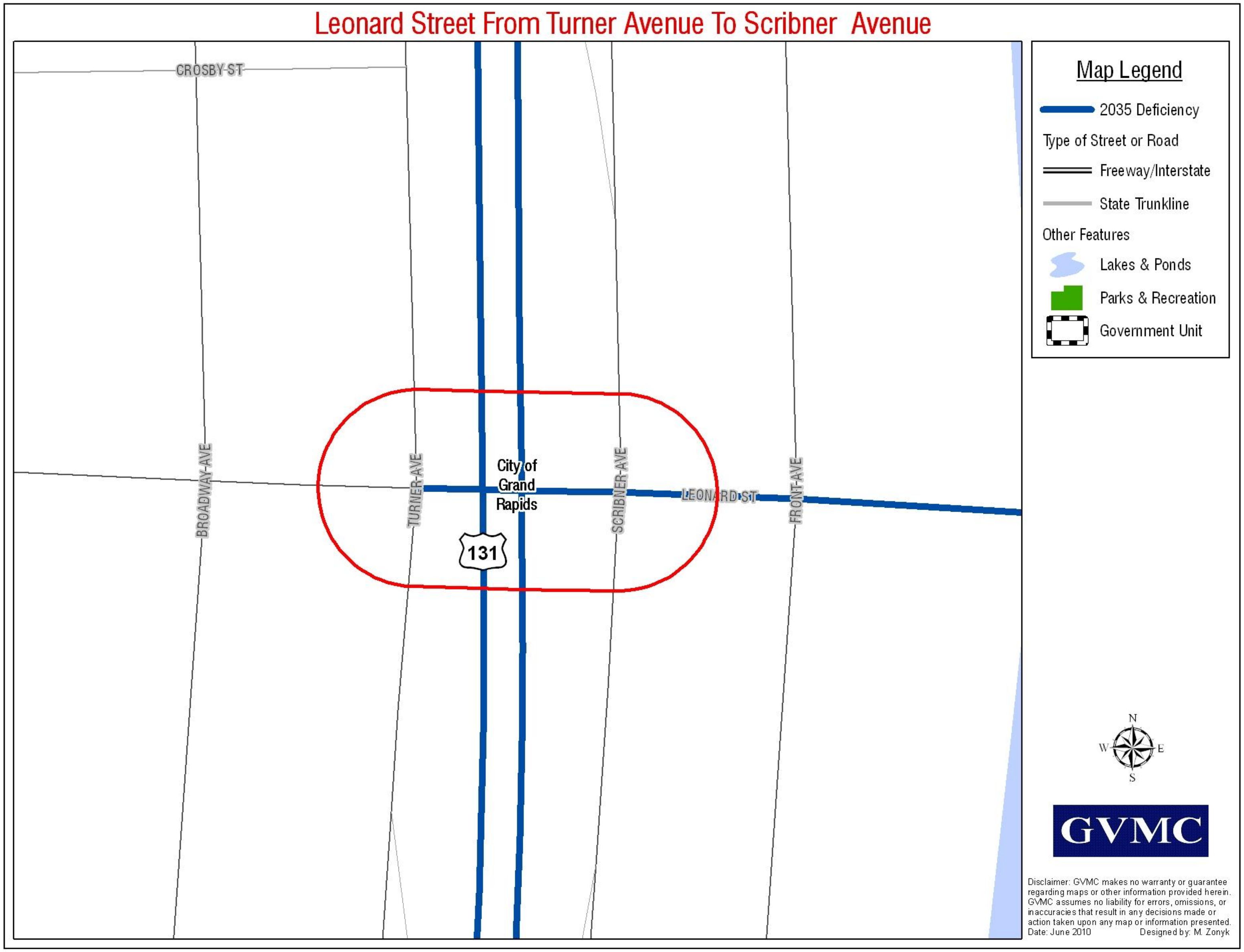
Transit Available: No Freight Route: Yes

CMP Analysis

Leonard Street is a primary east west corridor in the City of Grand Rapids. The predominant land use along this section of Leonard is commercial. The current and projected volumes do not put this section over capacity. However due to intersection delay this segment does experience some delay during peak times. As a corridor that provides primary access to the freeway system continued monitoring, corridor progression work and access management planning should occur.

***Preferred Alternative*: Further Study - Access Management Planning & Continued Signal Timing**

Deficiency Resolved? N/A


Leonard Street From Turner Avenue To Scribner Avenue
CROSBY ST
BROADWAY AVE
TURNER AVE
City of Grand Rapids
SCRIBNER AVE
LEONARD ST
FRONT AVE
131
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Leonard Street – Turner Avenue to Scribner Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.46 miles	Lanes: 6
Current ADT: 43,400	Current Capacity: 24,000
Proj. 2035 ADT: 43,400	Projected V/C: 1.81

Phase Deficient: Currently Deficient

Transit Available: No	Freight Route: Yes

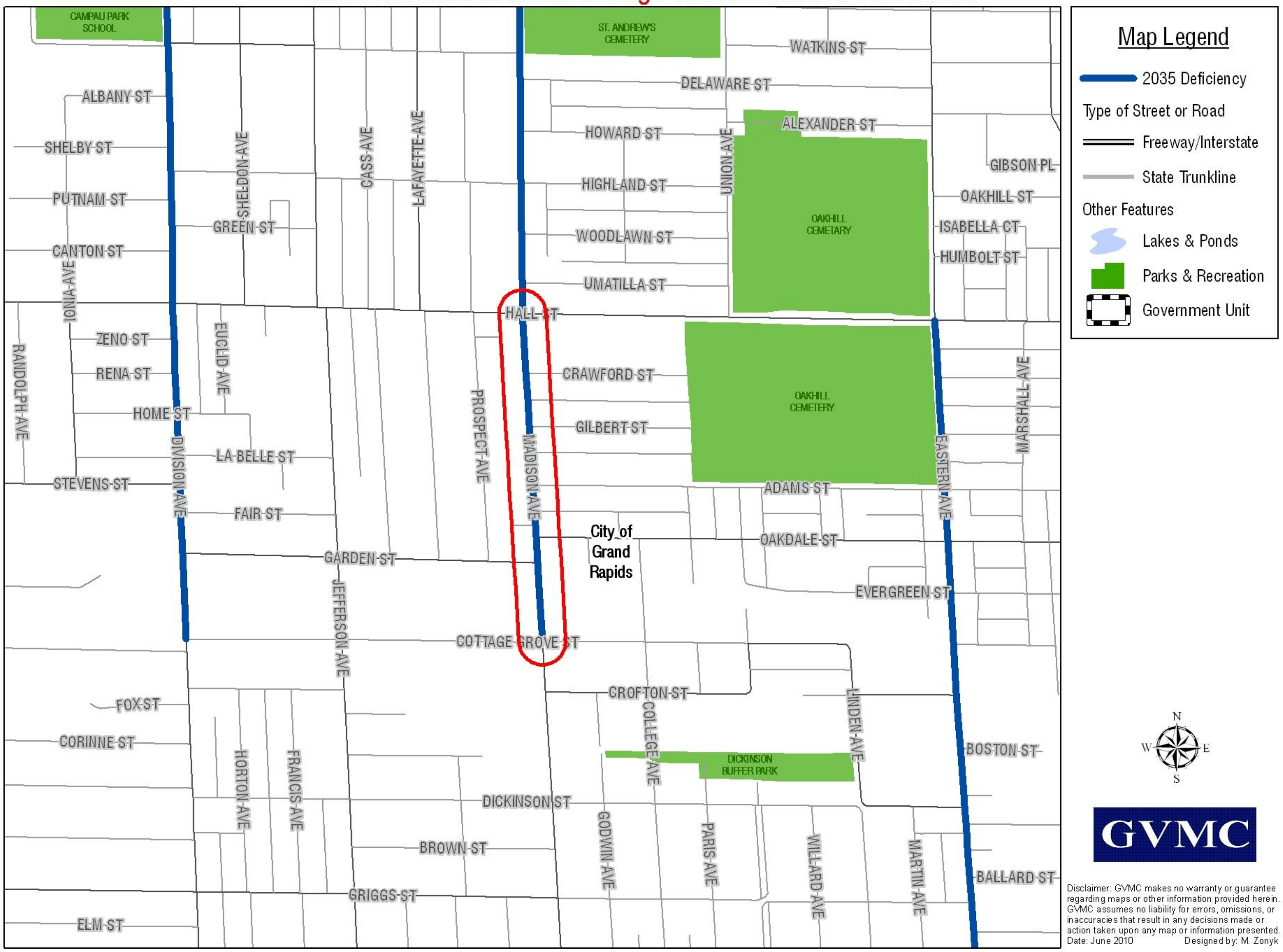
<u>CMP Analysis</u>

Leonard Street is a primary east west corridor in the City of Grand Rapids. The predominant land use along this section of Leonard is commercial. This section is primarily the segment under US-131. The demand for this section far exceeds the ability of the facility. Non-invasive techniques are deemed not able to reduce the demand enough to address the congestion. A significant study effort should be undertaken to determine the solution.

***Preferred Alternative*: Further Study - Access Management Planning & Continued Signal Timing**

Deficiency Resolved? N/A

Madison Avenue From Cottage Grove Street To Hall Street



Madison Avenue – Cottage Grove Street to Hall Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.39 miles	Lanes: 2
Current ADT: 13,000	Current Capacity: 12,000
Proj. 2035 ADT: 14,500	Projected V/C: 1.21

Phase Deficient: Currently Deficient

Transit Available: Yes	Freight Route: Yes

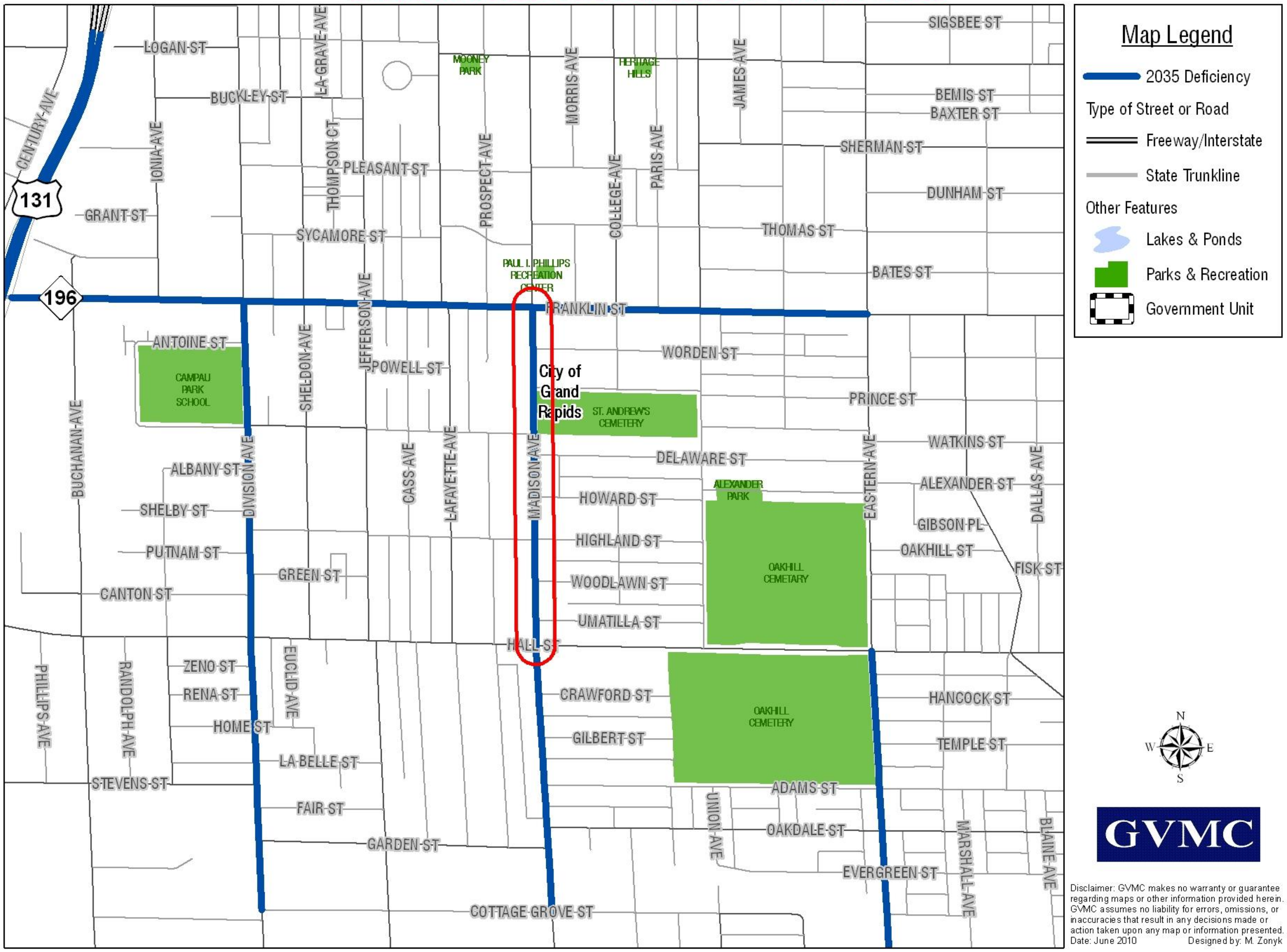
CMP Analysis

Madison Avenue is a secondary north/south corridor in the City of Grand Rapids. The predominant land use along this section is commercial and residential. There is transit service currently operating in this corridor. The current two lane configuration is currently operating with volumes in excess of its deigned capacity. There is sufficient space to accommodate a three lane cross section. The third continuous lane would provide additional capacity by providing refuge for those making left turns without delaying others. This segment also has the potential to benefit from a safety perspective as this corridor experiences accident types that may be significantly reduced with the installation of a center turn lane.

***Preferred Alternative*: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity**

Deficiency Resolved? Yes the future V/C would be 0.81

Madison Avenue From Hall Street To Franklin Street



Madison Avenue – Hall Street to Franklin Street

Photo from 2008

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.50 miles	Lanes: 2
Current ADT: 13,400	Current Capacity: 12,000
Proj. 2035 ADT: 14,000	Projected V/C: 1.17

Phase Deficient: Currently Deficient

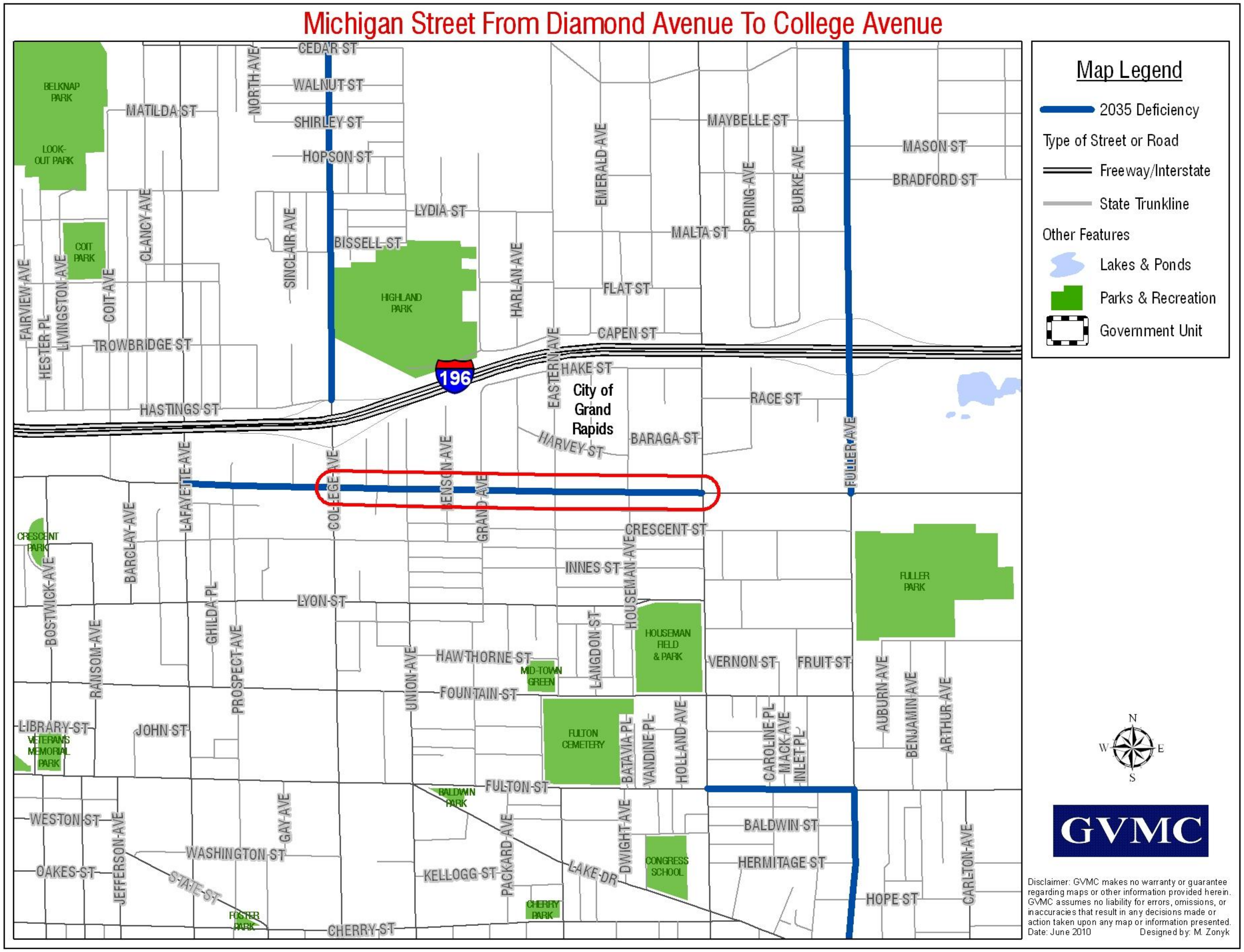
Transit Available: Yes	Freight Route: Yes

<u>CMP Analysis</u>

Madison Avenue is a secondary north/south corridor in the City of Grand Rapids. The predominant land use along this section is commercial and residential. There is transit service currently operating in this corridor. The current two lane configuration is currently operating with volumes in excess of its deigned capacity. There is sufficient space to accommodate a three lane cross section. The third continuous lane would provide additional capacity by providing refuge for those making left turns without delaying others. This segment also has the potential to benefit from a safety perspective as this corridor experiences accident types that may be significantly reduced with the installation of a center turn lane.

***Preferred Alternative*: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity**

Deficiency Resolved? Yes the future V/C would be 0.78


Michigan Street From Diamond Avenue To College Avenue
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grand Rapids
GVMC
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Date: June 2010
Designed by: M. Zonyk

Michigan Street – Diamond Avenue to College Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.25 miles Lanes: 5

Current ADT: 29,000 Current Capacity: 34,800

Proj. 2035 ADT: 33,700 Projected V/C: 0.97

Phase Deficient: Borderline Deficient by 2035

Transit Available: Yes Freight Route: Yes

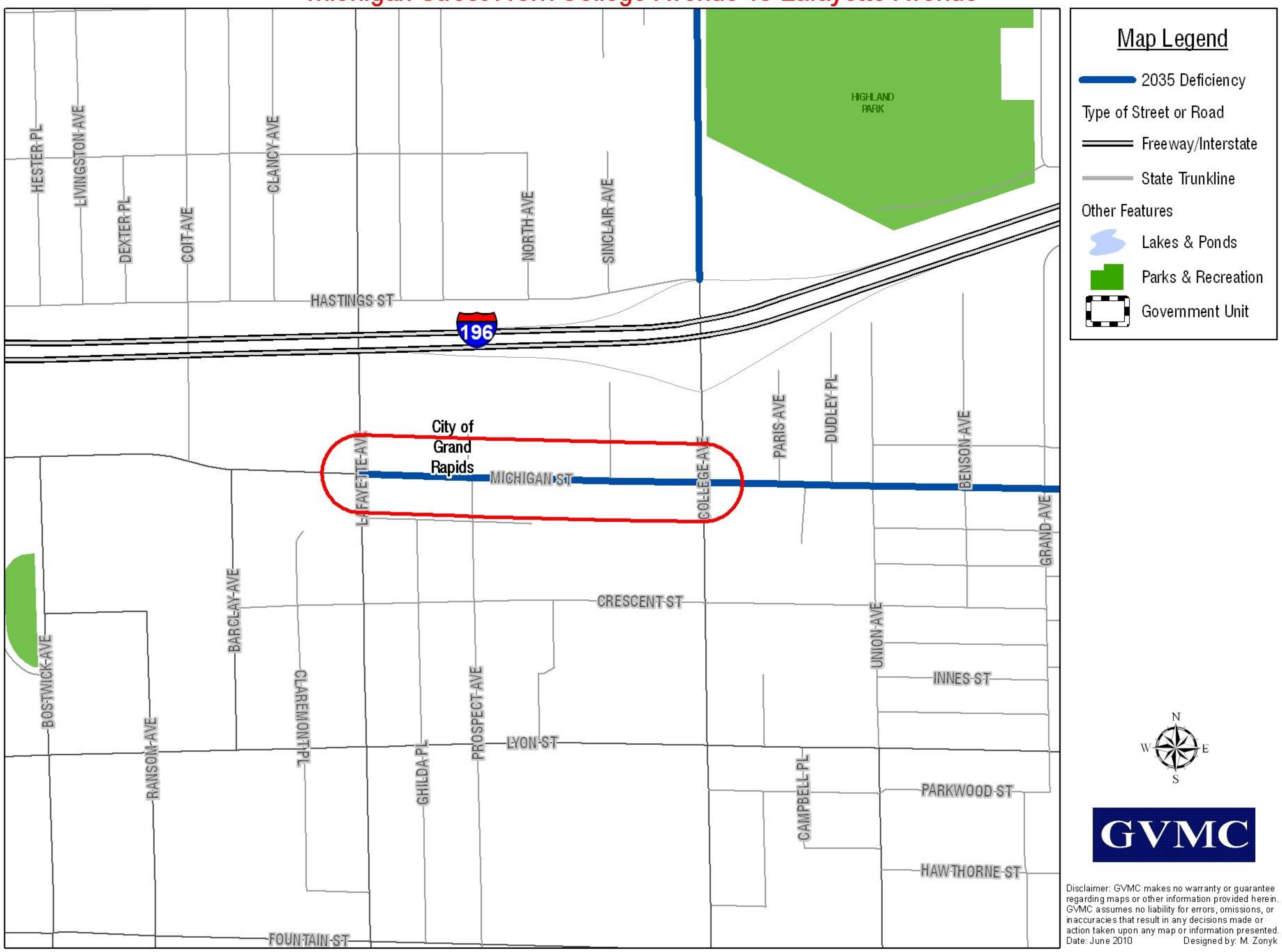
CMP Analysis

Michigan Street is a principal arterial that serves as access to the Medical Mile, Heritage Hill and Grand Rapids Community College. In recent years the Medical Mile has experienced high rates of growth. This growth has yet to reach its full impact on the transportation system. Currently, the facility is operating at 80% of its designed capacity. Projected growth (based on currently known development) will place this corridor near full capacity by 2035. Transit service is prevalent in the corridor with numerous services designed to reduce SOV demand on the corridor. These activities should continue and efforts be made to expand them where possible. Enhanced signal timing should also be continued to maximize the capacity that does exist.

***Preferred Alternative*: Physically Constrained - Signal Progression - Enhanced Transit Capacity**

Deficiency Resolved? N/A

Michigan Street From College Avenue To Lafayette Avenue



Michigan Street – College Avenue to Lafayette Avenue

Jurisdiction: City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.62 miles Lanes: 2

Current ADT: 20,500 Current Capacity: 12,000

Proj. 2035 ADT: 24,865 Projected V/C: 2.07

Phase Deficient: Currently Deficient

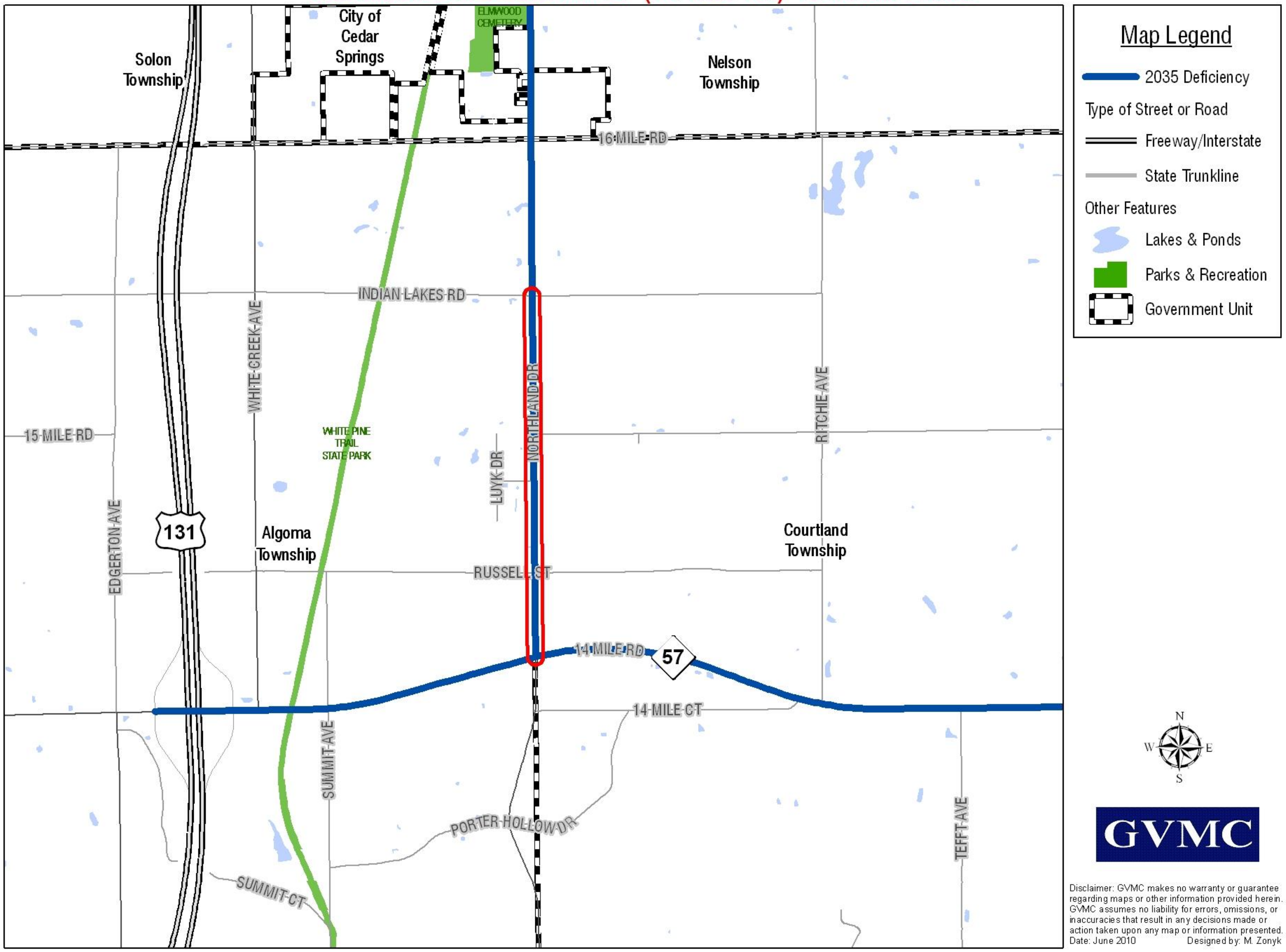
Transit Available: Yes Freight Route: Yes

<u>CMP Analysis</u>
Michigan Street is a principal arterial that serves as access to the Medical Mile, Heritage Hill and Grand Rapids Community College. In recent years the Medical Mile has experienced high rates of growth. This growth has yet to reach its full impact on the transportation system. Currently, the facility is operating at 170% of its designed capacity. Projected growth (based on currently known development) will place this corridor at more than twice its capacity by 2035. Transit service is prevalent in the corridor with numerous services designed to reduce SOV demand on the corridor. These activities should continue and efforts be made to expand them where possible. Enhanced signal timing should also be continued to maximize the capacity that does exist. Unfortunately, these efforts will not be enough to quell the demand that exists in the corridor. The corridor is somewhat constrained by businesses and dwellings close to the pavement. At a minimum there is sufficient pavement width to accommodate a 3 lane and possibly a 4 lane configuration. If the full width of the pavement can be utilized (4 lanes) it would alleviate most of the congestion projected for this section.

***Preferred Alternative*: Reconfigure to 3/4 lanes section - Signal Progression - Enhanced Transit Capacity**

Deficiency Resolved? Potentially.

Northland Drive From M-57 (14 Mile Rd) To Indian Lakes



Northland Drive – M-57 (14 Mile Rd) to Indian Lakes Drive

Jurisdiction: KCRC/Algoma Twp.

NFC: Urban Minor Arterial

Length: 1.31 miles	Lanes: 2
Current ADT: 12,400	Current Capacity: 13,600
Proj. 2035 ADT: 15,720	Projected V/C: 1.16

Phase Deficient: Deficient by 2035

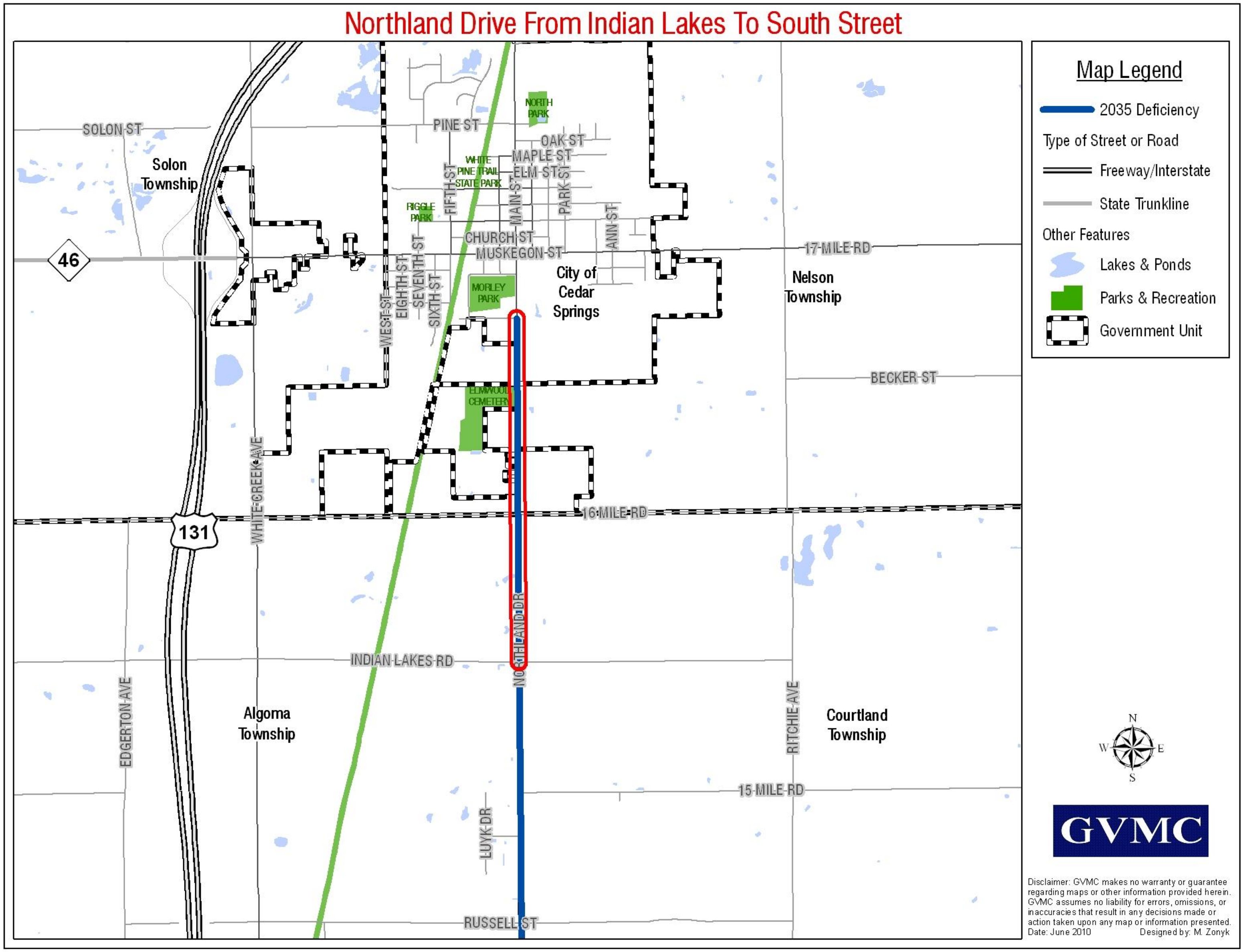
Transit Available: No	Freight Route: Yes

CMP Analysis

Northland Drive is a local primary north/south corridor that serves as a localized connector between Cedar Springs and the commercial area adjacent to M-57. The primary land use along this section is commercial and residential. Projected volumes will be in excess of the designed capacity of the facility. There is no transit service available and other non invasive techniques will not solve the projected capacity issues in this section. The KCRC is planning to reconstruct this facility and add a center turn lane in 2010. This improvement should alleviate any congestion that is projected well into the future. In addition to the added lane, access management should be employed to minimize the number of access/conflict points along the corridor.

***Preferred Alternative*: Reconstruct and Add Center Turn lane (2-3) - Access Management**

Deficiency Resolved? Yes.


Northland Drive From Indian Lakes To South Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
SOLON ST
Solon Township
PINE ST
NORTH PARK
OAK ST
MAPLE ST
ELM ST
WHITE PINE TRAIL STATE PARK
RIGGLE PARK
FIFTH ST
MAIN ST
PARK ST
ANN ST
CHURCH ST
MUSKEGON ST
17 MILE RD
46
City of Cedar Springs
Nelson Township
MORLEY PARK
WEST ST
EIGHTH ST
SEVENTH ST
SIXTH ST
BECKER ST
ELMWOOD CEMETERY
WHITE CREEK AVE
131
16 MILE RD
NORTHLAND DR
INDIAN LAKES RD
EDGERTON AVE
Algoma Township
RITCHIE AVE
Courtland Township
15 MILE RD
LUYK DR
RUSSELL ST
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Northland Drive – Indian Lakes Drive to South Street

Jurisdiction: KCRC/Nelson Twp.

NFC: Urban Minor Arterial

Length: 1.20 miles   Lanes: 2

Current ADT: 8,900   Current Capacity: 12,150

Proj. 2035 ADT: 10,600   Projected V/C: 0.87

Phase Deficient: Not Deficient by 2035

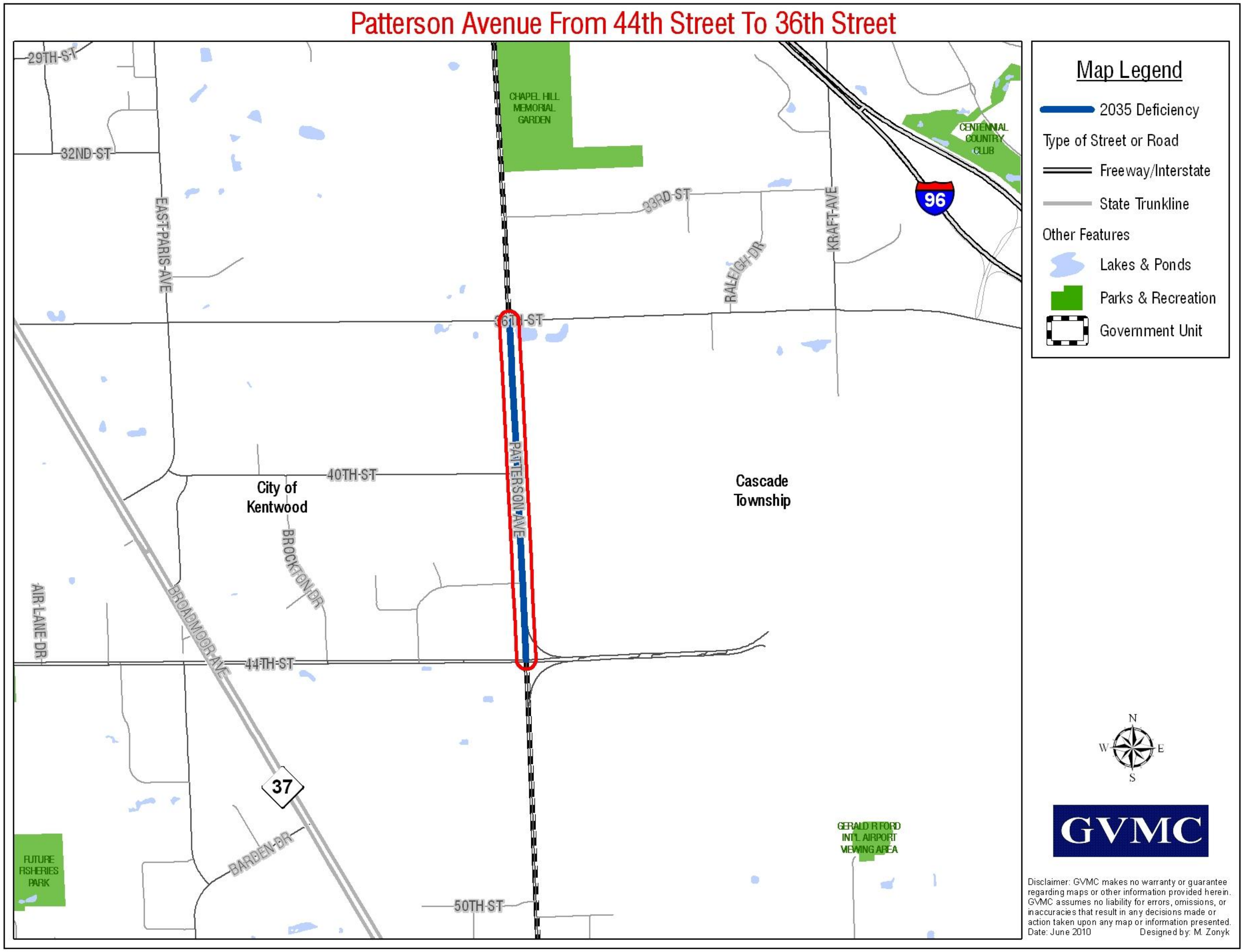
Transit Available: No   Freight Route: Yes

<u>CMP Analysis</u>

Northland Drive is a local primary north/south corridor that serves as a localized connector between Cedar Springs and the commercial area adjacent to M-57. The primary land use along this section is commercial and residential. Projected volumes will not be in excess of the designed capacity of the facility. While this facility is not currently nor is it projected to be capacity deficient in the future, the KCRC is planning to reconstruct this facility and add a center turn lane in 2013. For this reason it is listed in this document. In addition, access management should be employed to minimize the number of access/conflict points along the corridor.

***Preferred Alternative*: Reconstruct and Add Center Turn lane (2-3) - Access Management**

Deficiency Resolved? N/A


Patterson Avenue From 44th Street To 36th Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
29TH ST
32ND ST
33RD ST
36TH ST
40TH ST
44TH ST
50TH ST
EAST PARIS AVE
PATTERSON AVE
RALEIGH DR
KRAFT AVE
BROCKTON DR
BROADMOOR AVE
AIR LANE DR
BARDEN DR
CHAPEL HILL MEMORIAL GARDEN
CENTENNIAL COUNTRY CLUB
FUTURE FISHERIES PARK
GERALD R FORD INT'L AIRPORT VIEWING AREA
City of Kentwood
Cascade Township
96
37
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Patterson Avenue – 36th Street to 44th Street

Jurisdiction: KCRC/Cascade Twp.

NFC: Urban Principal Arterial

Length: 1.00 miles	Lanes: 5
Current ADT: 31,900	Current Capacity: 34,800
Proj. 2035 ADT: 35,046	Projected V/C: 1.01

Phase Deficient: Borderline Deficient by 2035

Transit Available: No	Freight Route: Yes

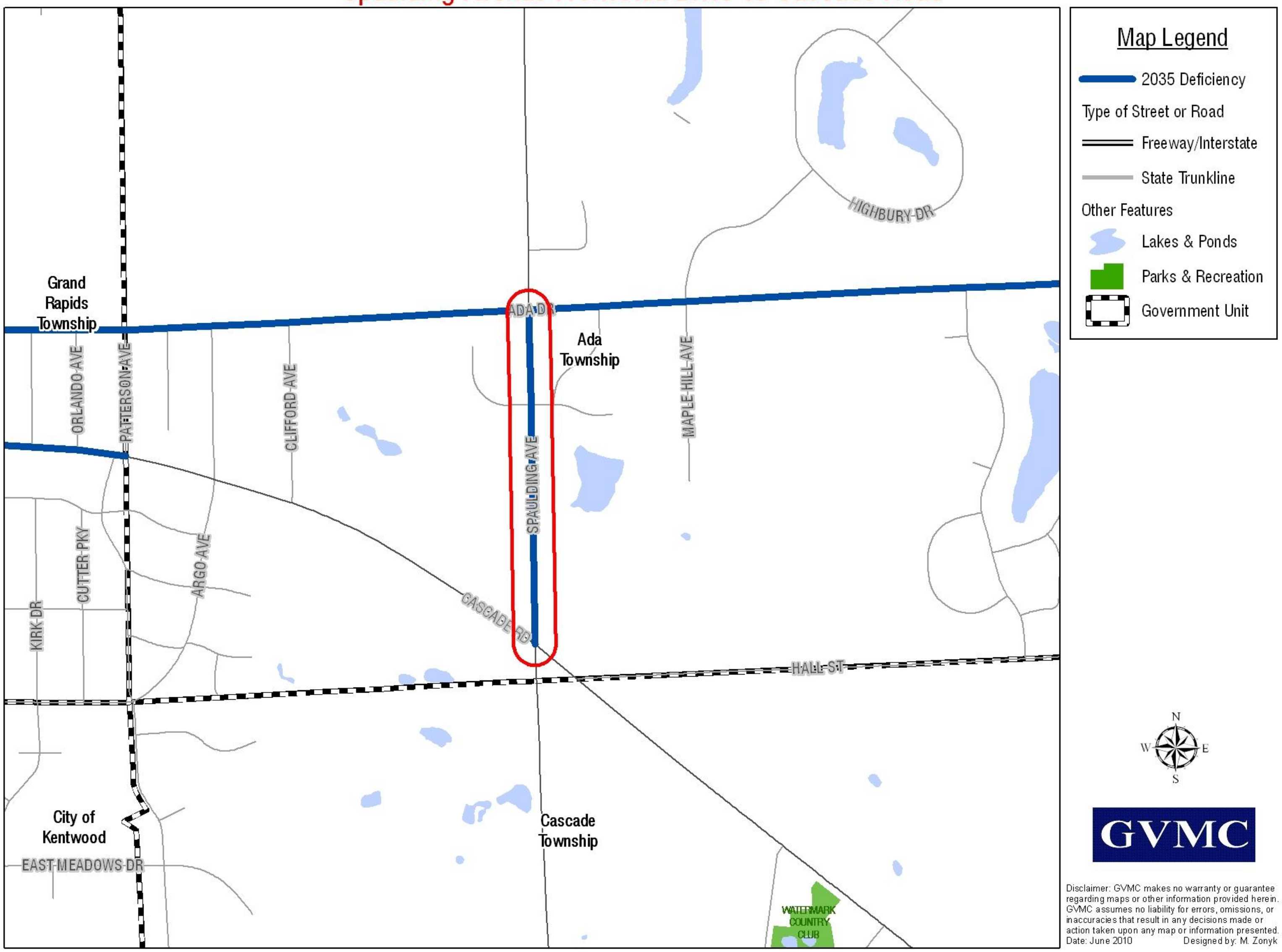
CMP Analysis

Patterson Avenue in Cascade Township is a primary north/south arterial in southeast Kent County. It is one of the few local facilities listed on the NHS. This facility serves the GR Ford International Airport and a significant area of industrial development adjacent to 36th Street. It is critical that this facility remains congestion free. Currently Patterson Avenue is operating at 92% capacity. Projections show most of the remaining capacity used by increased demand projected by 2035. Efforts in recent years to relieve some of the demand have been undertaken with the construction of the 36th Street extension and a new interchange with the interstate system. This section of Patterson is physically constrained by the railroad underpass. Access management strategies have been well planned and transit is not currently available.

***Preferred Alternative*: Further Study - Access Management Planning & Continued Signal Timing**

Deficiency Resolved? Congestion and delay will be at acceptable levels.

Spaulding Avenue From Ada Drive To Cascade Road



Spaulding Avenue – Ada Drive to Cascade Road

Jurisdiction: KCRC/Ada Twp.

NFC: Urban Minor Arterial

Length: 0.45 miles Lanes: 2

Current ADT: 12,000 Current Capacity: 12,000

Proj. 2035 ADT: 15,500 Projected V/C: 1.30

Phase Deficient: Deficient by 2025

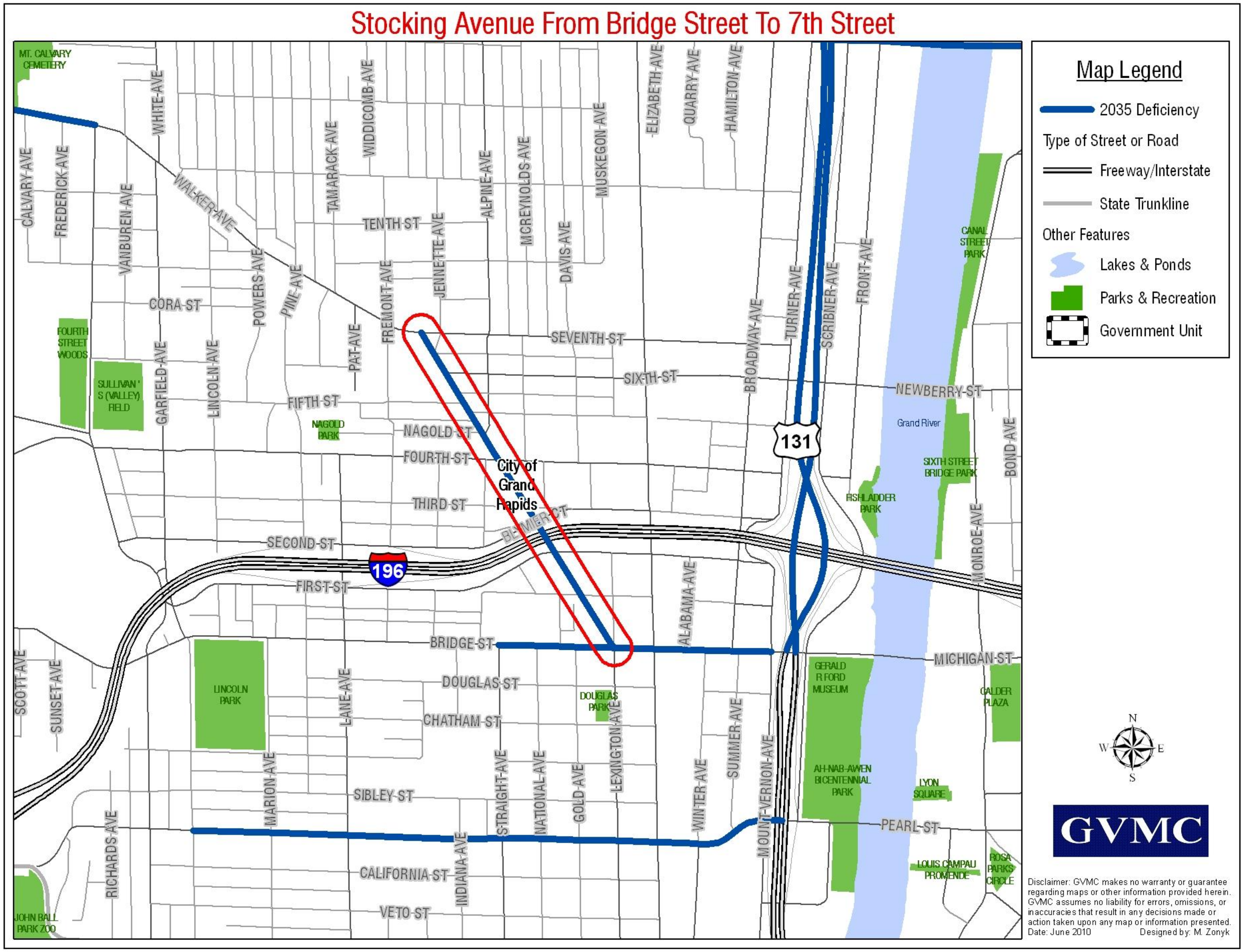
Transit Available: No Freight Route: No

CMP Analysis

Spaulding Avenue serves as a secondary feeder facility within Ada Township. The primary land use is residential. The level of demand for this facility is beyond an amount that can be resolved with non-invasive solutions. Additional capacity will be necessary in the near future. This may come in the form of a continuous center turn lane or may be a series of left turn bays constructed at key intersections as to not disrupt the community too significantly.

***Preferred Alternative*: Further Study - Reconstruct and Add Center Turn lane (2-3) or at key locations**

Deficiency Resolved? Yes.


Stocking Avenue From Bridge Street To 7th Street
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
City of Grand Rapids
131
196
Grand River
SEVENTH ST
SIXTH ST
FIFTH ST
NAGOLD ST
FOURTH ST
THIRD ST
SECOND ST
FIRST ST
BRIDGE ST
DOUGLAS ST
CHATHAM ST
SIBLEY ST
PEARL ST
CALIFORNIA ST
VETO ST
TENTH ST
CORA ST
NEWBERRY ST
MICHIGAN ST
WALKER AVE
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GVMC
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Date: June 2010
Designed by: M. Zonyk

Stocking Avenue – Bridge Street to 7th Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.60 miles Lanes: 2

Current ADT: 12,000 Current Capacity: 12,000

Proj. 2035 ADT: 15,600 Projected V/C: 1.30

Phase Deficient: Deficient by 2025

Transit Available: Yes Freight Route: Yes

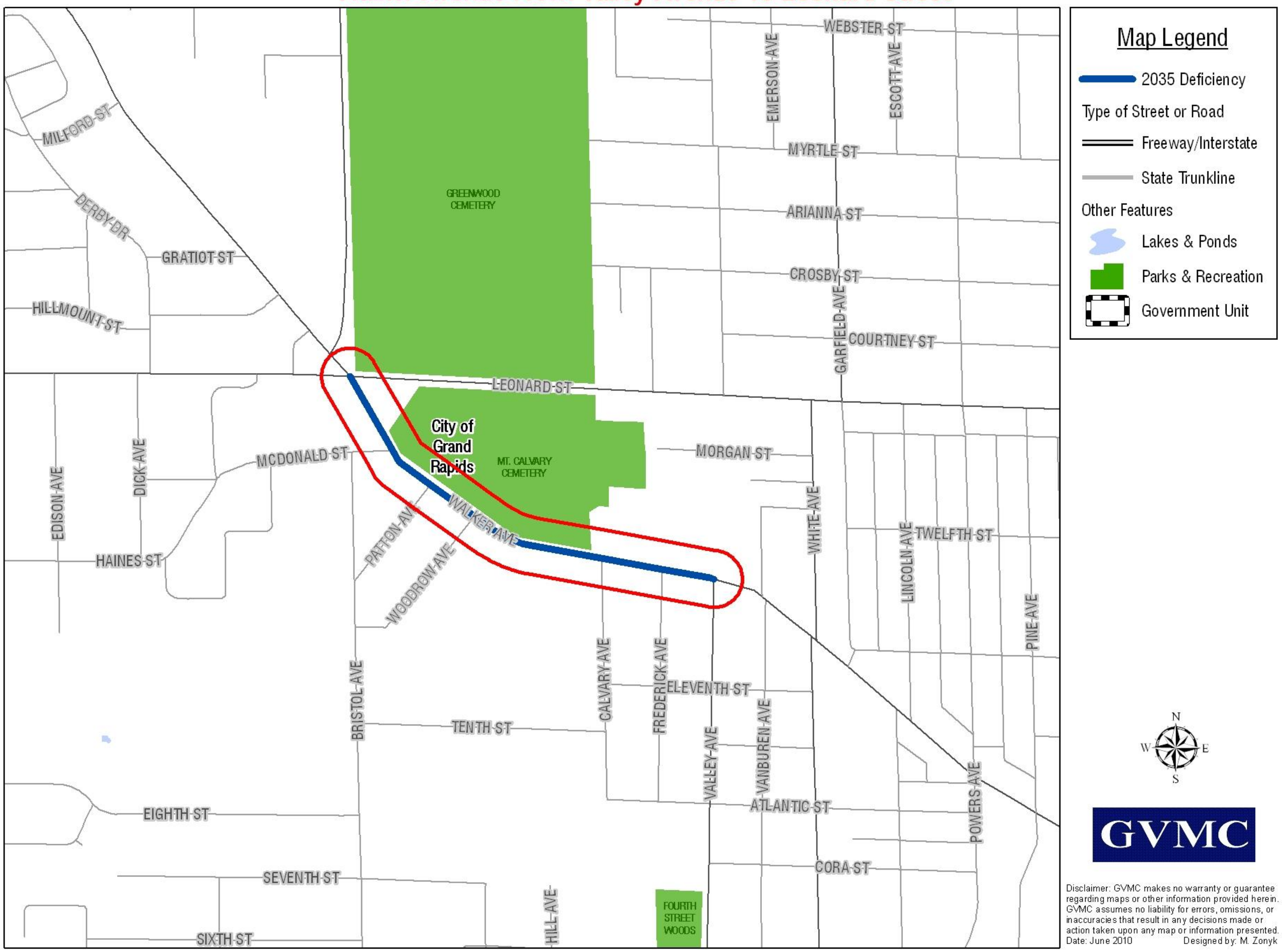
CMP Analysis

Stocking Avenue serves as a secondary north/south route on the west side of the City of Grand Rapids. The primary land use is localized retail and commercial. The facility is currently operating at its designed capacity as a 2 lane roadway. Future projections show demand for this corridor will moderately rise by 2035. Transit service is available and additional capacity should be explored. The primary consideration should be given to reconfiguring the cross section to provide a continuous center turn lane. This will accommodate the additional demand in the future but will provide added safety by separating through traffic from turning vehicles.

***Preferred Alternative*: Reconfigure within Existing ROW to 3 lanes - Enhance Transit Capacity**

Deficiency Resolved? Yes.

Walker Avenue From Valley Avenue To Leonard Street



Walker Avenue – Valley Avenue to Leonard Street

Jurisdiction: City of Grand Rapids

NFC: Urban Minor Arterial

Length: 0.44 miles Lanes: 2

Current ADT: 10,600 Current Capacity: 12,000

Proj. 2035 ADT: 13,500 Projected V/C: 1.13

Phase Deficient: Deficient by 2035

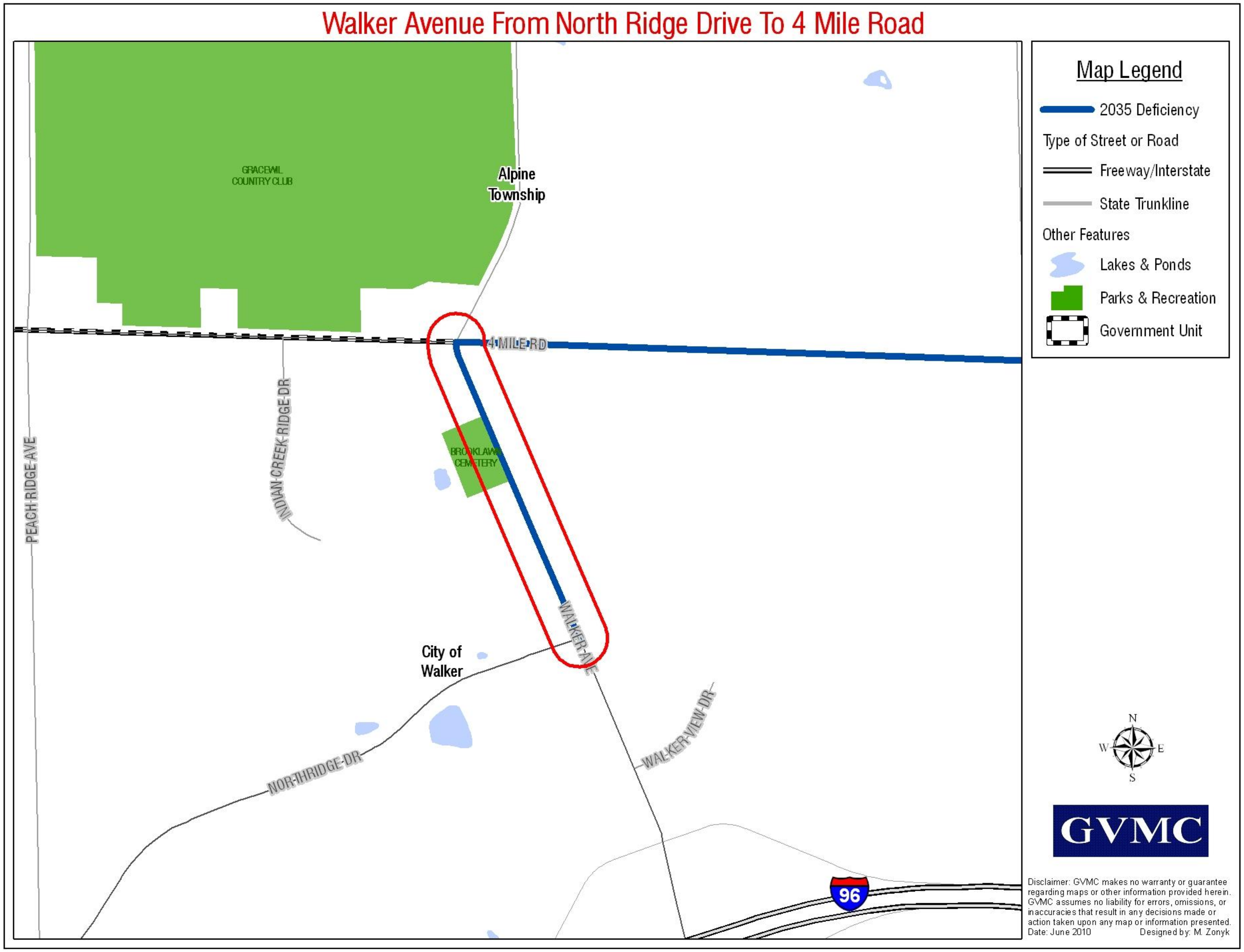
Transit Available: No Freight Route: No

CMP Analysis

Walker Avenue on the City of Grand Rapids' west side serves as a secondary north/south route as an extension of Stocking Avenue to the south. The primary land use is residential with a large cemetery making up a large portion of this section. There is sufficient space to accommodate a third continuous lane to accommodate left turn traffic and thus increase the capacity enough to handle future demand.

Preferred Alternative**: Reconfigure within Existing ROW to 3 lanes**

Deficiency Resolved? Yes.


Walker Avenue From North Ridge Drive To 4 Mile Road
GRACEWIL COUNTRY CLUB
Alpine Township
4 MILE RD
PEACH RIDGE AVE
INDIAN CREEK RIDGE DR
BROOKLAWN CEMETERY
WALKER AVE
City of Walker
WALKER VIEW DR
NORTHRIDGE DR
96
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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S
GVMC
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Date: June 2010
Designed by: M. Zonyk

Walker Avenue – North Ridge Drive to 4 Mile Road

Jurisdiction: City of Walker

NFC: Urban Minor Arterial

Length: 0.32 miles Lanes: 2

Current ADT: 11,436 Current Capacity: 13,200

Proj. 2035 ADT: 17,900 Projected V/C: 1.36

Phase Deficient: Deficient by 2025

Transit Available: No Freight Route: No

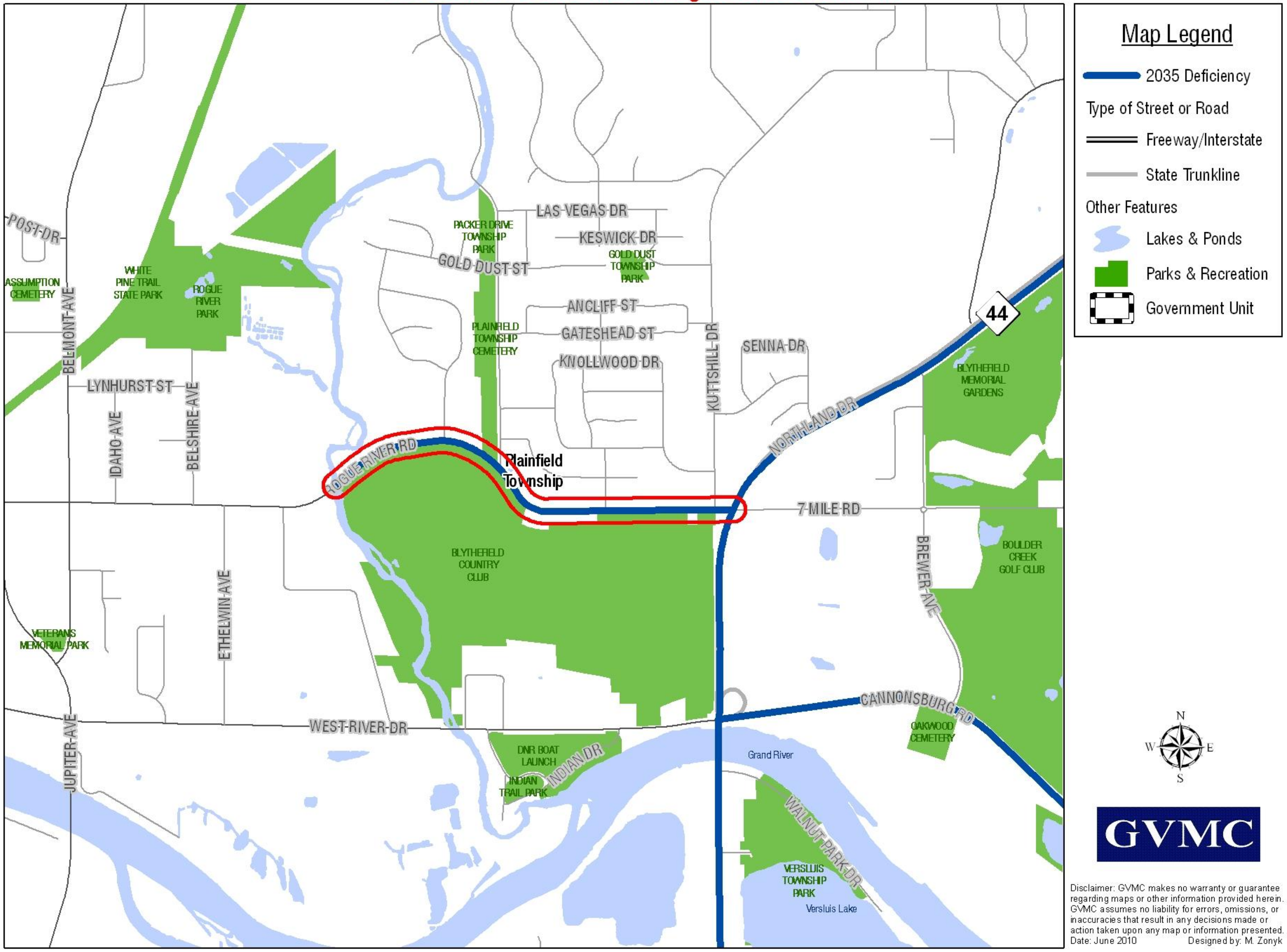
CMP Analysis

Walker Avenue on the north side of the City of Walker serves as a primary route from Alpine Township to the freeway system via I-96. A large mixed use development is planned for the land adjacent to this facility. The projections include demand created by this development. With proper land use planning and site access principles, a continuous center turn lane should be sufficient to handle the future demand. As you can see by the picture above this facility was recently improved. Any improvements should wait as long as possible to allow for the pavement condition to merit replacement.

***Preferred Alternative*: Reconstruct and Add Center Turn lane (2-3)**

Deficiency Resolved? Yes.

West River Drive From Rogue River To M-44



West River Drive – The Rogue River to M-44

Jurisdiction: KCRC/Plainfield Twp.

NFC: Urban Minor Arterial

Length: 0.75 miles Lanes: 4

Current ADT: 16,855 Current Capacity: 26,400

Proj. 2035 ADT: 19,500 Projected V/C: 0.74

Phase Deficient: Not Deficient by 2035

Transit Available: No Freight Route: No

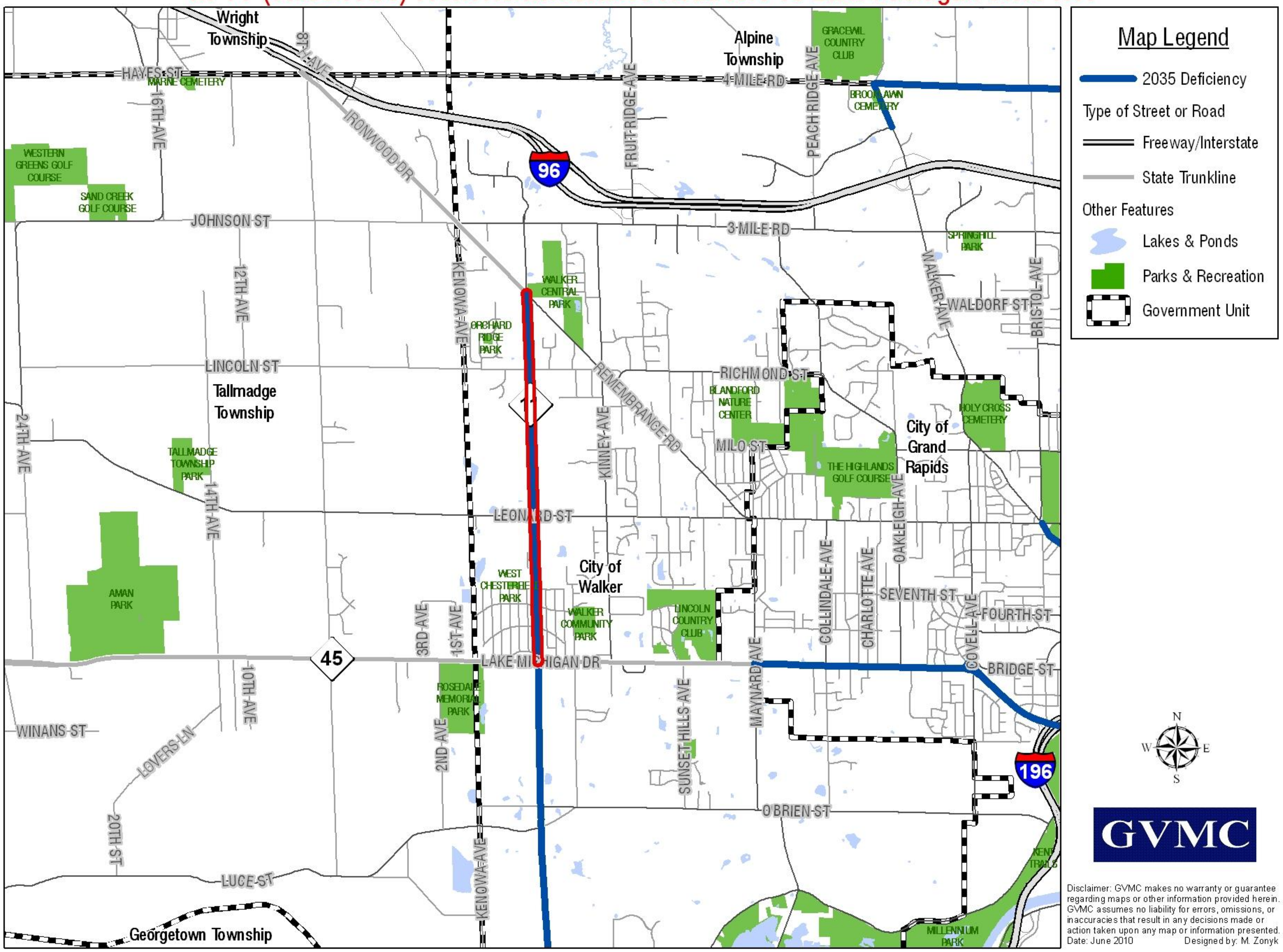
<u>CMP Analysis</u>

West River Drive on the north side of the Grand River in Plainfield Township serves as a primary east/west corridor. The current demand and future projections do not show demand over the current design capacity. However, the KCRC has secured funding to reconstruct and add a center turn lane in FY 2011 so this facility is listed in the CMP.

***Preferred Alternative*: Reconstruct and Add Center Turn lane (4-5)**

Deficiency Resolved? Not Deficient.

M-11 (Wilson Ave) From Remembrance Road NW To Lake Michigan Drive NW



Disclaimer: GVMC makes no warranty or guarantee regarding maps or other information provided herein. GVMC assumes no liability for errors, omissions, or inaccuracies that result in any decisions made or action taken upon any map or information presented.
Date: June 2010 Designed by: M. Zonyk

M-11 – (Wilson Avenue) – Remembrance to Lake Michigan Dr.

Jurisdiction: MDOT/City of Walker

NFC: Urban Minor Arterial

Length: 2.54 miles Lanes: 2

Current ADT: 16,000 Current Capacity: 13,600

Proj. 2035 ADT: 19,000 Projected V/C: 1.39

Phase Deficient: Currently Deficient

Transit Available: Partial Freight Route: Yes

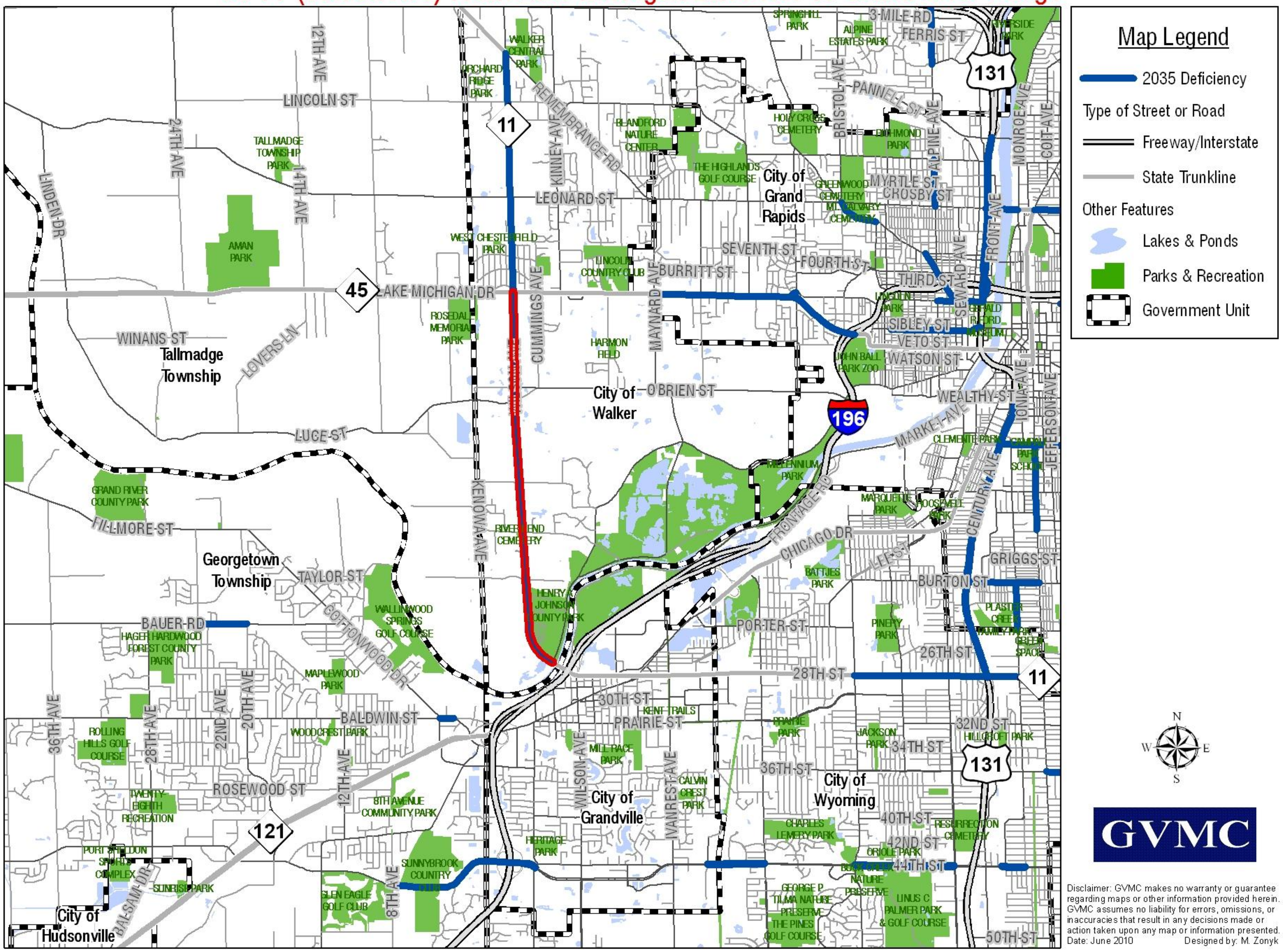
CMP Analysis

M-11 serves as the "West Beltline" for the urban area. Connecting I-96 from the north to the urban populations in the City of Walker, this facility serves as an important link in the network. The predominant land use is rural residential with small pockets of commercial and a school. A corridor based planning effort should be undertaken to determine the best solution for this facility.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-11 (Wilson Ave) From Lake Michigan Drive NW To Grand River Bridge



M-11 – (Wilson Avenue) – Lake Michigan Dr. to the Grand River

Jurisdiction: MDOT/City of Walker

NFC: Urban Principal Arterial

Length: 4.19 miles Lanes: 2

Current ADT: 21,275 Current Capacity: 13,600

Proj. 2035 ADT: 27,146 Projected V/C: 2.00

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

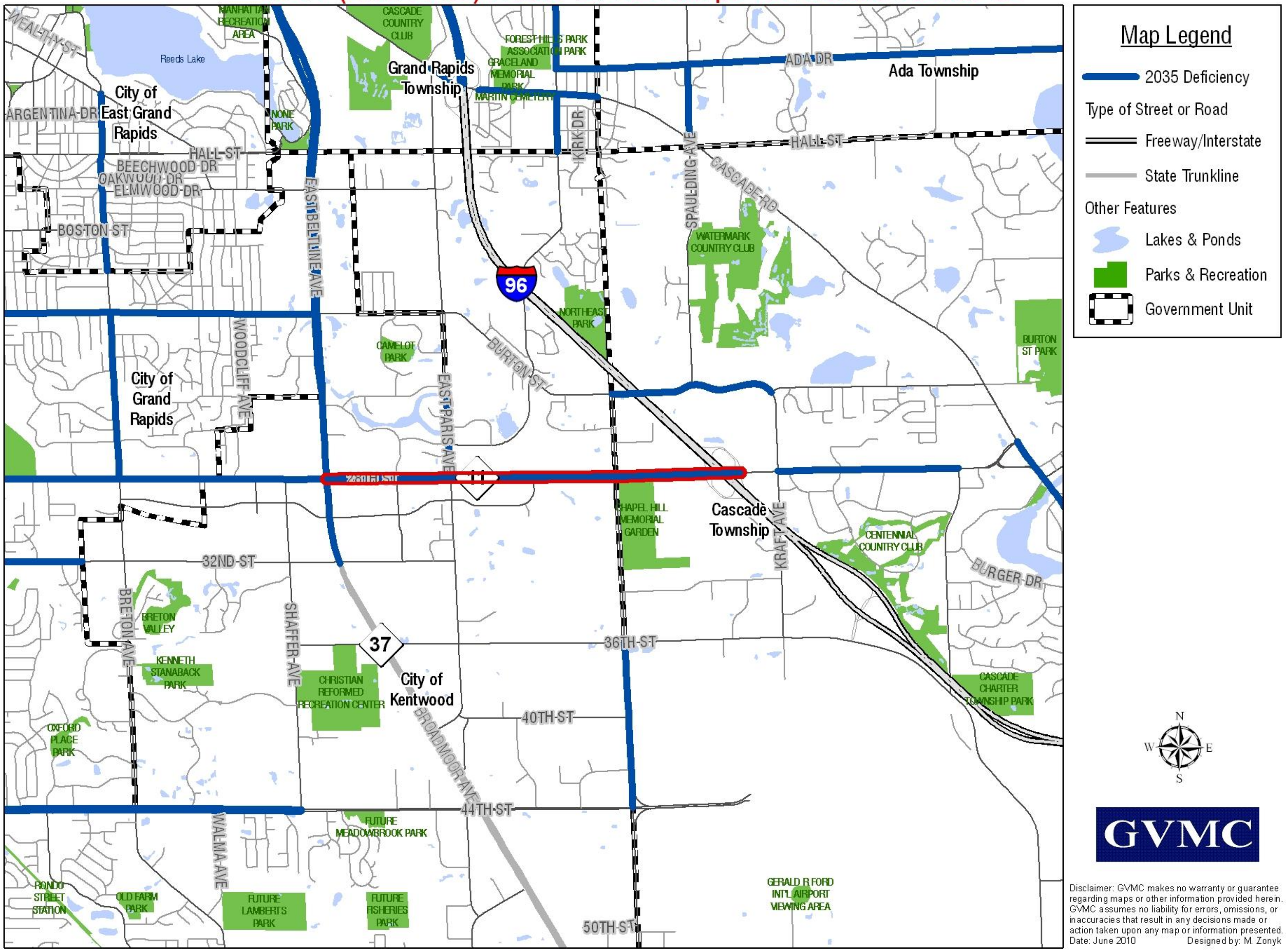
CMP Analysis

M-11 serves as the "West Beltline" for the urban area. Connecting I-196 from the south to the urban populations in the City of Walker, this facility serves as an important link in the network. The predominant land use is rural residential with small pockets of commercial and a school. A corridor based planning effort should be undertaken to determine the best solution for this facility.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-11 (28th Street) From I-96 WB Ramps To E Beltline Avenue SE



M-11 – (28th Street) – I-96 to East Beltline Avenue

Jurisdiction: MDOT/City of Kentwood/Cascade Twp.

NFC: Urban Principal Arterial

Length: 2.51 miles   Lanes: 5

Current ADT: 33,416   Current Capacity: 34,800

Proj. 2035 ADT: 37,600   Projected V/C: 1.08

Phase Deficient: Borderline Deficient by 2035

Transit Available: Yes   Freight Route: Yes

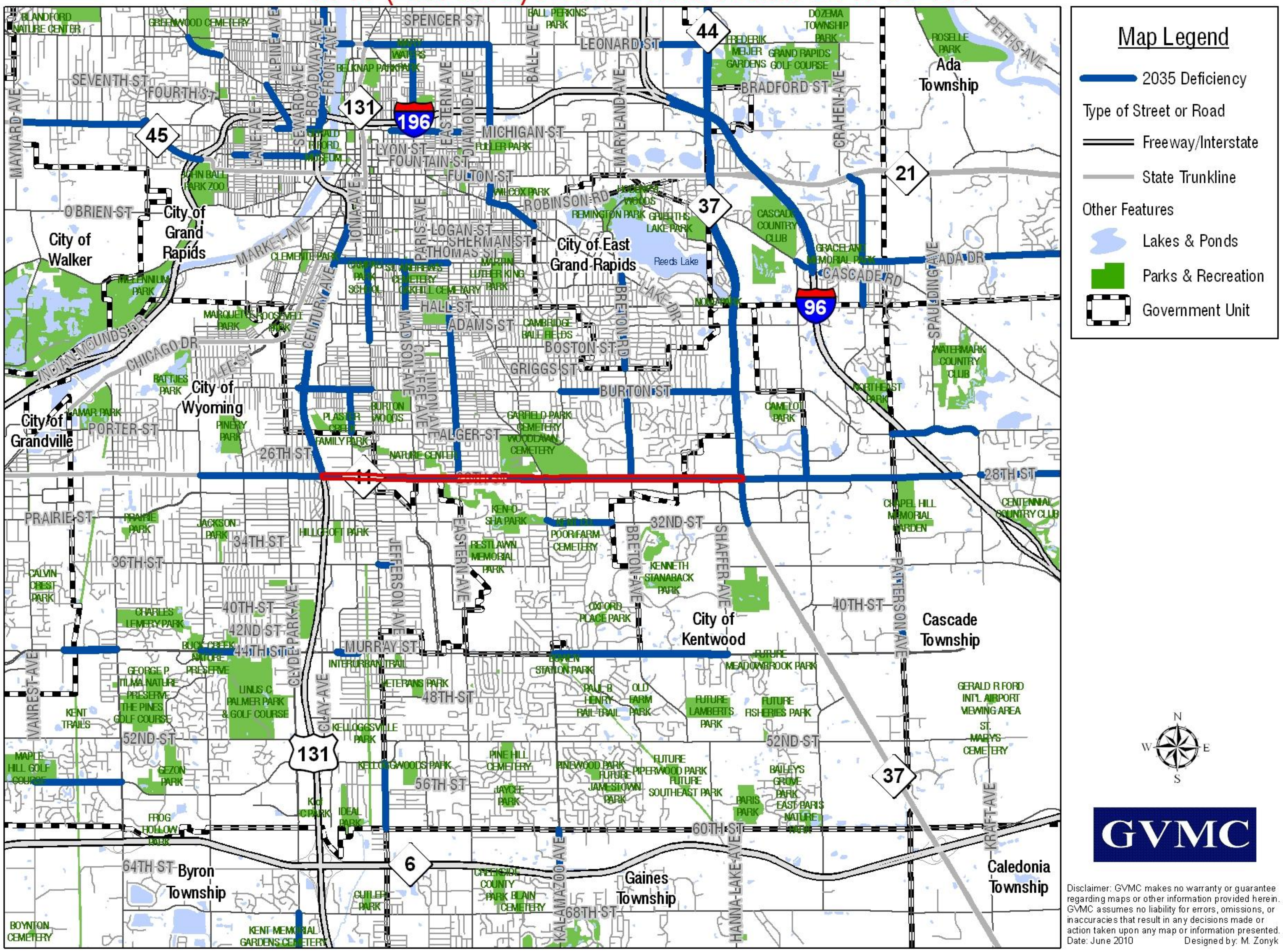
<u>CMP Analysis</u>

M-11 (28th Street) once served as the "south beltline" for the region. As growth in the area populated the southern reaches of the county and travel patterns changed, the "beltline" function of this corridor was transformed into a region center for retail/commercial activity. For decades 28th Street was the center of this activity for the metro area. There was discussion regarding converting the corridor to a 6 lane boulevard in the early 1990's. The lack of funding for right of way and negative impact on the local businesses delayed the construction. As development elsewhere (Grandville and Alpine) in the region occurred the importance of this corridor as the center of retail activity in the region waned. While there still remains traffic volumes near capacity in this corridor, the commitment for making capacity improvements to this corridor has weakened.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-11 (28th Street) From E Beltline Avenue SE To US-131



M-11 – (28th Street) – East Beltline Avenue to US-131

Jurisdiction: MDOT/City of Kentwood/ Grand Rapids

NFC: Urban Principal Arterial

Length: 5.24 miles		Lanes: 5

Current ADT: 31,735		Current Capacity: 34,800

Proj. 2035 ADT: 38,700		Projected V/C: 1.11

Phase Deficient: Deficient by 2035

Transit Available: Yes		Freight Route: Yes

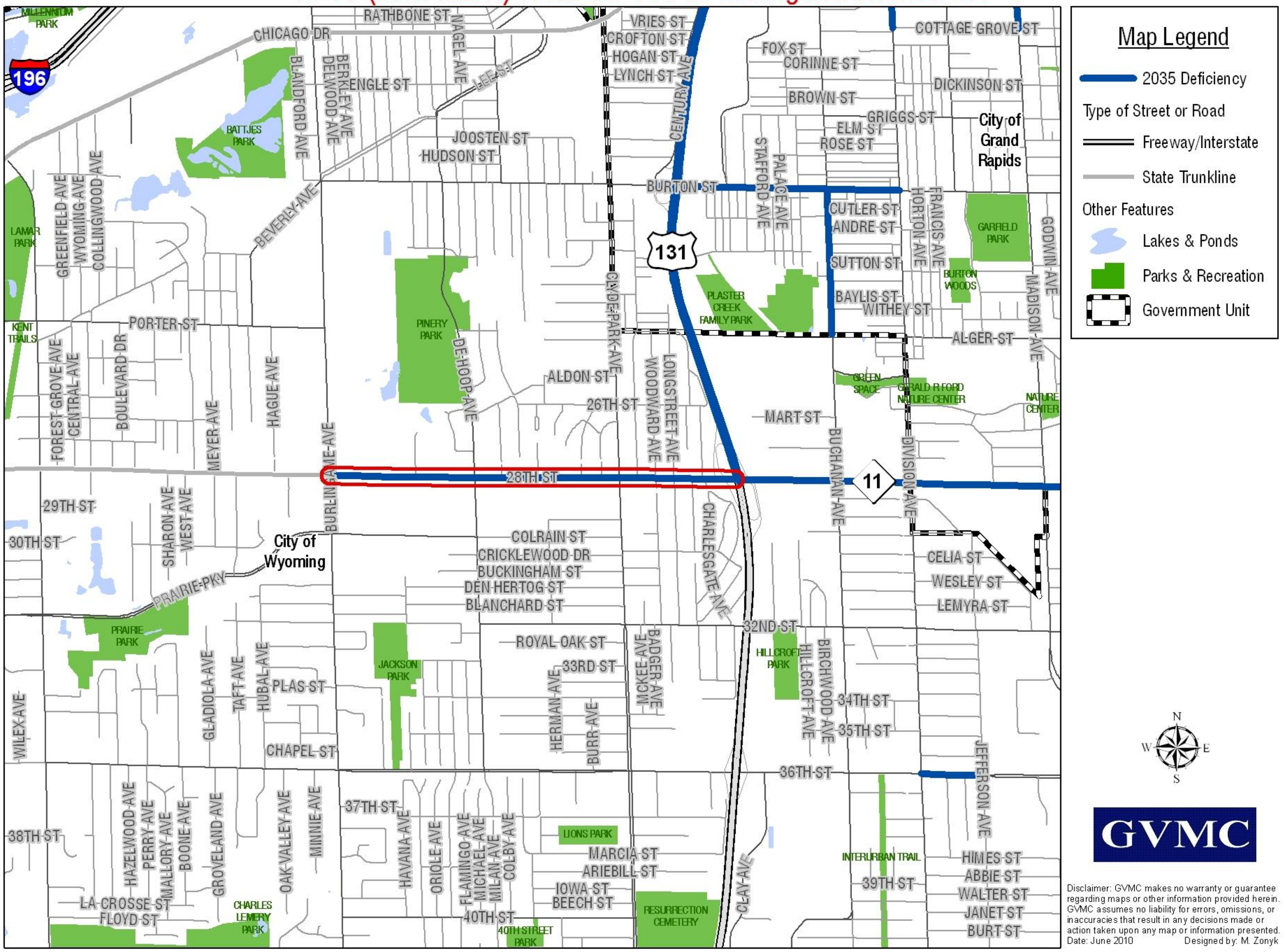
CMP Analysis

M-11 (28th Street) once served as the "south beltline" for the region. As growth in the area populated the southern reaches of the county and travel patterns changed, the "beltline" function of this corridor was transformed into a region center for retail/commercial activity. For decades 28th Street was the center of this activity for the metro area. There was discussion regarding converting the corridor to a 6 lane boulevard in the early 1990's. The lack of funding for right of way and negative impact on the local businesses delayed the construction. As development elsewhere (Grandville and Alpine) in the region occurred the importance of this corridor as the center of retail activity in the region waned. While there still remains traffic volumes near capacity in this corridor, the commitment for making capacity improvements to this corridor has weakened.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-11 (28th Street) From US-131 To Burlingame Avenue SW



M-11 – (28th Street) – US-131 to Burlingame Avenue

Jurisdiction: MDOT/City of Grand Rapids/ Wyoming

NFC: Urban Principal Arterial

Length: 1.41 miles	Lanes: 5
Current ADT: 30,100	Current Capacity: 34,800
Proj. 2035 ADT: 36,143	Projected V/C: 1.04

Phase Deficient: Borderline Deficient by 2035

Transit Available: Yes	Freight Route: Yes

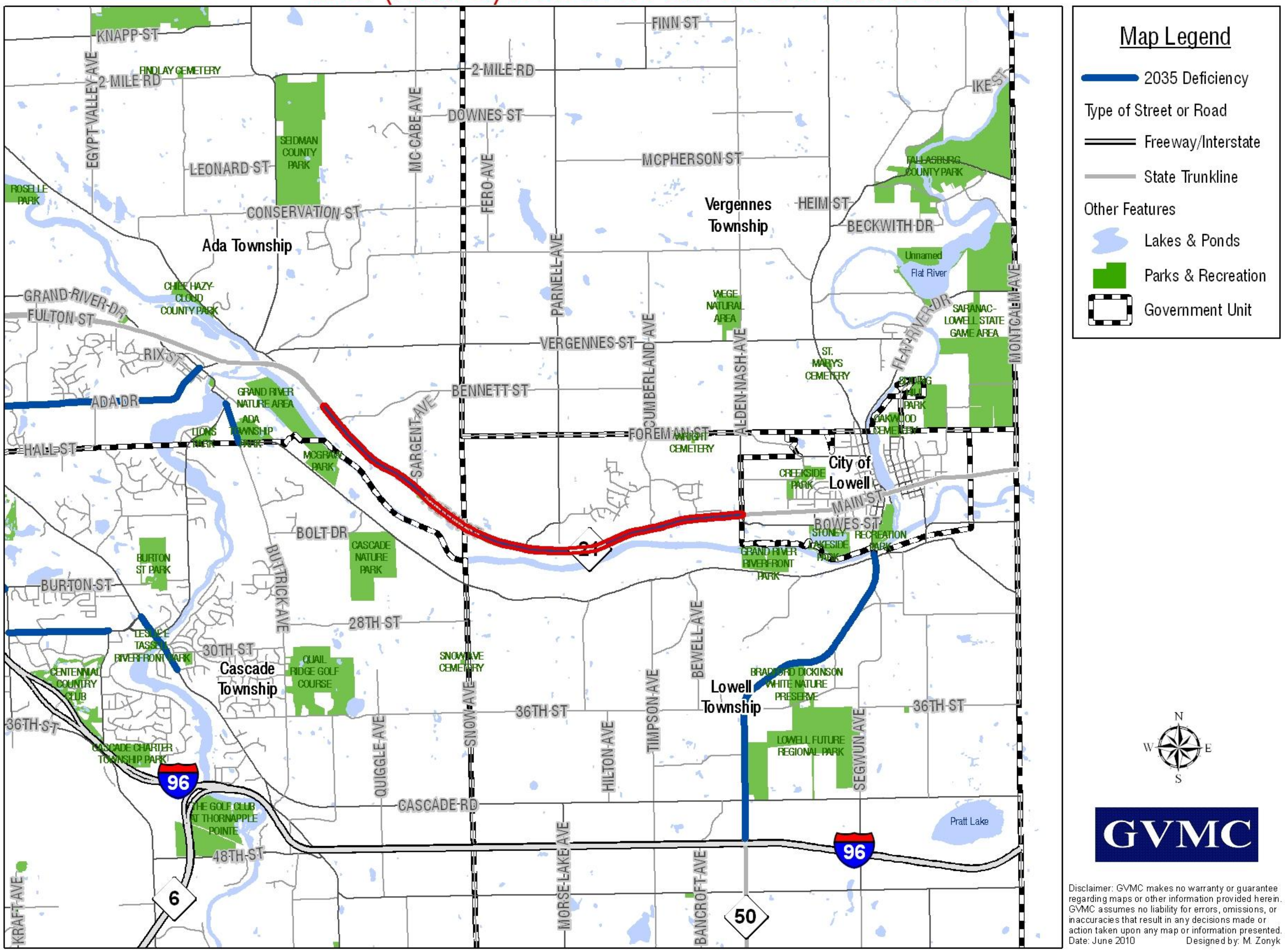
<u>CMP Analysis</u>

M-11 (28th Street) once served as the "south beltline" for the region. As growth in the area populated the southern reaches of the county and travel patterns changed, the "beltline" function of this corridor was transformed into a region center for retail/commercial activity. For decades 28th Street was the center of this activity for the metro area. There was discussion regarding converting the corridor to a 6 lane boulevard in the early 1990's. The lack of funding for right of way and negative impact on the local businesses delayed the construction. As development elsewhere (Grandville and Alpine) in the region occurred the importance of this corridor as the center of retail activity in the region waned. While there still remains traffic volumes near capacity in this corridor, the commitment for making capacity improvements to this corridor has weakened.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-21 (Fulton St) From SE of Pettis To Alden Nash Avenue



M-21 – (Fulton St) – SE of Pettis Avenue to Alden Nash Avenue

Jurisdiction: MDOT/Ada Twp

NFC: Urban Minor Arterial

Length: 5.28 miles	Lanes: 2
Current ADT: 12,373	Current Capacity: 13,600
Proj. 2035 ADT: 15,000	Projected V/C: 1.10

Phase Deficient: Deficient by 2025

Transit Available: No	Freight Route: Yes

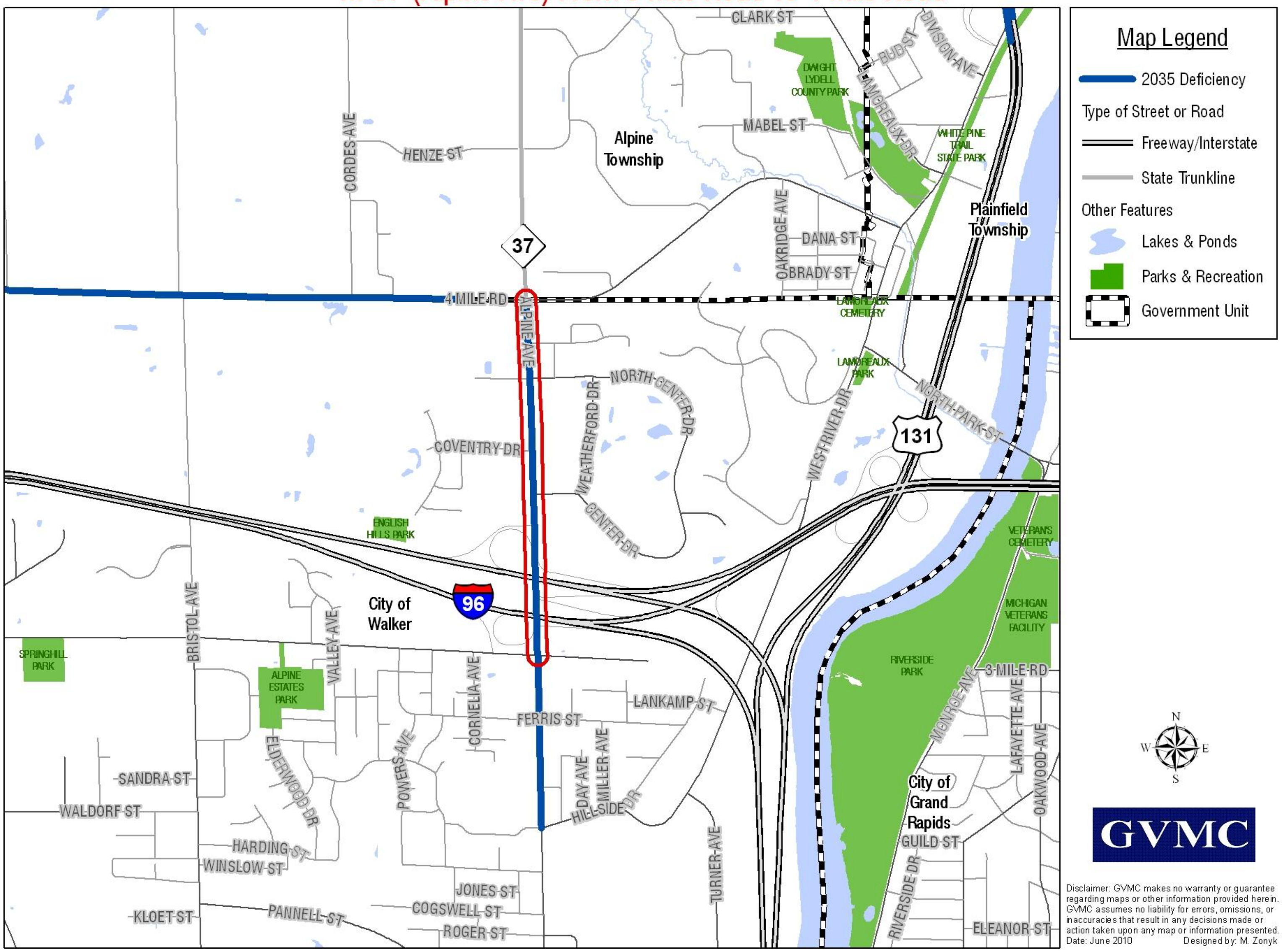
CMP Analysis

M-21 (Fulton Street) serves as the primary access to the City of Lowell to the core urban area. The primary land use is rural residential. While a great amount of development is not expected within the corridor, growth in Lowell and adjacent areas will continue to be a source of demand on the facility. Good access management planning and further study will be necessary to determine a logical solution.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-37 (Alpine Ave) From 3 Mile Road To 4 Mile Road



M-37 – (Alpine Ave) – 3 Mile Road to 4 Mile Road

Jurisdiction: MDOT/City of Walker

NFC: Urban Principal Arterial

Length: 1.03 miles Lanes: 6

Current ADT: 50,346 Current Capacity: 42,300

Proj. 2035 ADT: 53,200 Projected V/C: 1.26

Phase Deficient: Currently Deficient

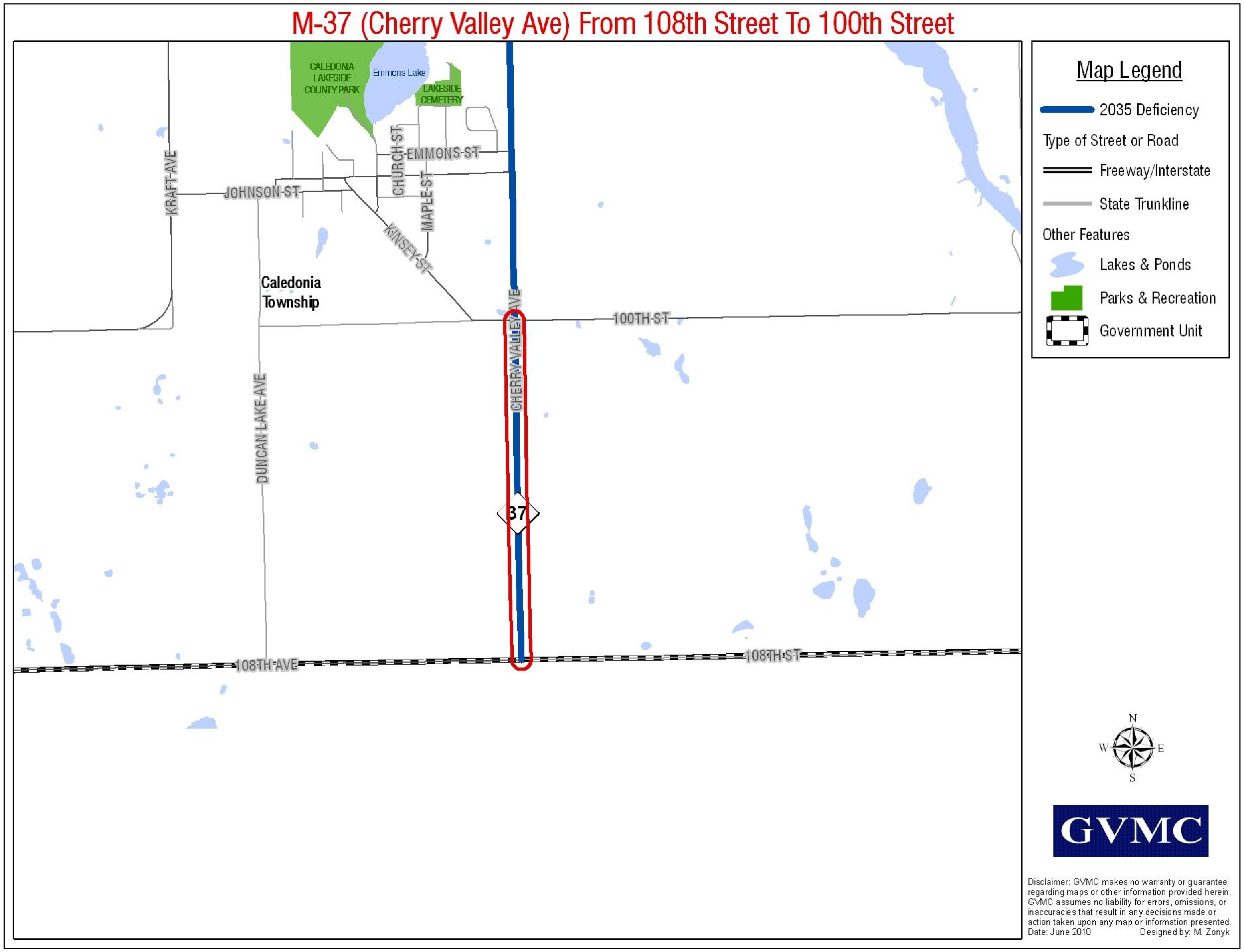
Transit Available: Yes Freight Route: Yes

CMP Analysis

For many M-37 (Alpine Ave) has become "the new 28th Street". Unfortunately, the connotations are not meant to be taken in a positive light. Alpine Avenue represents a classic example of land use dictating transportation. In the late 1980's the land use included a golf course and a few small retail establishments and the 2 lane facility that served the area was sufficient. In a few short years several big box developments were built on the land that was once a low traffic generating land use. The growth in this corridor was allowed to happen so rapidly and without regard for the transportation facility serving it, that delays now experienced along this segment are some of the highest in the region. Additionally, the options for fixing the deficiency are now extremely costly as the sole remaining options involve costly addition of capacity and/or a new bypass for through trips.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD


M-37 (Cherry Valley Ave) From 108th Street To 100th Street
CALEDONIA LAKESIDE COUNTY PARK
Emmons Lake
LAKESIDE CEMETERY
EMMONS-ST
CHURCH-ST
JOHNSON-ST
MAPLE-ST
KRAFT-AVE
KINSEY-ST
Caledonia Township
100TH-ST
CHERRY-VALLEY-AVE
DUNCAN-LAKE-AVE
37
108TH-AVE
108TH-ST
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
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Date: June 2010
Designed by: M. Zonyk

M-37 – (Cherry Valley Ave) – 108th Street to 100th Street

Jurisdiction: MDOT/Caledonia Twp.

NFC: Rural Minor Arterial

Length: 1.00 miles	Lanes: 2
Current ADT: 13,361	Current Capacity: 12,000
Proj. 2035 ADT: 16,142	Projected V/C: 1.35

Phase Deficient: Currently Deficient

Transit Available: No	Freight Route: Yes

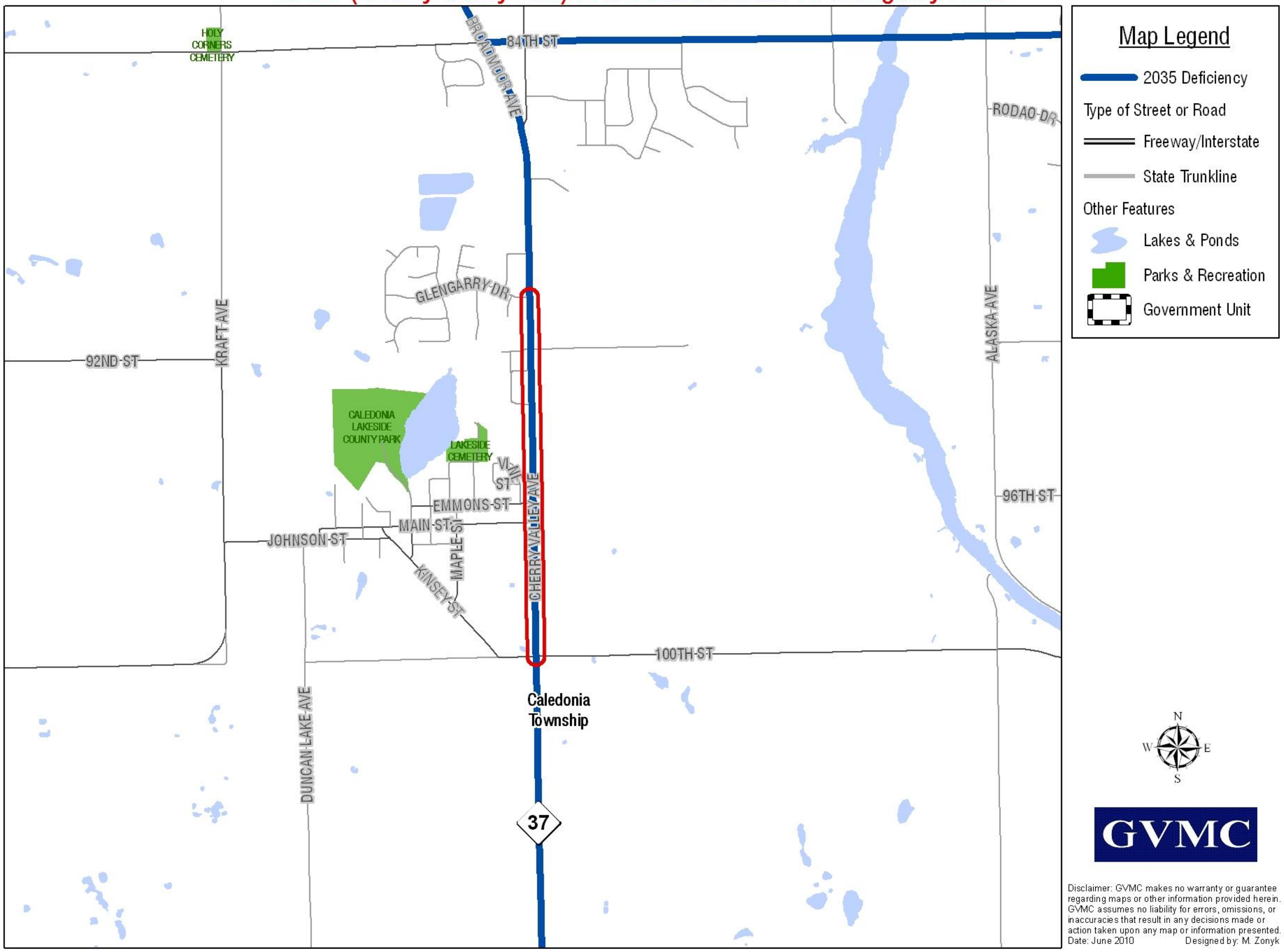
CMP Analysis

M-37 (Cherry Valley Ave) serves as the primary access from rural locations south of Kent County to the urban area. Recent growth in these areas has increased the demand on this facility and that growth is expected to continue.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-37 (Cherry Valley Ave) From 100th Street To Glengarry Drive



M-37 – (Cherry Valley Ave) – 100th Street to Glengarry Drive

Jurisdiction: MDOT/Caledonia Twp.

NFC: Rural Minor Arterial

Length: 1.17 miles	Lanes: 3
Current ADT: 15,225	Current Capacity: 18,000
Proj. 2035 ADT: 15,700	Projected V/C: 0.87

Phase Deficient: Borderline Deficient by 2035

Transit Available: No	Freight Route: Yes

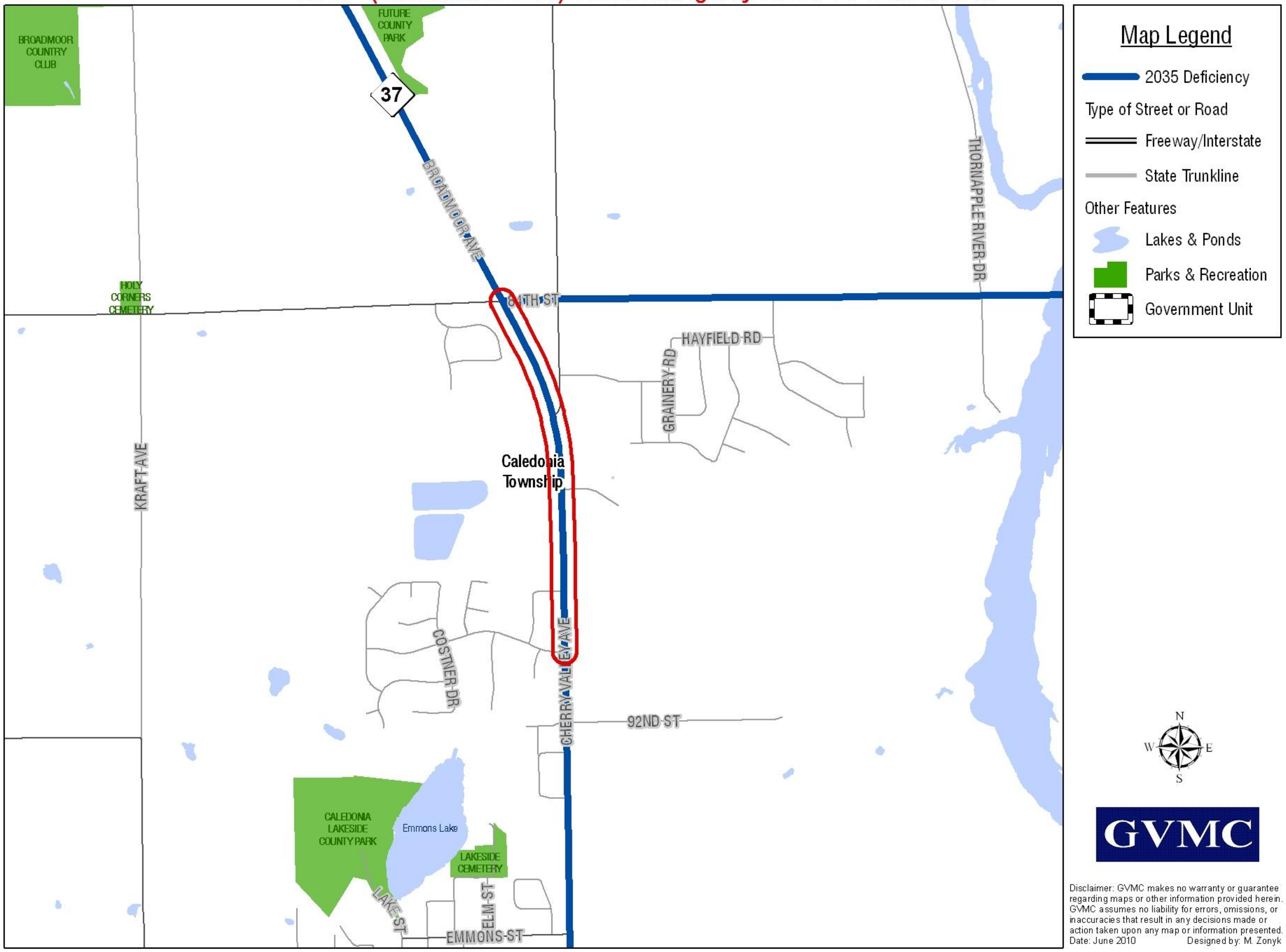
CMP Analysis

M-37 (Cherry Valley Ave) serves as the primary access from rural locations south of Kent County to the urban area. Recent growth in these areas has increased the demand on this facility and that growth is expected to continue. The growth for this section of M-37 is not expected to exceed its designed capacity. However, access management planning should continue along this corridor.

***Preferred Alternative*: Monitoring and Access Management Planning**

Deficiency Resolved? TBD

M-37 (Broadmoor Ave) From Glengarry Drive To 84th Street



M-37 – (Broadmoor Ave) – Glengarry Avenue to 84th Street

Jurisdiction: MDOT/Caledonia Twp.

NFC: Rural Minor Arterial

Length: 0.86 miles   Lanes: 2

Current ADT: 13,429   Current Capacity: 13,200

Proj. 2035 ADT: 15,555   Projected V/C: 1.18

Phase Deficient: Currently Deficient

Transit Available: No   Freight Route: Yes

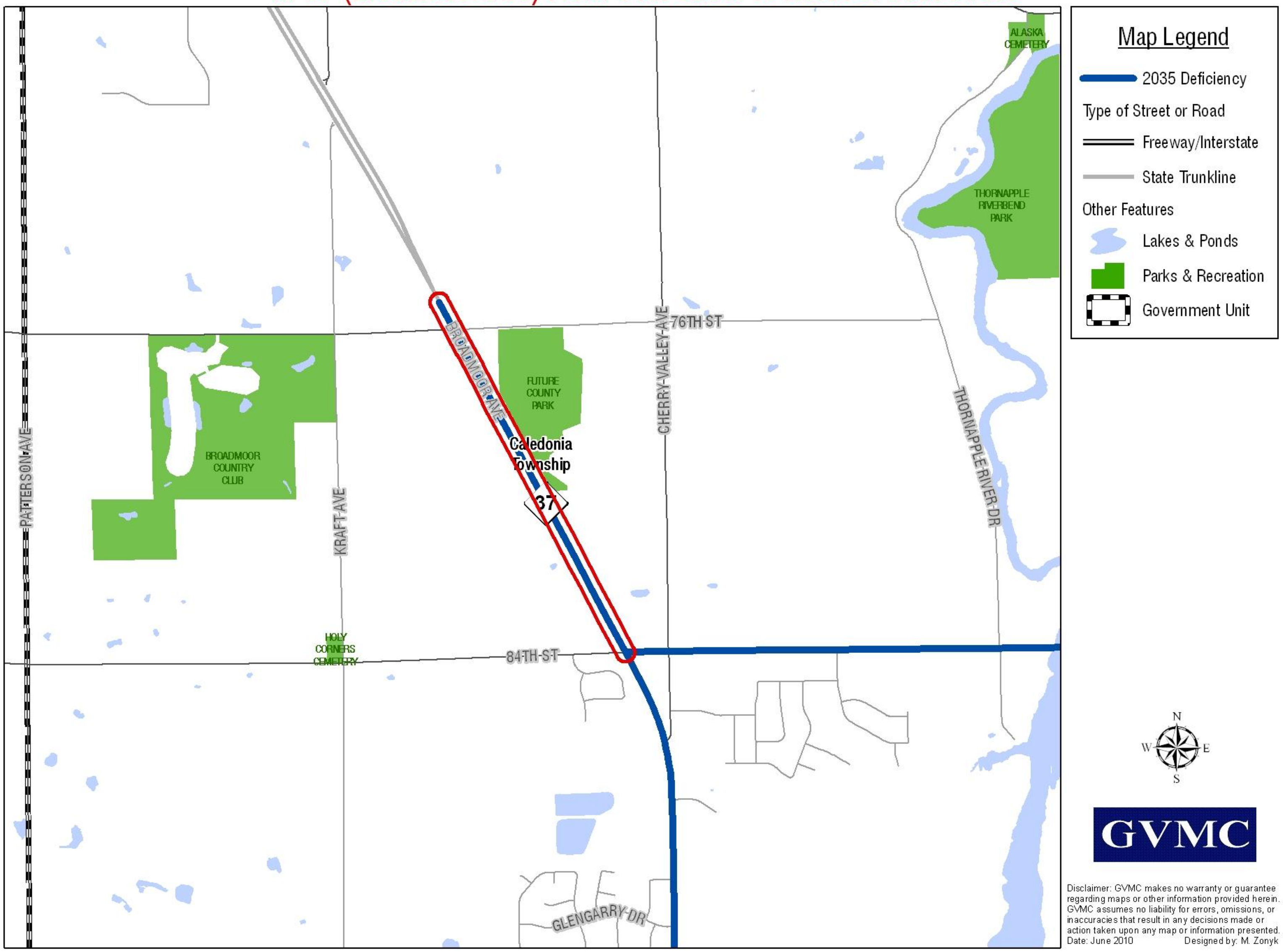
<u>CMP Analysis</u>

M-37 (Broadmoor Ave) serves as the primary access from the growing area near Caledonia to the urban area. . Recent growth in these areas has increased the demand on this facility and that growth is expected to continue.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-37 (Broadmoor Ave) From 84th Street To North of 76th Street



M-37 – (Broadmoor Ave) – 84th Street to north of 76th Street

Jurisdiction: MDOT/Caledonia Twp.

NFC: Urban Minor Arterial

Length: 1.31 miles Lanes: 2

Current ADT: 17,788 Current Capacity: 13,200

Proj. 2035 ADT: 20,200 Projected V/C: 1.53

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

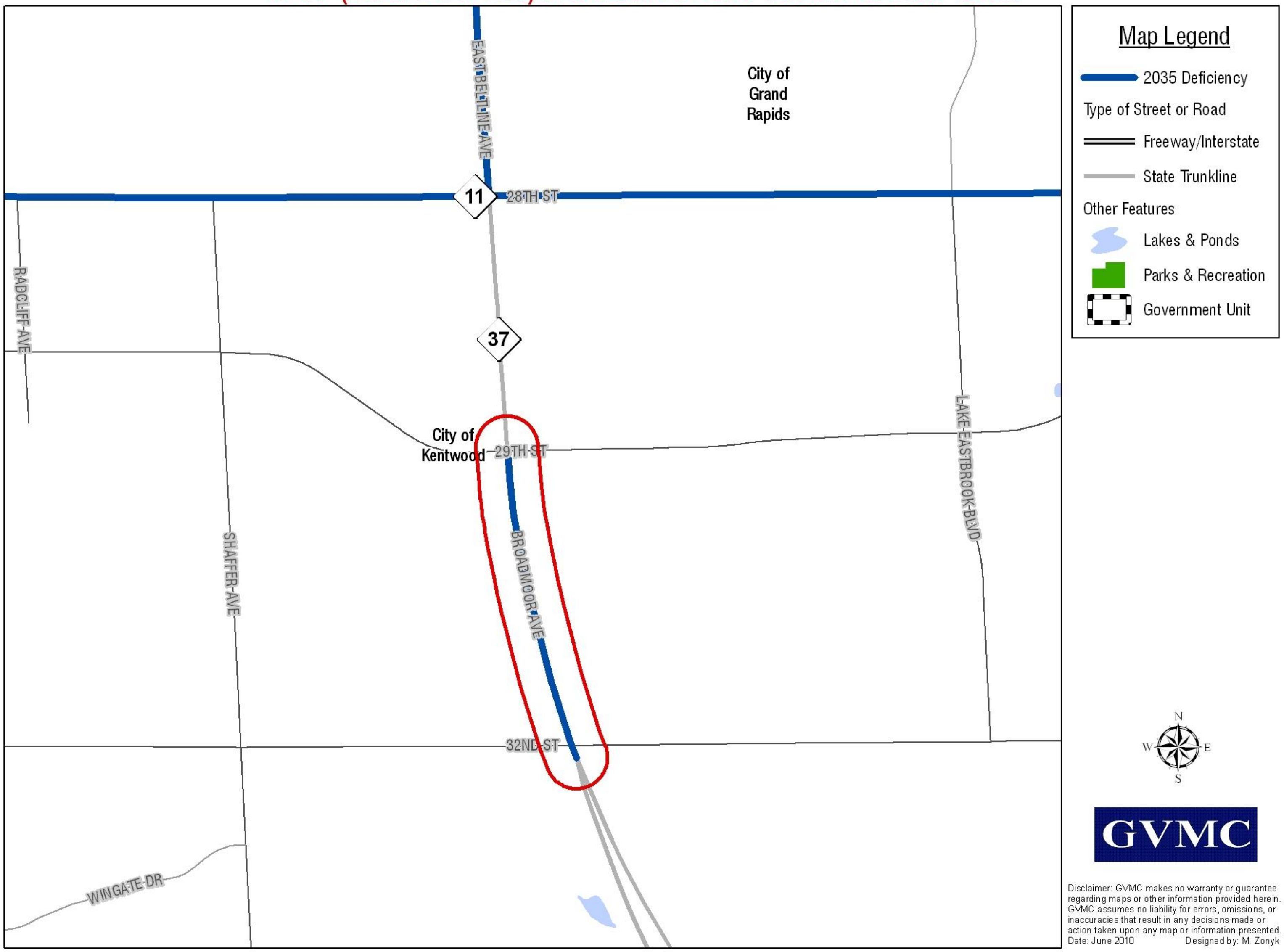
CMP Analysis

M-37 (Broadmoor Ave) serves as the primary access from the growing area near Caledonia to the urban area. . Recent growth in these areas has increased the demand on this facility and that growth is expected to continue.

***Preferred Alternative*: Further Study and Access Management Planning**

Deficiency Resolved? TBD

M-37 (Broadmoor Ave) From Start of Blvd Section To 29th Street



M-37 – (Broadmoor Ave) – Blvd to south of 29th Street

Jurisdiction: MDOT/Kentwood

NFC: Urban Principal Arterial

Length: 0.11 miles Lanes: 4

Current ADT: 28,230 Current Capacity: 26,400

Proj. 2035 ADT: 31,622 Projected V/C: 1.20

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

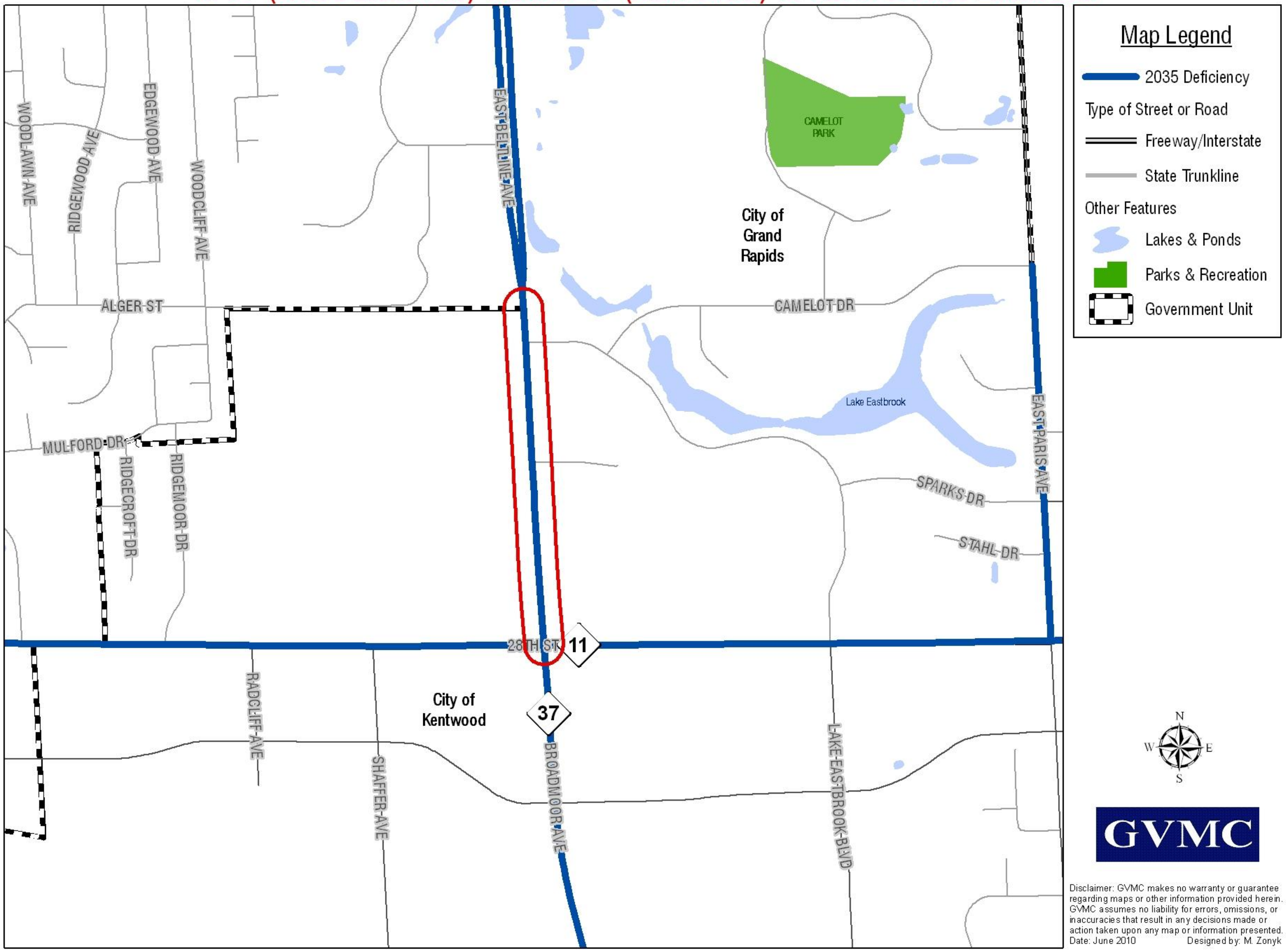
<u>CMP Analysis</u>

This section of M-37 (Broadmoor Ave) serves as a regional corridor on the southeastern side of Kent County. The primary land use in light industrial and commercial. The roadway to the north and south was upgraded a number of years ago to accommodate the increased demand. Unfortunately the segment under the railroad and 32nd Street bridges was omitted. To completely alleviate congestion in this section of the corridor this situation needs to be addressed.

***Preferred Alternative*: Further Study.**

Deficiency Resolved? TBD

M-37 (East Beltline Ave) From M-11 (28th Street) To North of Lake Eastbrook



M-37 – (East Beltline Ave) – M-11 to Lake Eastbrook Ave

Jurisdiction: MDOT/Kentwood

NFC: Urban Principal Arterial

Length: 0.48 miles	Lanes: 5

Current ADT: 35,400	Current Capacity: 34,800

Proj. 2035 ADT: 37,400	Projected V/C: 1.08

Phase Deficient: Currently Deficient

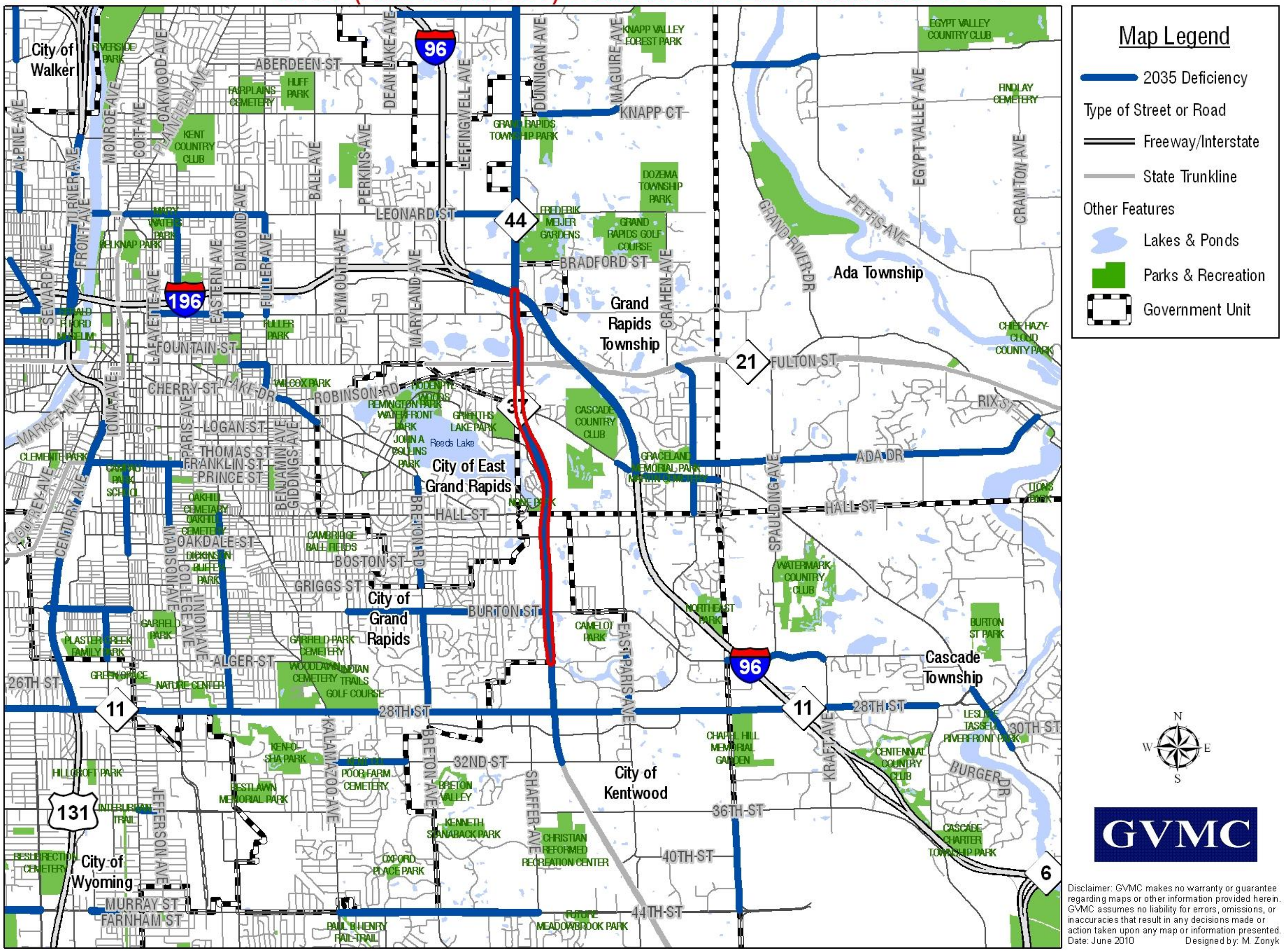
Transit Available: No	Freight Route: Yes

CMP Analysis
Providing continuous access from the north county line to the south, the East Beltline in eastern Kent County is aptly named. This facility serves as the primary north/south roadway for much of the region between I-96 to the east and US-131 to the west. This section of the beltline lies between two regional malls and a variety of retail outlots that generate a great deal of demand on the facility. The entire corridor should be given consideration for a large scale transit operation. A specialized route similar to the BRT being planned along the Division Avenue corridor may provide a high profile alternative to the SOV.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning Study**

Deficiency Resolved? TBD

M-37 (East Beltline Ave) From North of Lake Eastbrook To I-96



M-37 – (East Beltline Ave) – Lake Eastbrook Ave to I-96

Jurisdiction: MDOT/Grand Rapids/ GR Twp.

NFC: Urban Principal Arterial

Length: 3.89 miles Lanes: 4 blvd

Current ADT: 48,000 Current Capacity: 35,000

Proj. 2035 ADT: 48,810 Projected V/C: 1.39

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

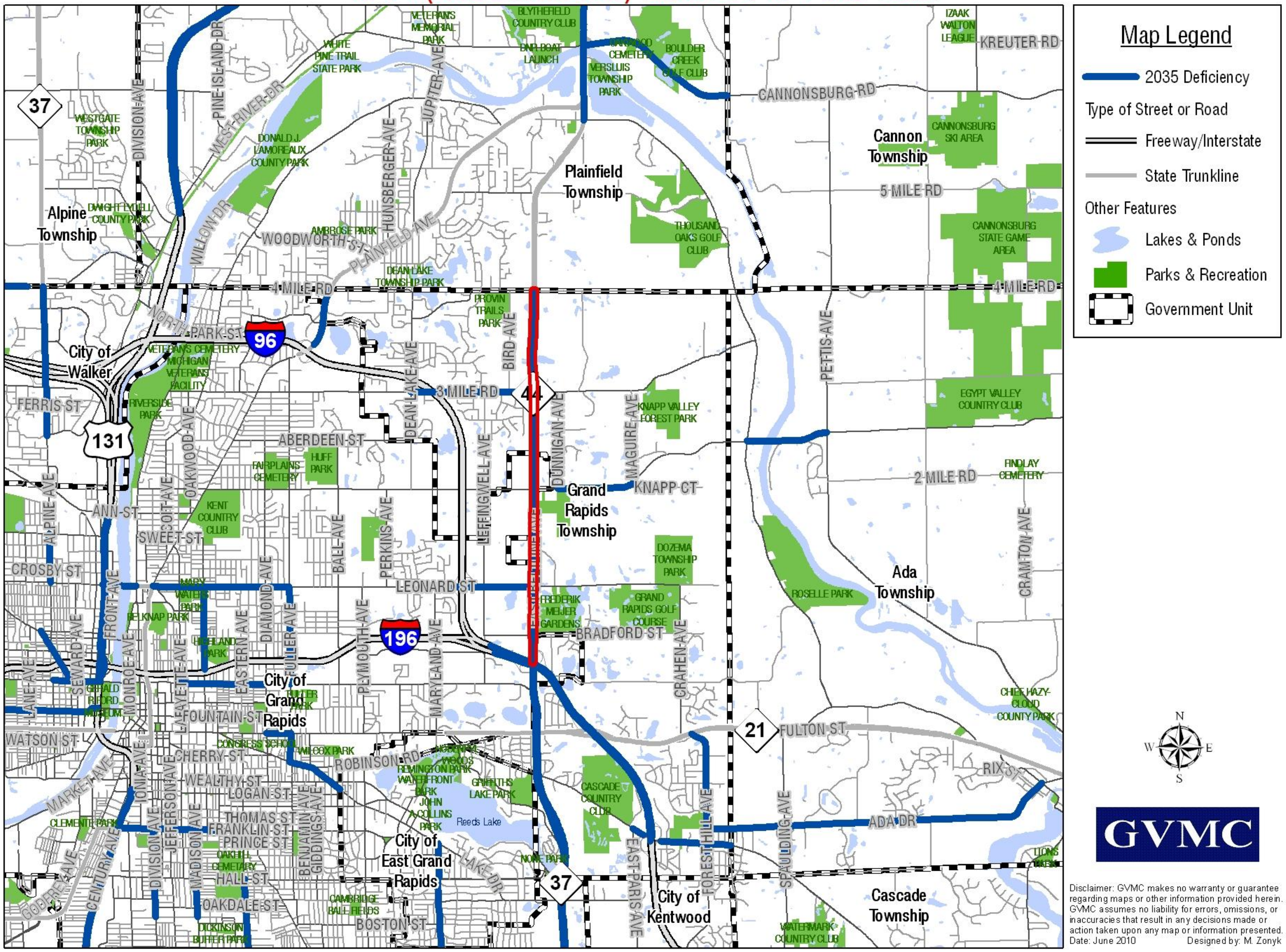
CMP Analysis

Providing continuous access from the north county line to the south, the East Beltline in eastern Kent County is aptly named. This facility serves as the primary north/south roadway for much of the region between I-96 to the east and US-131 to the west. The primary land use is office and low density residential. The Calvin College campus is prominent along this section as well. . The entire corridor should be given consideration for a large scale transit operation. A specialized route similar to the BRT being planned along the Division Avenue corridor may provide a high profile alternative to the SOV.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning Study**

Deficiency Resolved? TBD

M-44 (East Beltline Ave) From I-96 To 4 Mile Road



M-37 – (East Beltline Ave) – I-96 to 4 Mile Road

Jurisdiction: MDOT/Grand Rapids/ GR Twp.

NFC: Urban Principal Arterial

Length: 3.68 miles Lanes: 4 blvd

Current ADT: 46,300 Current Capacity: 35,000

Proj. 2035 ADT: 49,142 Projected V/C: 1.40

Phase Deficient: Currently Deficient

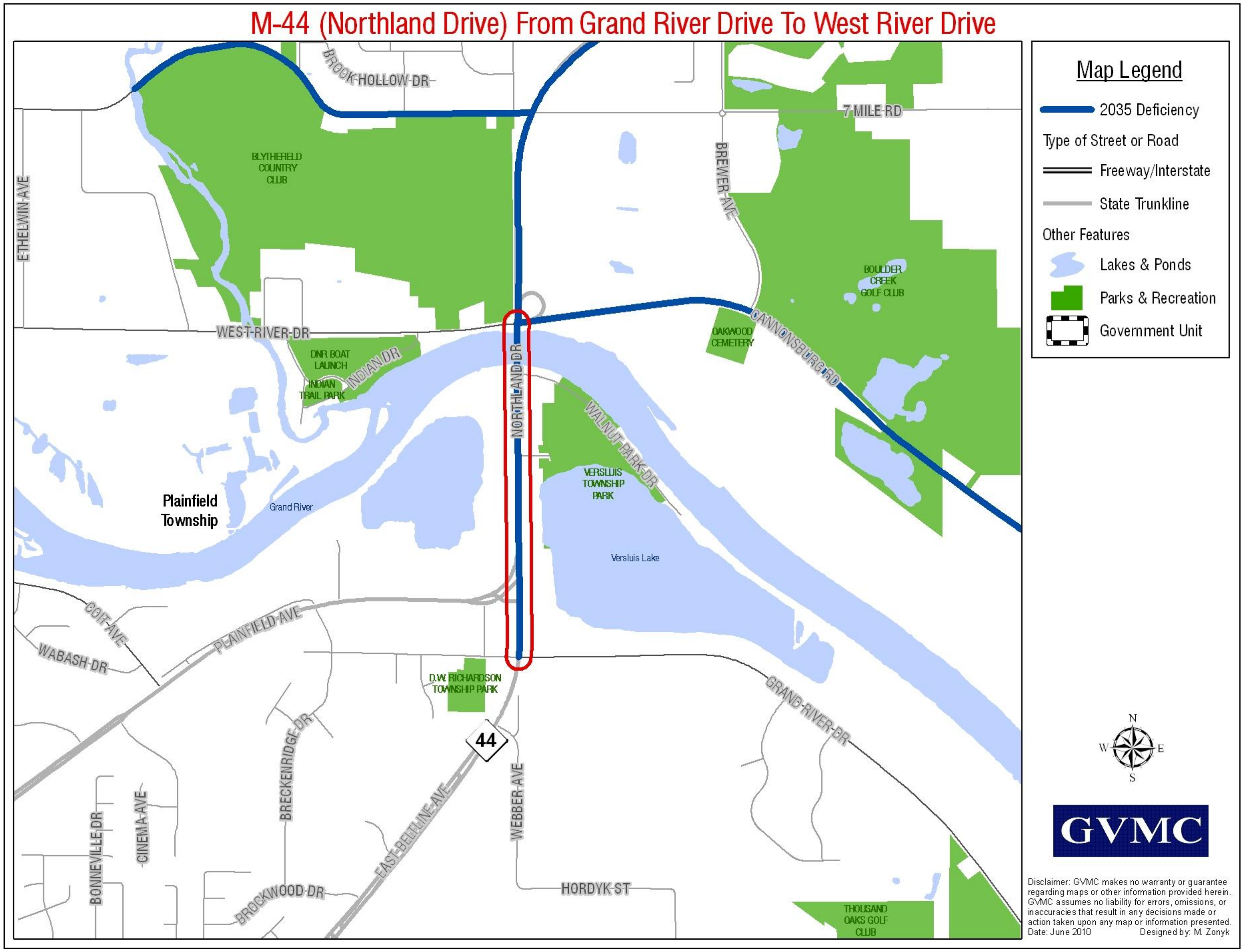
Transit Available: No Freight Route: Yes

CMP Analysis

Providing continuous access from the north county line to the south, the East Beltline in eastern Kent County is aptly named. This facility serves as the primary north/south roadway for much of the region between I-96 to the east and US-131 to the west. The primary land use is office and commercial/retail. The entire corridor should be given consideration for a large scale transit operation. A specialized route similar to the BRT being planned along the Division Avenue corridor may provide a high profile alternative to the SOV.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning Study**

Deficiency Resolved? TBD


M-44 (Northland Drive) From Grand River Drive To West River Drive
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
BROOK HOLLOW DR
7 MILE RD
BLYTHEFIELD COUNTRY CLUB
ETHELWIN AVE
BREWER AVE
BOULDER CREEK GOLF CLUB
WEST RIVER DR
OAKWOOD CEMETERY
CANNONSBURG RD
DNR BOAT LAUNCH
INDIAN DR
INDIAN TRAIL PARK
NORTHLAND DR
WALNUT PARK DR
VERSLUIS TOWNSHIP PARK
Plainfield Township
Grand River
Versluis Lake
GOLF AVE
PLAINFIELD AVE
WABASH DR
D.W. RICHARDSON TOWNSHIP PARK
GRAND RIVER DR
44
BRECKENRIDGE DR
EAST BELTLINE AVE
WEBBER AVE
CINEMA AVE
BONNEVILLE DR
HORDYK ST
BROCKWOOD DR
THOUSAND OAKS GOLF CLUB
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Date: June 2010
Designed by: M. Zonyk

M-44 – (Northland Drive) – Grand River Dr. to West River Dr.

Jurisdiction: MDOT/Plainfield Twp.

NFC: Urban Principal Arterial

Length: 0.77 miles Lanes: 5

Current ADT: 27,600 Current Capacity: 34,800

Proj. 2035 ADT: 33,170 Projected V/C: 0.95

Phase Deficient: Borderline Deficient by 2035

Transit Available: No Freight Route: Yes

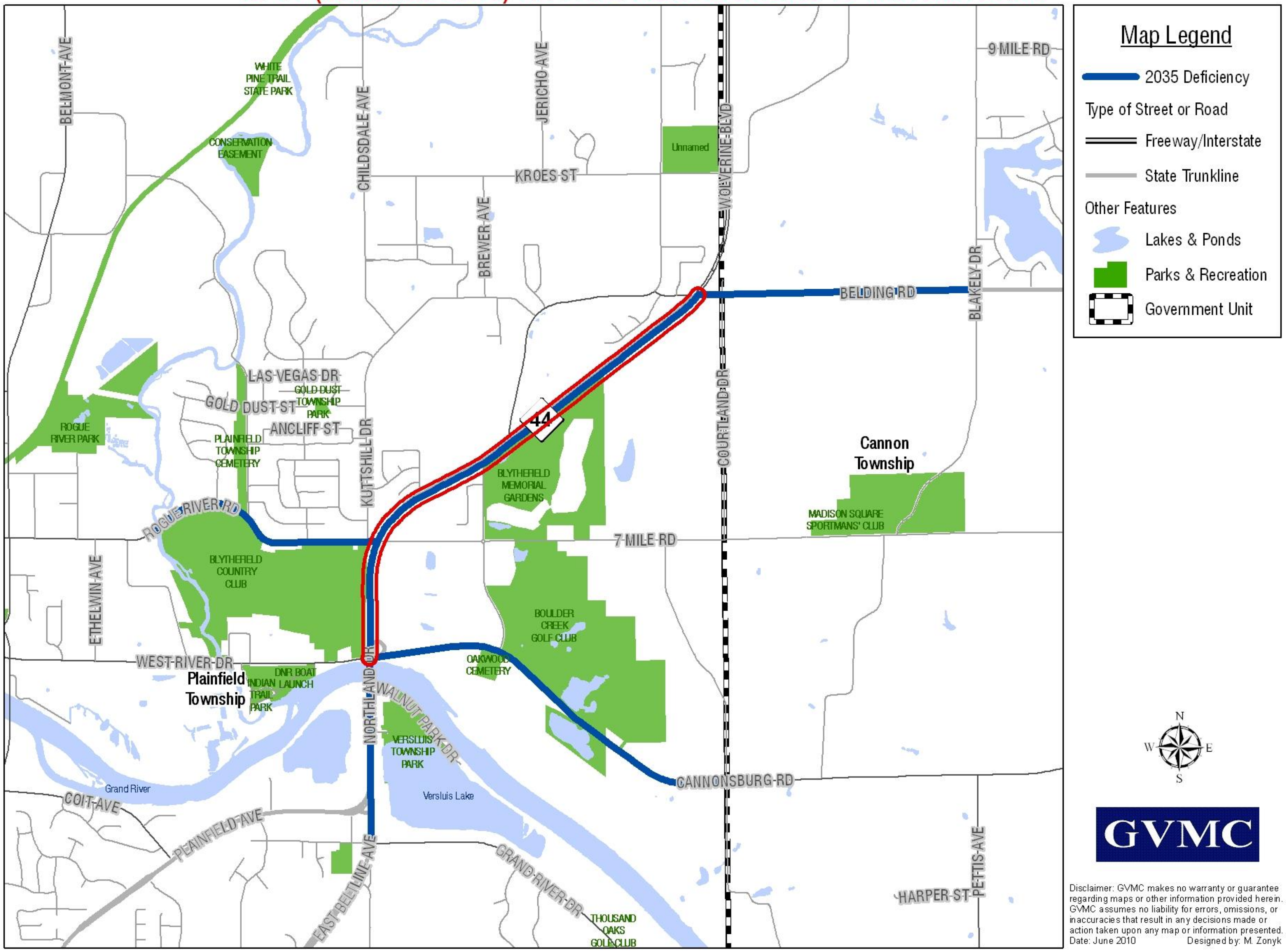
CMP Analysis

Providing continuous access from the north county line to the south, the East Beltline in eastern Kent County is aptly named. This facility serves as the primary north/south roadway for much of the region between I-96 to the east and US-131 to the west. The primary land use is commercial/retail. The entire orridor should be given consideration for a large scale transit operation. A specialized route similar to he BRT being planned along the Division Avenue corridor may provide a high profile alternative to the SOV.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning Study**

Deficiency Resolved? TBD

M-44 (Northland Drive) NB From West River Drive To Wolverinve Blvd



M-44 – (Northland Drive) – West River Drive to Wolverine Blvd

Jurisdiction: MDOT/Plainfield Twp.

NFC: Urban Principal Arterial

Length: 2.17 miles	Lanes: 4 blvd
Current ADT: 34,632	Current Capacity: 35,000
Proj. 2035 ADT: 37,625	Projected V/C: 1.08

Phase Deficient: Deficient by 2025

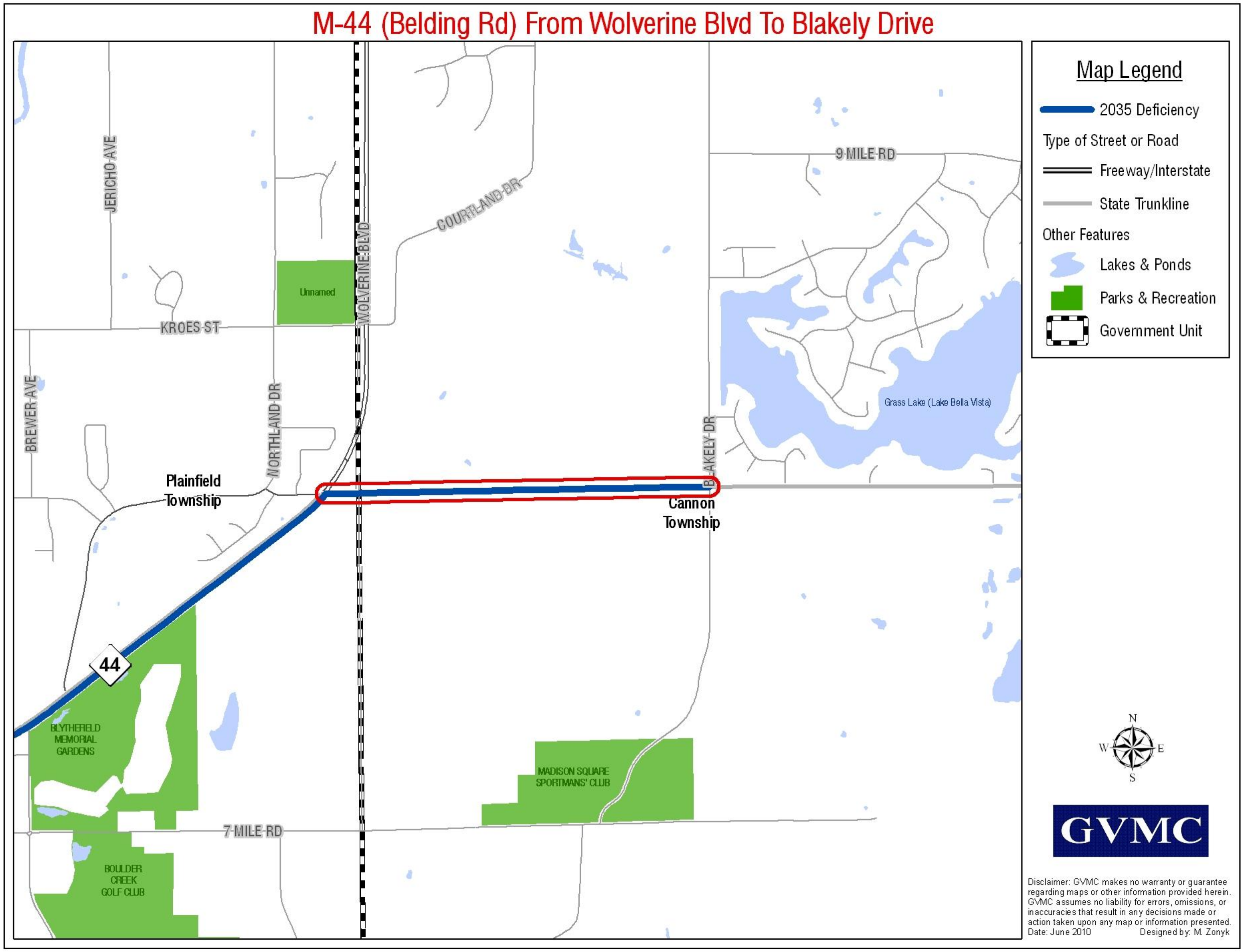
Transit Available: No	Freight Route: Yes

CMP Analysis

Providing continuous access from the north county line to the south, the East Beltline in eastern Kent County is aptly named. This facility serves as the primary north/south roadway for much of the region between I-96 to the east and US-131 to the west. The primary land use is rural residential. The entire corridor should be given consideration for a large scale transit operation.   A specialized route similar to he BRT being planned along the Division Avenue corridor may provide a high profile alternative to the SOV.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning Study**

Deficiency Resolved? TBD



M-44 (Belding Rd) From Wolverine Blvd To Blakely Drive
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
JERICHO AVE
KROES ST
BREWER AVE
NORTHLAND DR
WOLVERINE BLVD
COURTLAND DR
9 MILE RD
BLAKELY DR
7 MILE RD
Unnamed
Plainfield Township
Cannon Township
Grass Lake (Lake Bella Vista)
44
BLYTHEFIELD MEMORIAL GARDENS
MADISON SQUARE SPORTMANS' CLUB
BOULDER CREEK GOLF CLUB
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Date: June 2010
Designed by: M. Zonyk

M-44 – (Belding Road) – Wolverine Blvd to Blakely Drive

Jurisdiction: MDOT/Cannon Twp.

NFC: Urban Minor Arterial

Length: 1.17 miles Lanes: 2

Current ADT: 16,000 Current Capacity: 13,200

Proj. 2035 ADT: 17,275 Projected V/C: 1.31

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

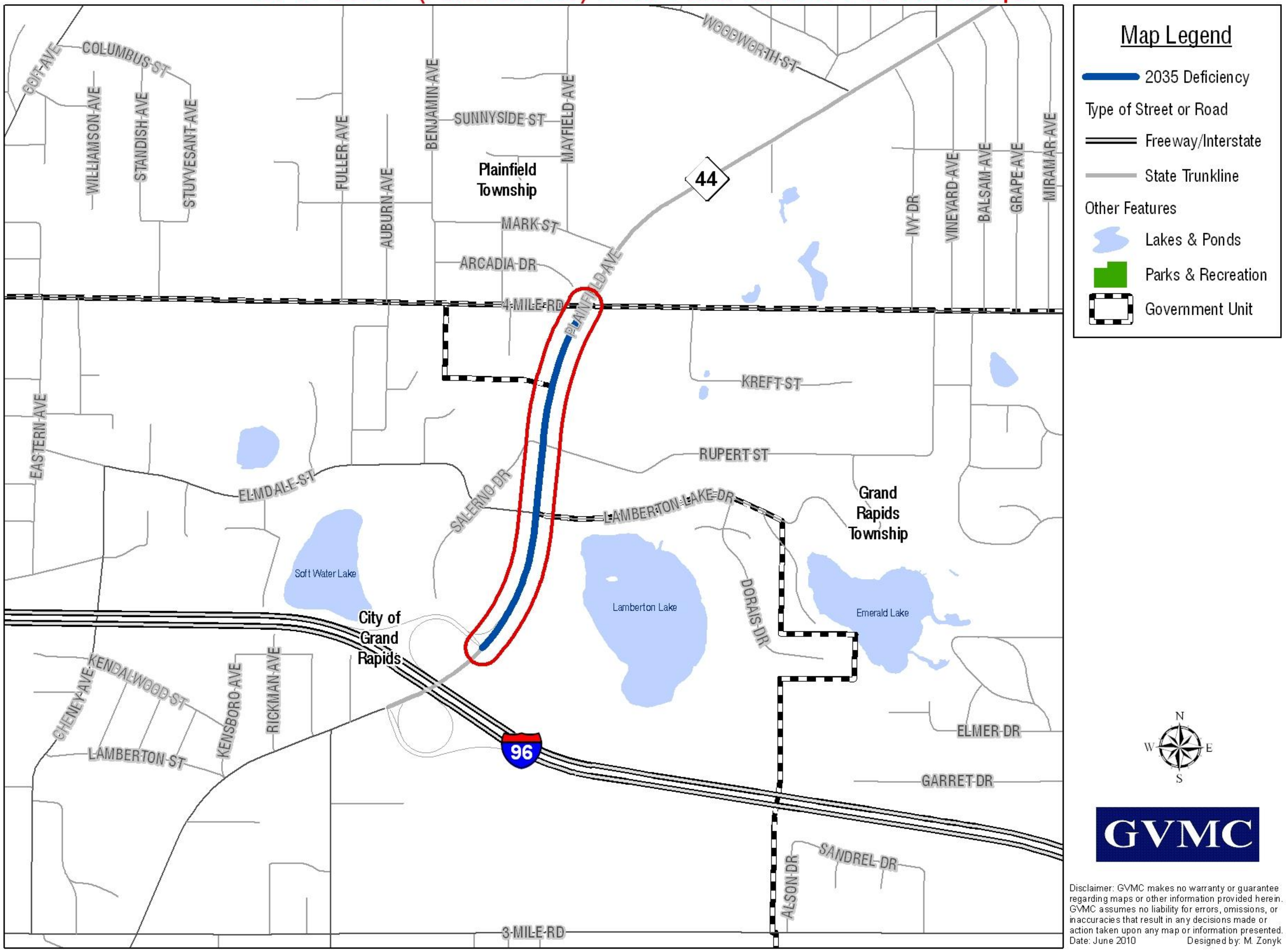
<u>CMP Analysis</u>

M-44 (Belding Rd) provides access to/from the urban area to rural communities in eastern Kent County and further. Belding and Greenville is readily accessible using this corridor. The many land uses along this corridor include commercial, retail, office and low density residential. Growth in this part of the region is expected to continue placing increasing demand along the corridor.

***Preferred Alternative*: Further Study – continue access management planning**

Deficiency Resolved? TBD

M-44 Conn - (Plainfield Ave) From 4 Mile Road To I-96 WB Ramps



M-44 Connector – (Plainfield Ave) –4 Mile Rd to I-96

Jurisdiction: MDOT/Plainfield Twp.

NFC: Urban Principal Arterial

Length: 2.40 miles	Lanes: 5
Current ADT: 36,500	Current Capacity: 34,800
Proj. 2035 ADT: 41,000	Projected V/C: 1.18

Phase Deficient: Currently Deficient

Transit Available: Partial Freight Route: Yes

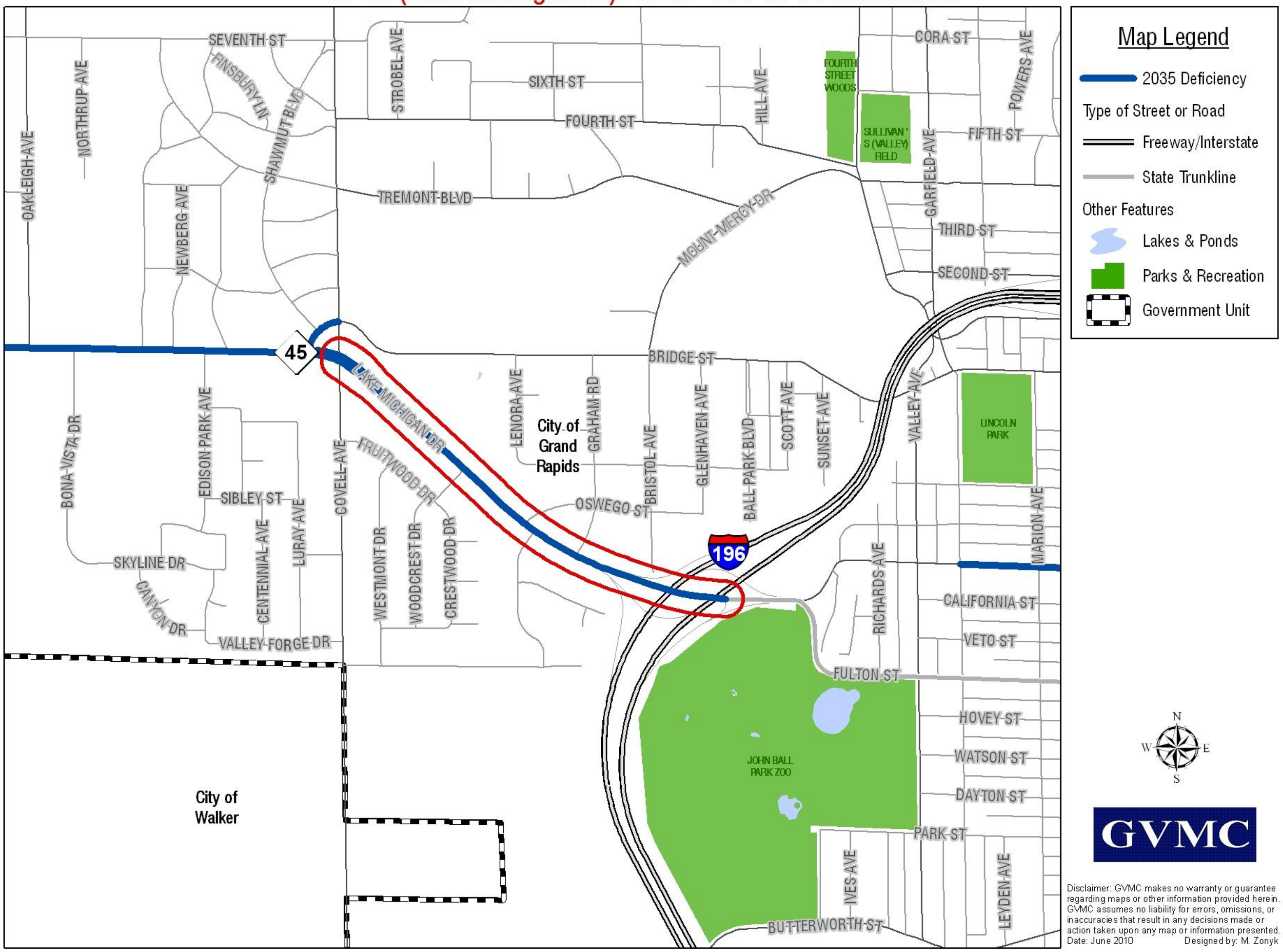
<u>CMP Analysis</u>

M-44 provides arterial access to the core of the heavily developed portion of Plainfield Township. The primary land use is retail/commercial. Growth along the corridor is expected to be moderate as older existing developments are redeveloped. Transit service currently terminates at the township line. It may be beneficial to explore an extension of this service to help alleviate the projected congestion.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning Study**

Deficiency Resolved? TBD

M-45 (Lake Michigan Dr) From I-196 To Covell Avenue



M-45 (Lake Michigan Drive) – I-196 to Covell Avenue

Jurisdiction: MDOT/City of Grand Rapids

NFC: Urban Principal Arterial

Length: 0.85 miles Lanes: 5

Current ADT: 37,200 Current Capacity: 34,800

Proj. 2035 ADT: 41,932 Projected V/C: 1.20

Phase Deficient: Currently Deficient

Transit Available: Yes Freight Route: Yes

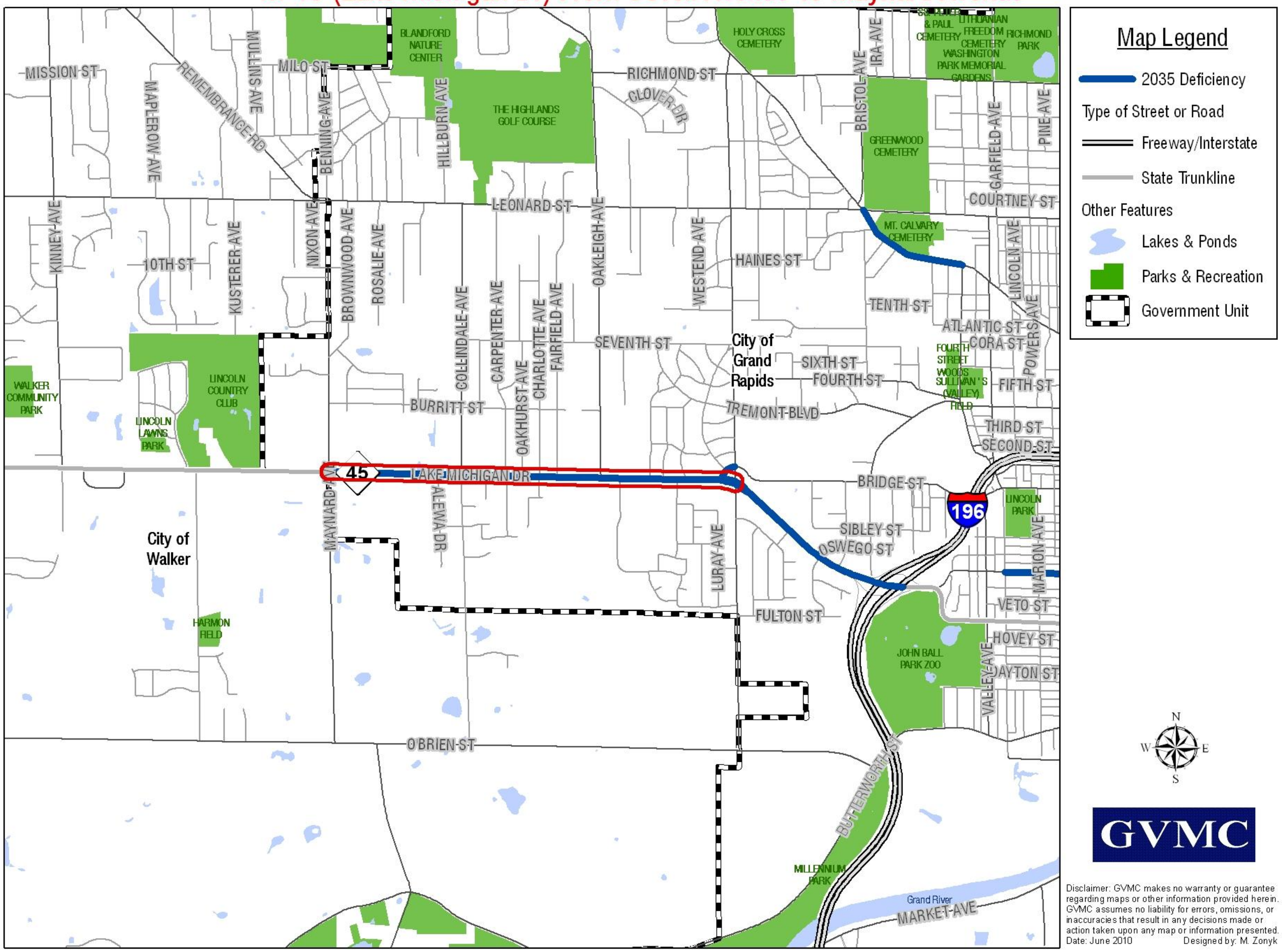
<u>CMP Analysis</u>

M-45 provides arterial access to the core the urban area from points in western Kent County and eastern Ottawa County including GVSU. The primary land use along this section is residential. Transit is available but on a limited basis through an express bus service to GVSU.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning**

Deficiency Resolved? TBD

M-45 (Lake Michigan Dr) From Covell Avenue To Maynard Avenue



M-45 (Lake Michigan Drive) – Covell Avenue to Maynard Ave

Jurisdiction: MDOT/City of Grand Rapids

NFC: Urban Principal Arterial

Length: 1.51 miles   Lanes: 5

Current ADT: 34,300   Current Capacity: 34,800

Proj. 2035 ADT: 40,100   Projected V/C: 1.15

Phase Deficient: Borderline Deficient Currently

Transit Available: Yes   Freight Route: Yes

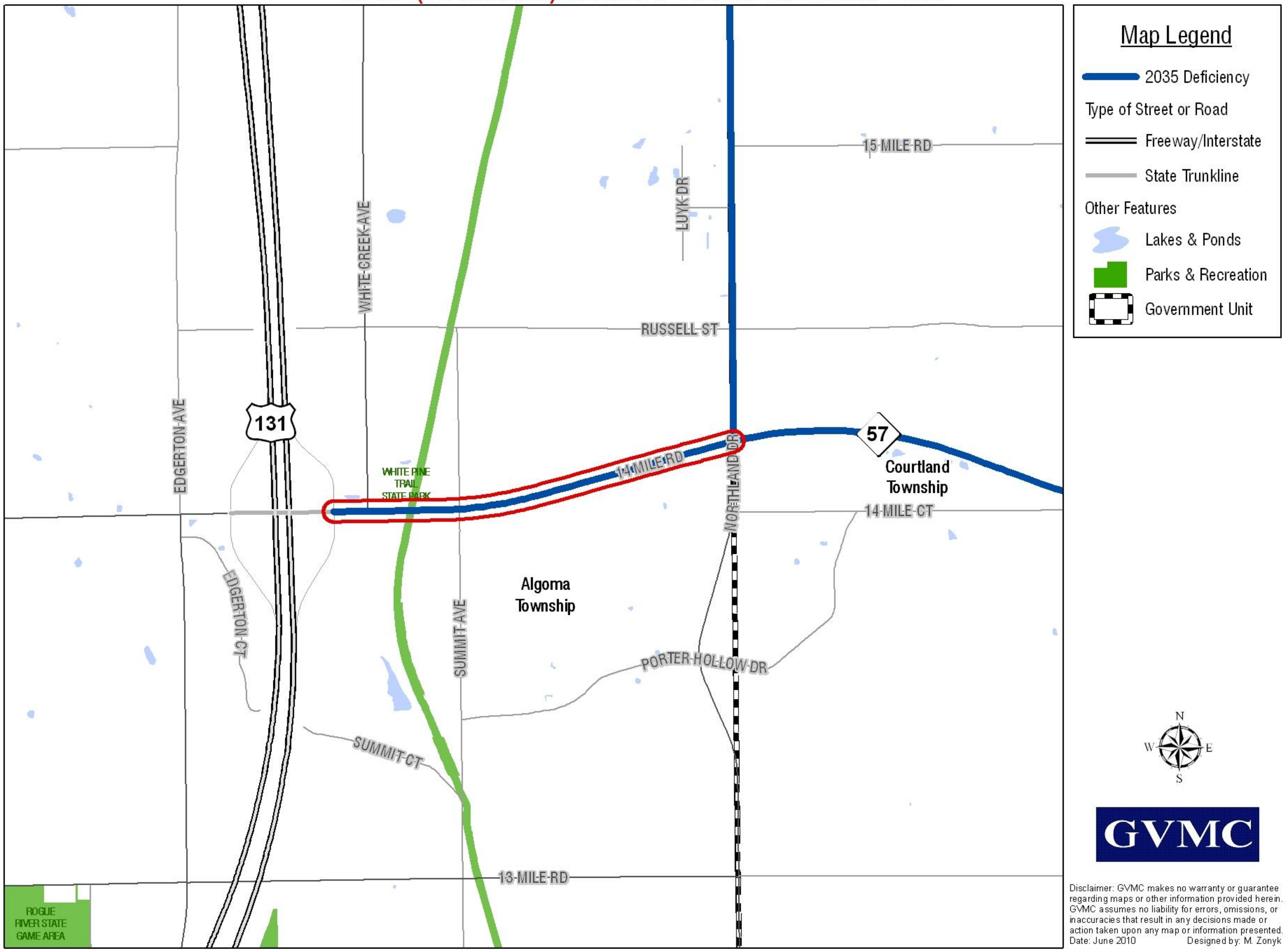
CMP Analysis

M-45 provides arterial access to the core the urban area from points in western Kent County and eastern Ottawa County including GVSU. The primary land use along this section is residential. Transit is available but on a limited basis through an express bus service to GVSU.

***Preferred Alternative*: Further Study – continue access management planning – Transit Planning**

Deficiency Resolved? TBD

M-57 (14 Mile Rd) From US-131 To Northland Drive



M-57 (14 Mile Road) – US-131 to Northland Drive

Jurisdiction: MDOT/Algoma Twp.

NFC: Rural Minor Arterial

Length: 1.40 miles Lanes: 3

Current ADT: 15,364 Current Capacity: 18,000

Proj. 2035 ADT: 17,500 Projected V/C: 0.97

Phase Deficient: Borderline Deficient in 2035

Transit Available: No Freight Route: Yes

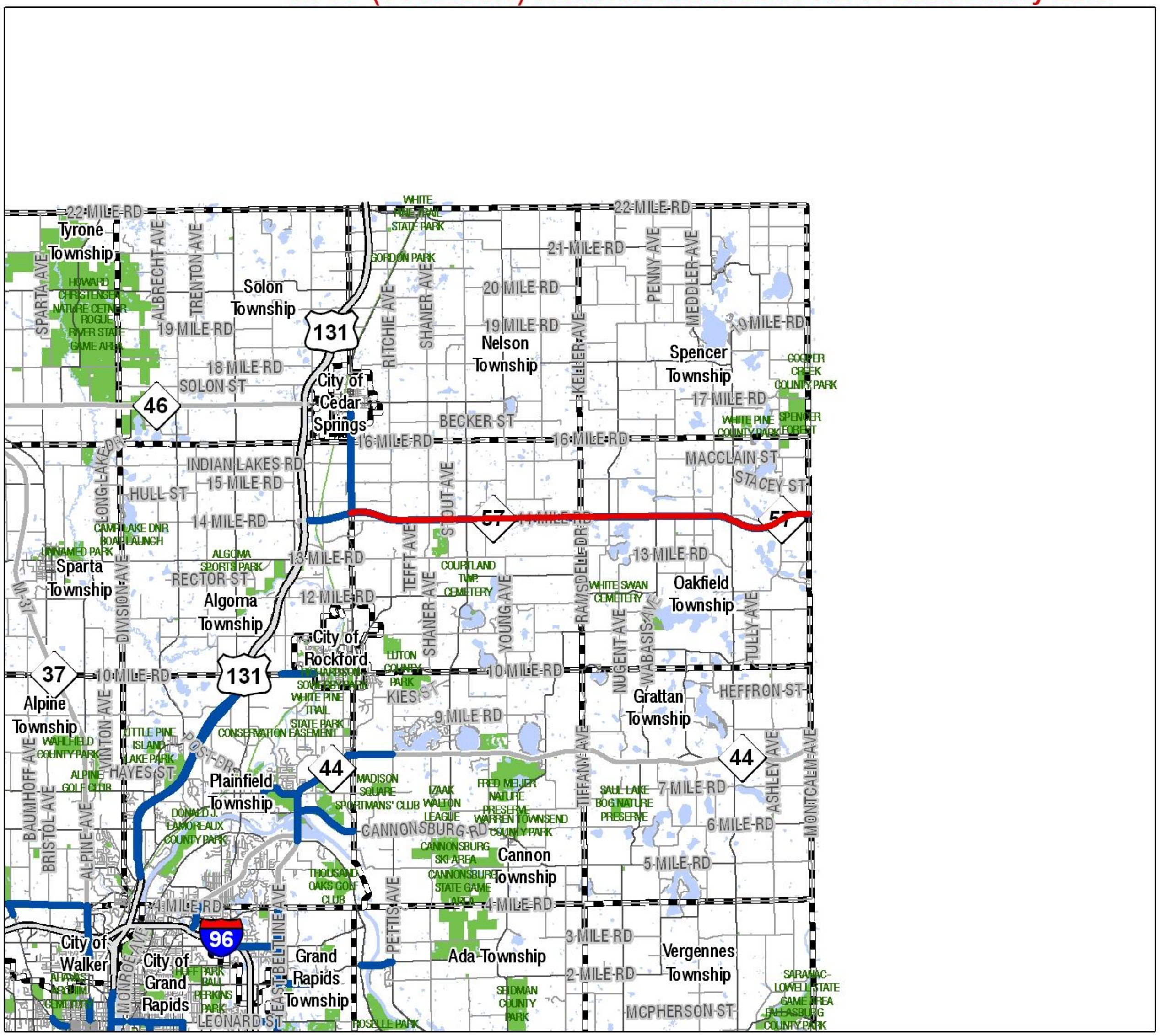
<u>CMP Analysis</u>

M-57 provides arterial access to eastern Kent County from the freeway system (US-131). The primary land use in this section is local retail and commercial. The current projections do not show demand in excess of capacity. However, consideration should be given to continuing proper access management planning as redevelopment occurs in the corridor.

***Preferred Alternative*: Monitoring – Continue Access Management Planning**

Deficiency Resolved? N/A

M-57 (14 Mile Rd) From Northland Drive NE To East County Line



Map Legend

- 2035 Deficiency
- Type of Street or Road
  - Freeway/Interstate
  - State Trunkline
- Other Features
  - Lakes & Ponds
  - Parks & Recreation
  - Government Unit

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Date: June 2010 Designed by: M. Zonyk

M-57 (14 Mile Road) – Northland Drive to East County Line

Jurisdiction: MDOT/Courtland and Oakfield Twps.

NFC: Rural Minor Arterial

Length: 12.23 miles   Lanes: 2

Current ADT: 12,241   Current Capacity: 13,600

Proj. 2035 ADT: 13,400   Projected V/C: 0.98

Phase Deficient: Borderline Deficient in 2035

Transit Available: No   Freight Route: Yes

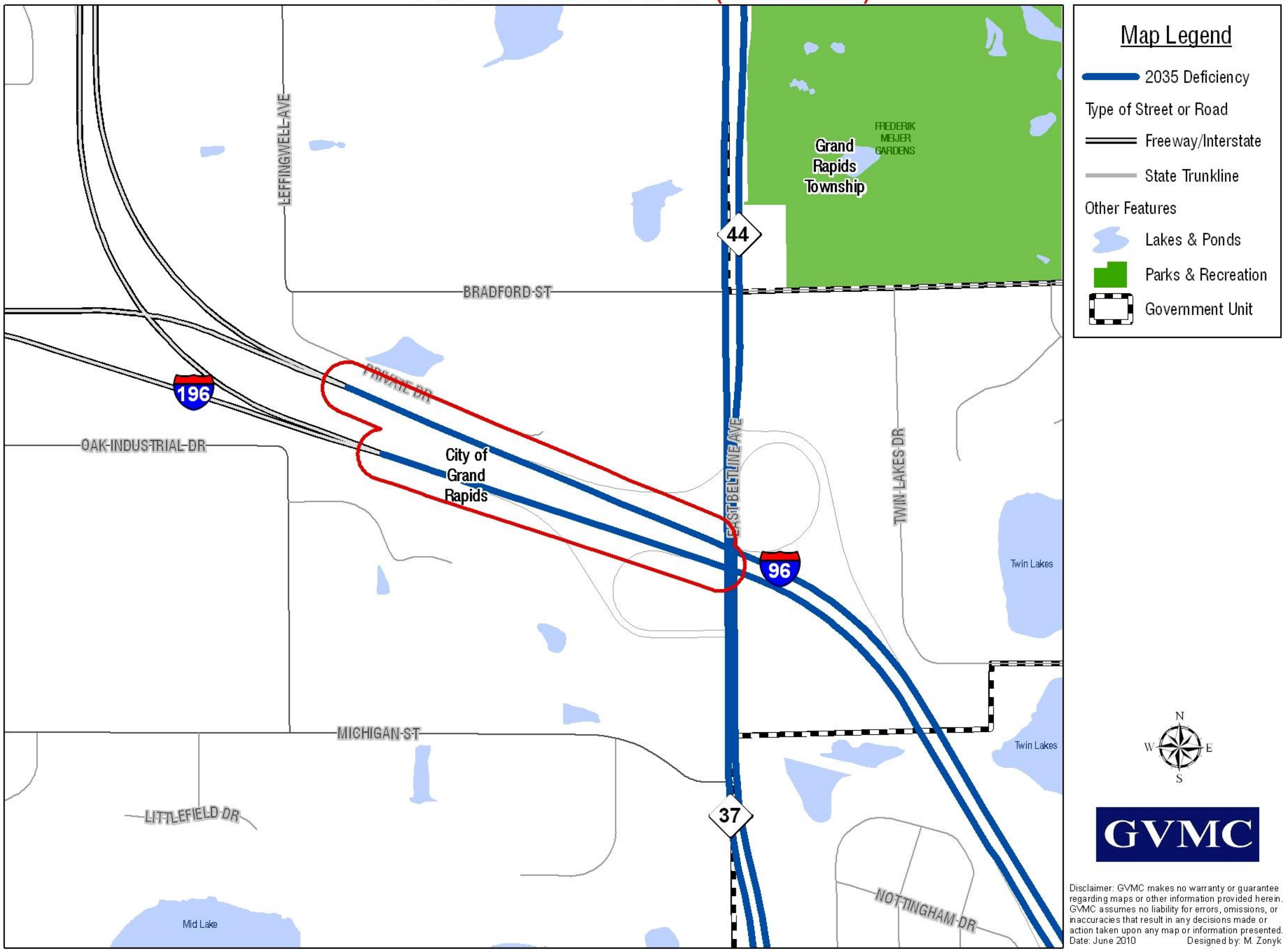
<u>CMP Analysis</u>

M-57 provides arterial access to eastern Kent County from the freeway system (US-131). The primary land use in this section is low density residential. The current projections do not show demand in excess of capacity. However, consideration should be given to continuing proper access management planning as development occurs in the corridor.

***Preferred Alternative*: Monitoring – Continue Access Management Planning**

Deficiency Resolved? N/A

I-96 From I-196 To M-37 (East Beltline)



I-96 – I-196 to M-37 (East Beltline)

Jurisdiction: MDOT

NFC: Urban Interstate

Length: 0.48 miles Lanes: 6

Current ADT: 92,200 Current Capacity: 94,200

Proj. 2035 ADT: 108,500 Projected V/C: 1.15

Phase Deficient: Deficient by 2015

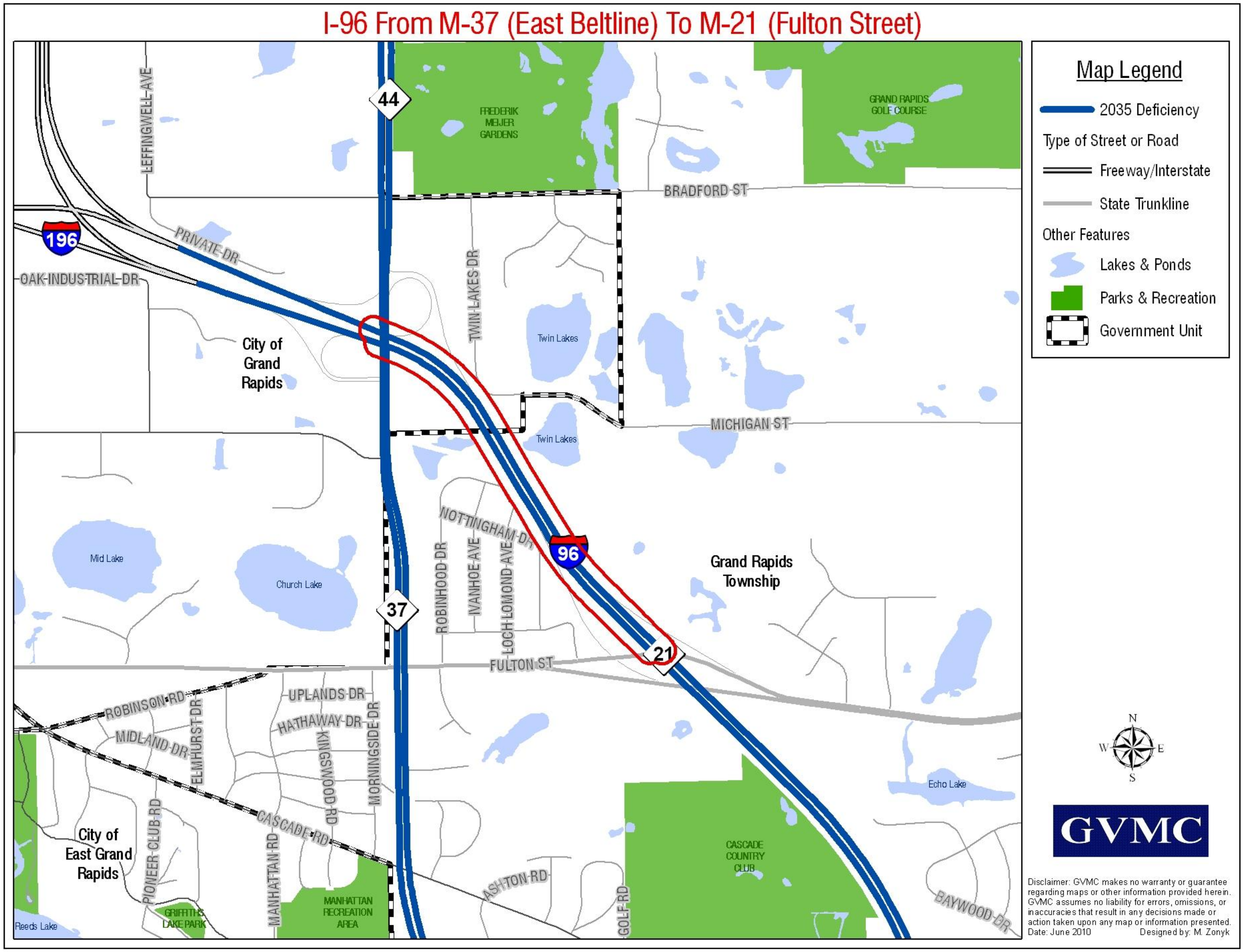
Transit Available: No Freight Route: Yes

CMP Analysis

This section of I-96 is the location where two interstates and a major arterial merge. While the traffic volumes are higher at other locations in the region the merging traffic creates delay situations due to the number of conflict points. In recent years MDOT has developed preliminary plans to help alleviate some of these conflict points. The implementation of these plans is extremely costly. This situation should be monitored with ITS implemented wherever possible to ease the flow during peak periods. Increased incident management efforts may also be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**

Deficiency Resolved? N/A


I-96 From M-37 (East Beltline) To M-21 (Fulton Street)
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
FREDERIK MEIJER GARDENS
GRAND RAPIDS GOLF COURSE
LEFFINGWELL-AVE
BRADFORD-ST
PRIVATE-DR
OAK-INDUSTRIAL-DR
TWIN-LAKES-DR
Twin Lakes
City of Grand Rapids
MICHIGAN-ST
NOTTINGHAM-DR
Grand Rapids Township
Mid Lake
Church Lake
ROBINHOOD-DR
IVANHOE-AVE
LOCH-LOMOND-AVE
FULTON-ST
UPLANDS-DR
ROBINSON-RD
HATHAWAY-DR
MIDLAND-DR
ELMHURST-DR
KINGSWOOD-RD
MORNINGSIDE-DR
CASCADE-RD
City of East Grand Rapids
PIONEER-CLUB-RD
MANHATTAN-RD
MANHATTAN RECREATION AREA
GRIFFITHS LAKE PARK
Reeds Lake
ASHTON-RD
GOLF-RD
CASCADE COUNTRY CLUB
Echo Lake
BAYWOOD-DR
196
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Date: June 2010
Designed by: M. Zonyk

I-96 – M-37 (East Beltline) to M-21 (Fulton Street)

Jurisdiction: MDOT

NFC: Urban Interstate

Length: 0.92 miles Lanes: 6

Current ADT: 78,000 Current Capacity: 94,200

Proj. 2035 ADT: 95,800 Projected V/C: 1.02

Phase Deficient: Borderline Deficient by 2035

Transit Available: No Freight Route: Yes

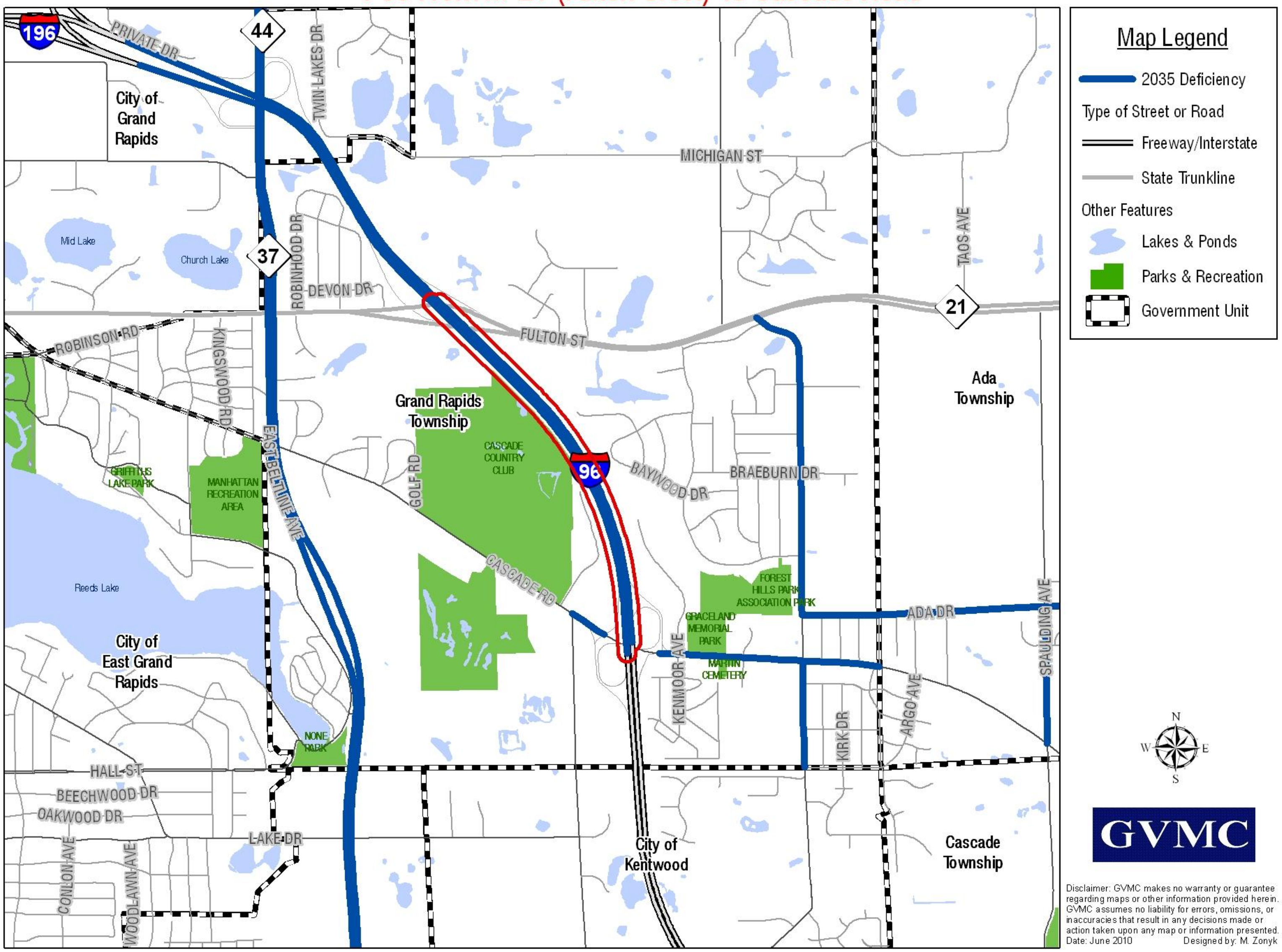
CMP Analysis

This section of I-96 is the location where two interstates and a major arterial merge. While the traffic volumes are higher at other locations in the region the merging traffic creates delay situations due to the number of conflict points. Recent additions of longer merge lanes to the off ramp at M-21 has helped reduce delay during peak periods. The current projection does not show a significant level of congestion into the future. This situation should be monitored with ITS implemented wherever possible to ease the flow during peak periods. Increased incident management efforts may also be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**

Deficiency Resolved? N/A

I-96 From M-21 (Fulton Sreet) To Cascade Road



I-96 – M-21 (Fulton Street) to Cascade Road

Jurisdiction: MDOT

NFC: Urban Interstate

Length: 1.23 miles Lanes: 4

Current ADT: 63,300 Current Capacity: 62,800

Proj. 2035 ADT: 73,900 Projected V/C: 1.18

Phase Deficient: Currently Deficient

Transit Available: No Freight Route: Yes

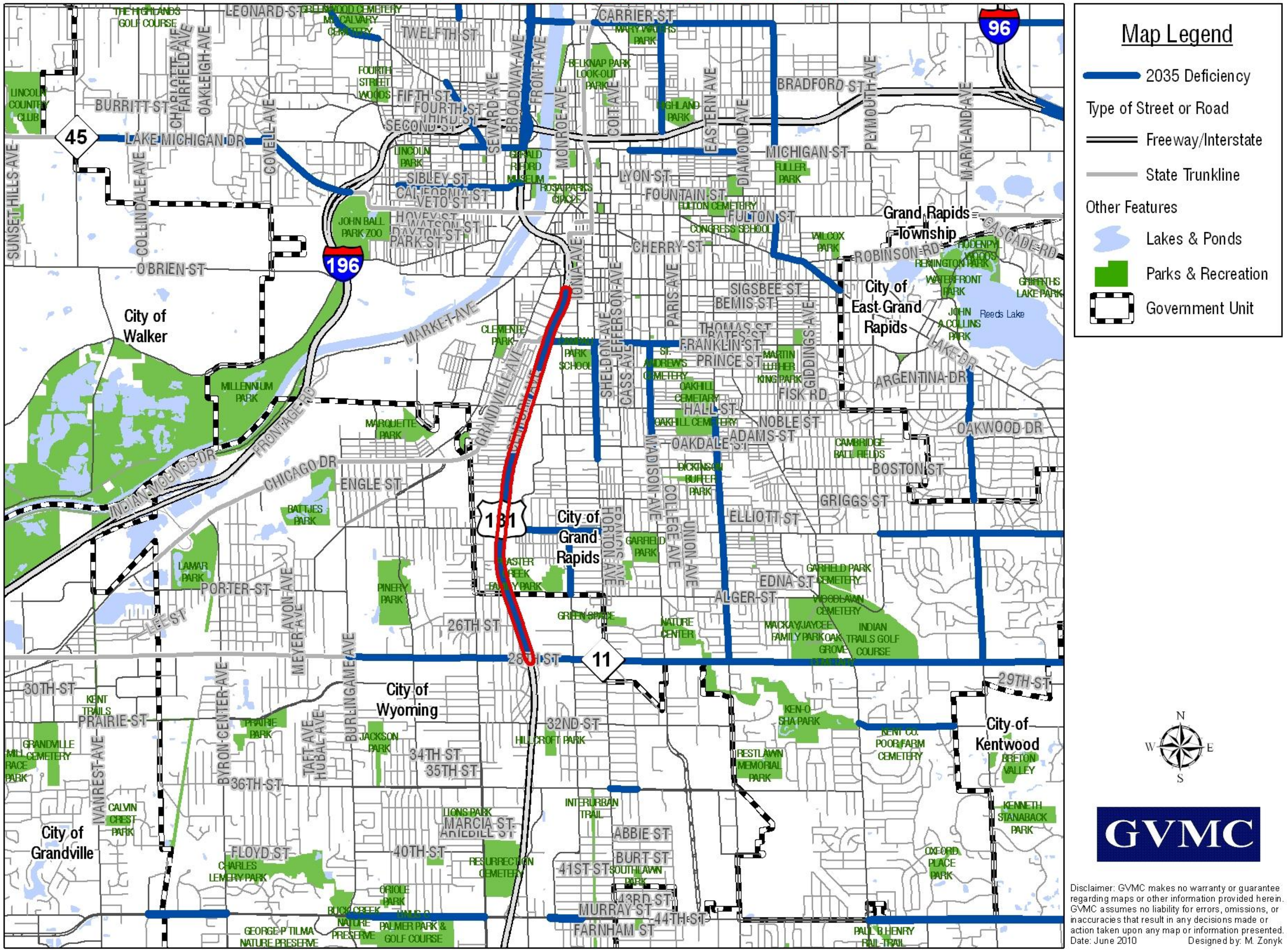
CMP Analysis

This section of I-96 is currently operating over its designed capacity. Delays on the mainline during peak demand periods are common and lengthy. Efforts to extend merge lanes in the near future main help in spot locations, but addition through capacity may be necessary in the near future. Increased incident management efforts may also be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**

Deficiency Resolved? N/A

US-131 From 28th Street To S-Curve



US-131 – M-11 (28th Street) to The S-Curve

Jurisdiction: MDOT/City of Grand Rapids/ Wyoming

NFC: Urban Freeway

Length: 2.96 miles Lanes: 6

Current ADT: 94,200 Current Capacity: 94,200

Proj. 2035 ADT: 107,700 Projected V/C: 1.14

Phase Deficient: Currently Borderline Deficient

Transit Available: No Freight Route: Yes

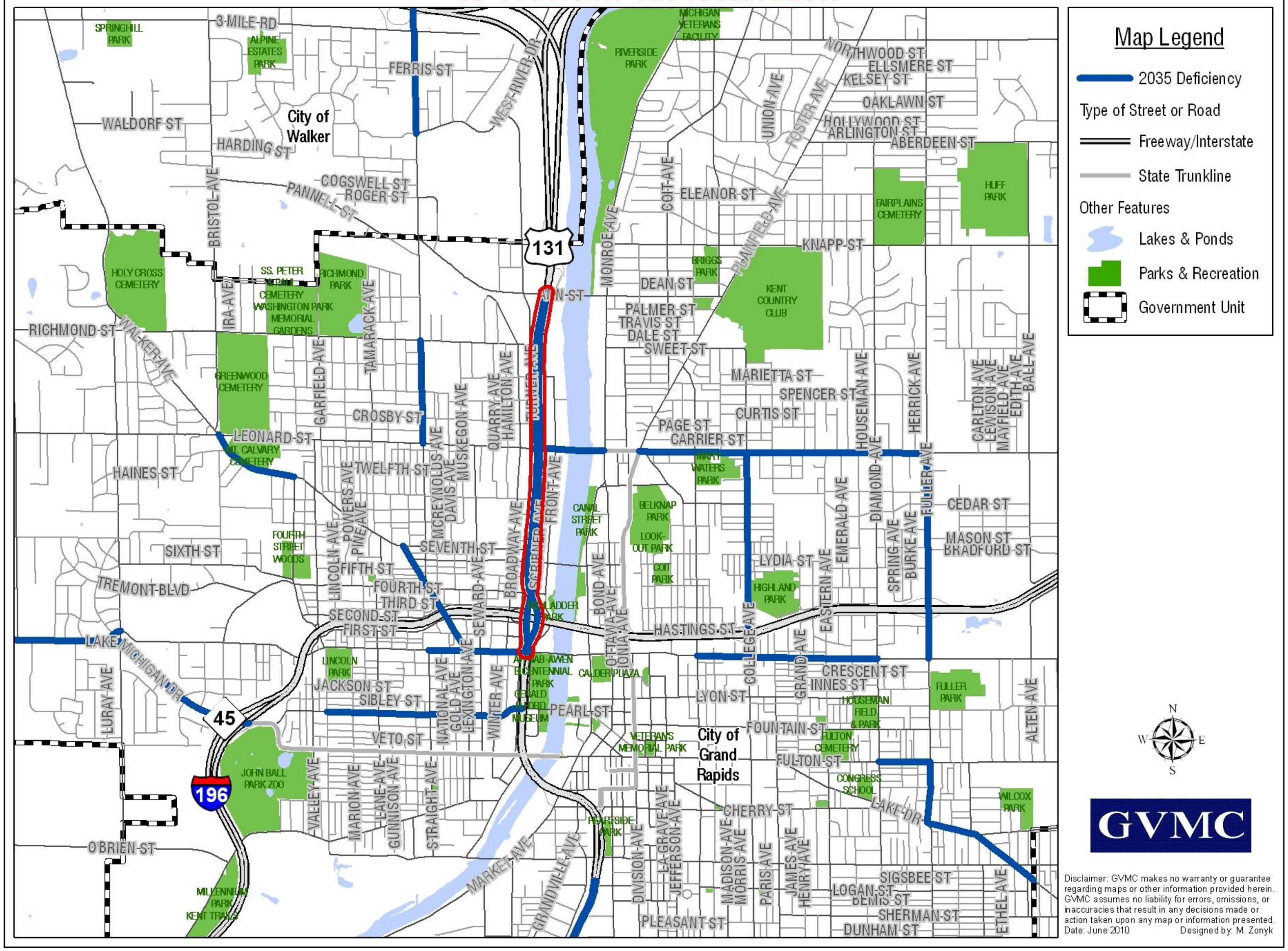
CMP Analysis

Since its completion in the 1960's, US-131 has been the backbone of the transportation network in the region. With the exception of the reconstruction of the S-Curve in 2000 little has been done to address congestion in this vital transportation corridor. Without question any improvement to this corridor would be extremely costly. The addition of capacity would require the difficult acquisition of right-of-way and the reconstruction of many of the sub-standard interchanges similar to the effort currently underway on I-196 in downtown Grand Rapids. Until in depth analysis and subsequent funding is identified other measures should be undertaken to help alleviate peak period congestion and non-recurring related crashes and breakdowns). Increased incident management efforts may also be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**

Deficiency Resolved? N/A

US-131 From I-196 To Ann Street



US-131/I-296 – I-196 to Ann Street

Jurisdiction: MDOT/City of Grand Rapids

NFC: Urban Interstate

Length: 0.99 miles Lanes: 6

Current ADT: 100,000 Current Capacity: 94,200

Proj. 2035 ADT: 107,300 Projected V/C: 1.14

Phase Deficient: Currently Deficient

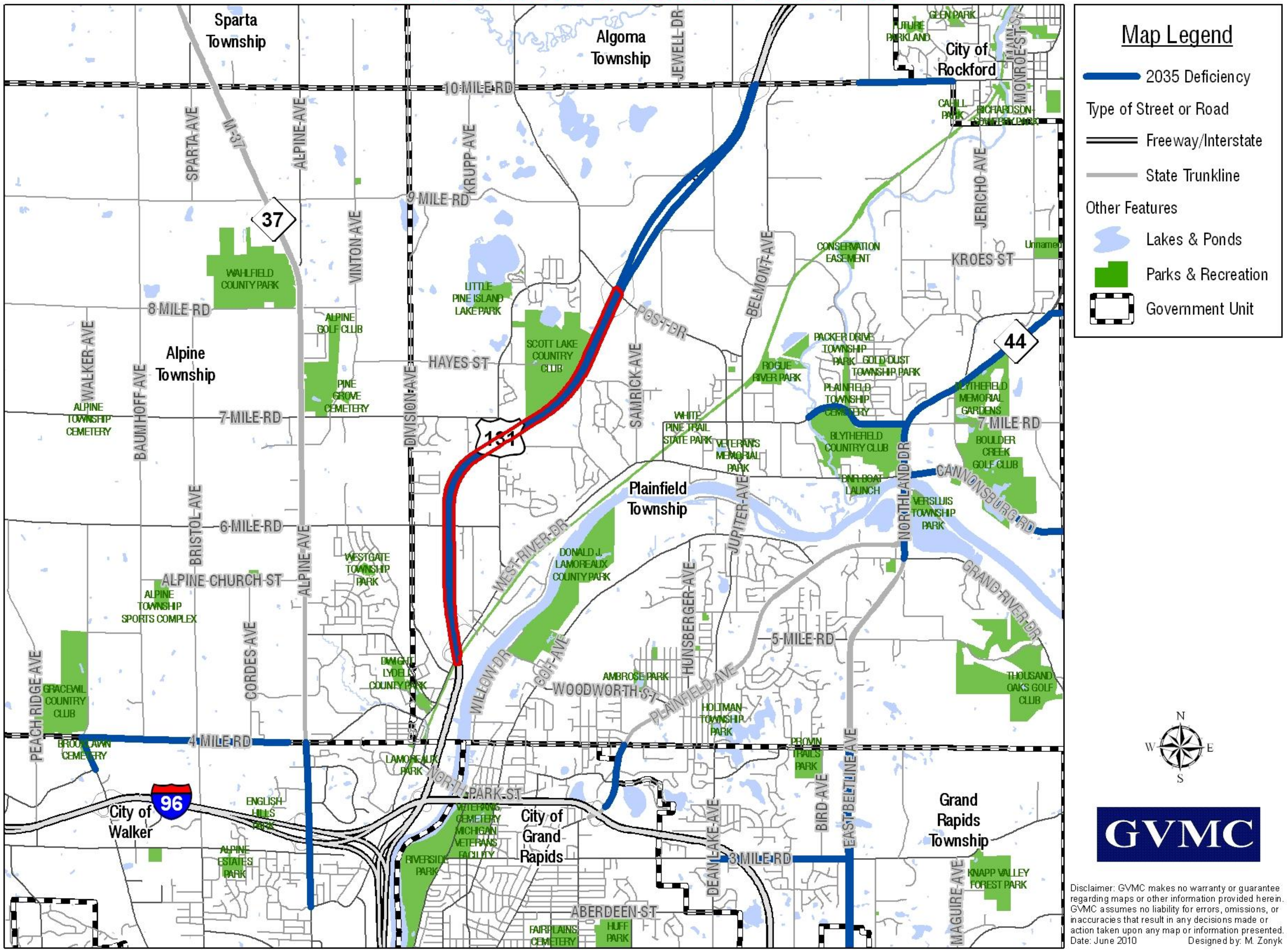
Transit Available: No Freight Route: Yes

CMP Analysis

Since its completion in the 1960's, US-131 has been the backbone of the transportation network in the region. With the exception of the reconstruction of the S-Curve in 2000, little has been done to address congestion in this vital transportation corridor. Without question any improvement to this corridor would be extremely costly. The addition of capacity would require the difficult acquisition of right-of-way and the reconstruction of many of the sub-standard interchanges similar to the effort currently underway on I-196 in downtown Grand Rapids. Until in depth analysis and subsequent funding is identified other measures should be undertaken to help alleviate peak period congestion and non-recurring related crashes and breakdowns). Increased incident management efforts may also be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**
Deficiency Resolved? N/A

US-131 From West River Drive To Post Drive



US-131 – West River Drive to Post Drive

Jurisdiction: MDOT

NFC: Urban Freeway

Length: 3.97 miles Lanes: 4

Current ADT: 56,100 Current Capacity: 62,800

Proj. 2035 ADT: 72,200 Projected V/C: 1.15

Phase Deficient: Deficient by 2025

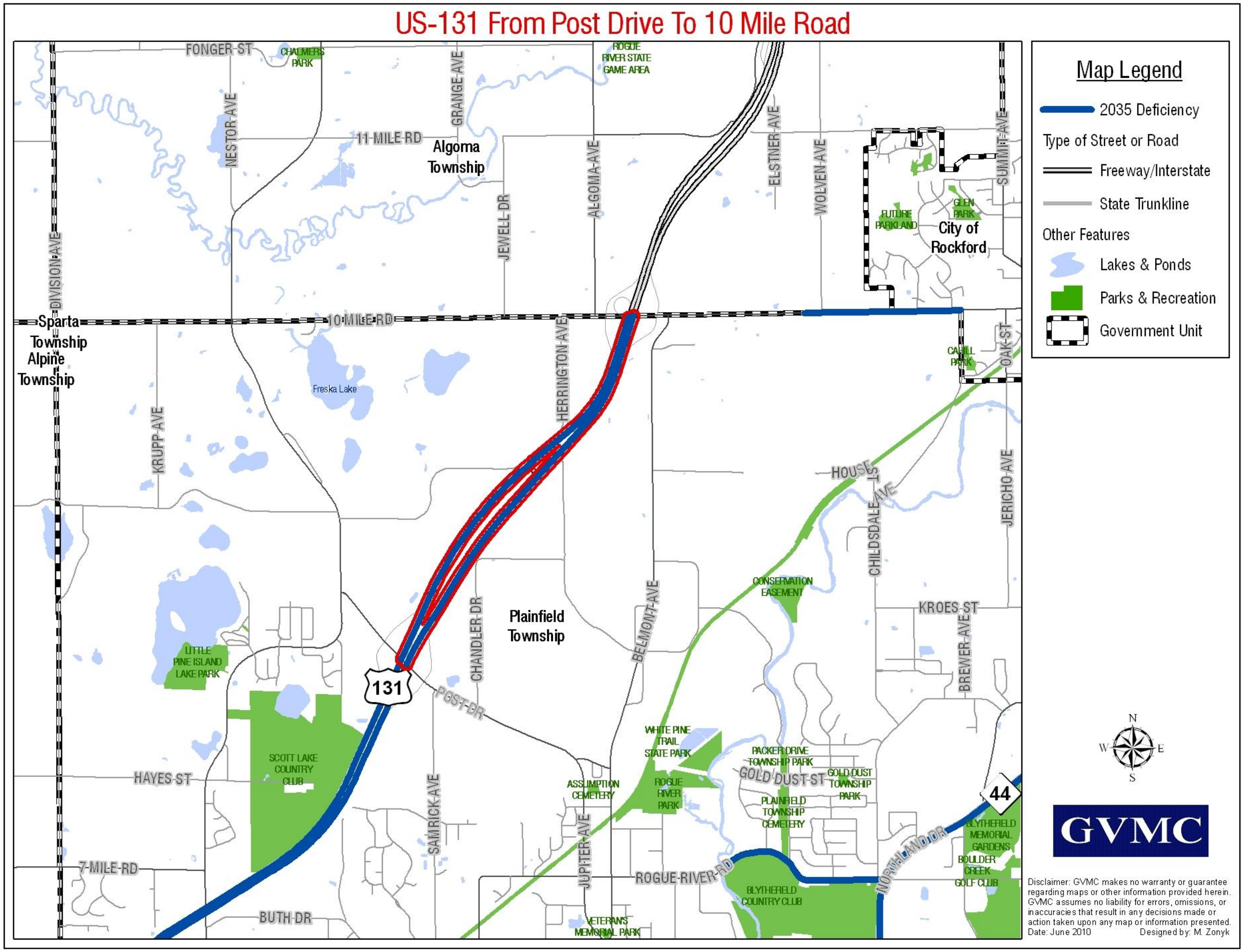
Transit Available: No Freight Route: Yes

CMP Analysis

US-131 north of the urban area has experienced continued growth over the last decade due mostly to development in rural areas in northern Kent County. Current peak demand for this facility creates moderate delay conditions. Future daily volumes will be in excess of designed capacity. Until in depth analysis and subsequent funding is identified other measures should be undertaken to help alleviate peak period congestion and non-recurring related crashes and breakdowns). Increased incident management efforts may also be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**

Deficiency Resolved? N/A


US-131 From Post Drive To 10 Mile Road
Map Legend
2035 Deficiency
Type of Street or Road
Freeway/Interstate
State Trunkline
Other Features
Lakes & Ponds
Parks & Recreation
Government Unit
Algoma Township
Plainfield Township
Sparta Township
Alpine Township
City of Rockford
10 MILE RD
11 MILE RD
FONGER ST
HAYES ST
7 MILE RD
BUTH DR
POST DR
ROGUE RIVER RD
GOLD DUST ST
KROES ST
HOUSE ST
DIVISION AVE
KRUPP AVE
NESTOR AVE
GRANGE AVE
JEWELL DR
ALGOMA AVE
HERRINGTON AVE
CHANDLER DR
BELMONT AVE
SAMRICK AVE
JUPITER AVE
ELSTNER AVE
WOLVEN AVE
SUMMIT AVE
OAK ST
JERICHO AVE
CHILDSDALE AVE
BREWER AVE
NORTHLAND DR
131
44
Freska Lake
SCOTT LAKE COUNTRY CLUB
LITTLE PINE ISLAND LAKE PARK
CONSERVATION EASEMENT
WHITE PINE TRAIL STATE PARK
ROGUE RIVER PARK
ASSUMPTION CEMETERY
PACKER DRIVE TOWNSHIP PARK
GOLD DUST TOWNSHIP PARK
PLAINFIELD TOWNSHIP CEMETERY
BLYTHEFIELD COUNTRY CLUB
BLYTHEFIELD MEMORIAL GARDENS
BOULDER CREEK GOLF CLUB
VETERANS MEMORIAL PARK
CAHILL PARK
FUTURE PARKLAND
GLEN PARK
CHALMERS PARK
ROGUE RIVER STATE GAME AREA
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GVMC
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Date: June 2010
Designed by: M. Zonyk

US-131 – Post Drive to 10 Mile Road

Jurisdiction: MDOT

NFC: Urban Freeway

Length: 2.34 miles Lanes: 4

Current ADT: 46,500 Current Capacity: 62,800

Proj. 2035 ADT: 60,600 Projected V/C: 0.97

Phase Deficient: Borderline Deficient by 2035

Transit Available: No Freight Route: Yes

CMP Analysis

US-131 north of the urban area has experienced continued growth over the last decade due mostly to development in rural areas in northern Kent County. Current peak demand for this facility creates moderate delay conditions. Future daily volumes will not be in excess of designed capacity. Incident management efforts may be an efficient tool for extending the capacity of this facility. Quick clearance or delayed clearance policies in conjunction with road service patrols would be beneficial during peak periods when an incident can cause lengthy delays.

***Preferred Alternative*: Monitoring – Continued Study – ITS – Incident Management**

Deficiency Resolved? N/A

Appendix C

Locations of Signalized Intersections with Capacity Related Needs

Street 1	Street 2	Jurisdiction	Highest Functional Class
10 Mile Road	US-131 NB Ramps	MDOT - Plainfield Twp	Urban Principle Arterial - Trunkline
32nd Avenue	M-121 Chicago Drive	MDOT - City of Hudsonville	Urban Principle Arterial - Trunkline
32nd Avenue	Allen Street	City of Hudsonville	Urban Principle Arterial - Local
32nd Avenue	Barry Street	City of Hudsonville	Urban Principle Arterial - Local
54th Street	US-131 SB Ramps	MDOT - City of Wyoming	Urban Principle Arterial - Trunkline
Alpine Avenue	Henze Street	MDOT - Alpine Twp	Urban Principle Arterial - Trunkline
Alpine Avenue	4 Mile Road	MDOT - City of Walker	Urban Principle Arterial - Trunkline
Alpine Avenue	Old Orchard Street	MDOT - City of Walker	Urban Principle Arterial - Trunkline
Alpine Avenue	Center Drive (Greenridge)	MDOT - City of Walker	Urban Principle Arterial - Trunkline
Alpine Avenue	3 Mile Road	MDOT - City of Walker	Urban Principle Arterial - Trunkline
Alpine Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Belmont Avenue	10 Mile Road	KCRC - Plainfield Twp	Urban Principle Arterial - Local
Breton Avenue	Burton Street	City of Grand Rapids	Urban Principle Arterial - Local
Breton Avenue	M-11 - 28th Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Breton Avenue	29th Street	City of Grand Rapids	Urban Minor Arterial - Local
Buchanan Avenue	Burton Street	City of Grand Rapids	Urban Principle Arterial - Local
Buchanan Avenue	M-11 - 28th Street	MDOT - City of Wyoming	Urban Principle Arterial - Trunkline
Burlingame Avenue	Burton Street	City of Wyoming	Urban Minor Arterial - Local
Burlingame Avenue	44th Street	City of Wyoming	Urban Principle Arterial - Local
Burton Street	US-131 NB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Burton Street	US-131 SB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Byron Center Avenue	44th Street	City of Wyoming	Urban Principle Arterial - Local
Canal Avenue	Grandville High Drive	City of Grandville	Urban Minor Arterial - Local
Canal Avenue	Rivertown Parkway	City of Grandville	Urban Principle Arterial - Local
Cascade Road	28th Street	KCRC - Cascade Twp	Urban Minor Arterial - Local
Cascade Road	I-96 WB Ramps	MDOT - Grand Rapids Twp	Urban Minor Arterial - Trunkline
Cascade Road	I-96 EB Ramps	MDOT - Grand Rapids Twp	Urban Minor Arterial - Trunkline
Clay Avenue	54th Street	City of Wyoming	Urban Principle Arterial - Local
Clyde Park Avenue	M-11 - 28th Street	MDOT - City of Wyoming	Urban Principle Arterial - Trunkline
Clyde Park Avenue	54th Street	City of Wyoming	Urban Principle Arterial - Local
College Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
College Avenue	I-196 WB Ramps	MDOT - City of Grand Rapids	Urban Minor Arterial - Trunkline
College Avenue	I-196 EB Ramps	MDOT - City of Grand Rapids	Urban Minor Arterial - Trunkline
College Avenue	Michigan Street	City of Grand Rapids	Urban Principle Arterial - Local
Cottonwood Drive	Baldwin Street	OCRC - Georgetown Twp	Urban Minor Arterial - Local
Diamond Avenue	Michigan Street	City of Grand Rapids	Urban Principle Arterial - Local
Division Avenue	Fulton Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Division Avenue	Wealthy Street	City of Grand Rapids	Urban Principle Arterial - Local
Division Avenue	Burton Street	City of Grand Rapids	Urban Principle Arterial - Local
Division Avenue	M-11 - 28th Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Division Avenue	44th Street	City of Wyoming	Urban Principle Arterial - Local
Division Avenue	54th Street	City of Wyoming	Urban Principle Arterial - Local
East Beltline Avenue	Burton Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
East Beltline Avenue	Lake Eastbrook Blvd	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
East Beltline Avenue	M-11 - 28th Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
East Beltline Avenue	Leonard Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
East Beltline Avenue	I-96 WB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
East Beltline Avenue	I-96 EB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline

Street 1	Street 2	Jurisdiction	Highest Functional Class
East Paris Avenue	Burton Street	City of Grand Rapids	Urban Minor Arterial - Local
East Paris Avenue	Sparks Drive	City of Grand Rapids	Urban Minor Arterial - Local
East Paris Avenue	M-11 - 28th Street	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
East Paris Avenue	29th Street	City of Kentwood	Urban Minor Arterial - Local
Fruit Ridge Avenue	3 Mile Road	City of Walker	Urban Principle Arterial - Local
Fuller Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Fuller Avenue	I-196 WB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Fuller Avenue	I-196 EB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Fuller Avenue	Michigan Street	City of Grand Rapids	Urban Principle Arterial - Local
Fuller Avenue	Fulton Street	City of Grand Rapids	Urban Principle Arterial - Local
Fuller Avenue	Lake Drive	City of Grand Rapids	Urban Minor Arterial - Local
Kalamazoo Avenue	Burton Street	City of Grand Rapids	Urban Principle Arterial - Local
Kalamazoo Avenue	Eastport Street	KCRC - Gaines Twp	Urban Principle Arterial - Local
Kenmore Avenue	Cascade Road	KCRC - Grand Rapids Twp	Urban Minor Arterial - Local
Kenowa Avenue	44th Street	OCRC - Georgetown Twp	Urban Principle Arterial - Local
Kraft Avenue	28th Street	KCRC - Cascade Twp	Urban Minor Arterial - Local
Lexington Avenue	Bridge Street	City of Grand Rapids	Urban Minor Arterial - Local
M-11 28th Street	I-96 WB Ramps	MDOT - Cascade Twp	Urban Principle Arterial - Trunkline
M-11 28th Street	I-96 EB Ramps	MDOT - Cascade Twp	Urban Principle Arterial - Trunkline
M-11 Wilson Avenue	Lake Michigan Drive	MDOT - City of Walker	Urban Principle Arterial - Trunkline
M-44 Northland Drive	West River Drive	MDOT - Plainfield Twp	Urban Principle Arterial - Trunkline
M-44 Northland Drive	Versluis Park Drive	MDOT - Plainfield Twp	Urban Principle Arterial - Trunkline
Main Street	M-121 Chicago Drive	MDOT - Georgetown Twp	Urban Principle Arterial - Trunkline
Main Street	Baldwin Street	OCRC - Georgetown Twp	Urban Minor Arterial - Local
Market Avenue	Wealthy Street	City of Grand Rapids	Urban Principle Arterial - Local
Monroe Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Patterson Avenue	M-11 - 28th Street	MDOT - Cascade Twp	Urban Principle Arterial - Trunkline
Plainfield Avenue	4 Mile Road	KCRC - Grand Rapids Twp	Urban Principle Arterial - Local
Plainfield Avenue	Rupert Street	City of Grand Rapids	Urban Principle Arterial - Local
Plainfield Avenue	I-96 WB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Plainfield Avenue	I-96 EB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Plainfield Avenue	3 Mile Road	City of Grand Rapids	Urban Principle Arterial - Local
Plainfield Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Plymouth Avenue	Burton Street	City of Grand Rapids	Urban Principle Arterial - Local
Remembrance Road	Leonard Street	City of Walker	Urban Principle Arterial - Local
School Avenue	M-121 Chicago Drive	MDOT - City of Hudsonville	Urban Minor Arterial - Trunkline
Scribner Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Seward Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Spartan Industrial Drive	44th Street	City of Grandville	Urban Principle Arterial - Local
Stafford Avenue	44th Street	City of Wyoming	Urban Principle Arterial - Local
Turner Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Walker Avenue	3 Mile Road	City of Walker	Urban Minor Arterial - Local
Walker Avenue	Leonard Street	City of Grand Rapids	Urban Principle Arterial - Local
Wealthy Street	US-131 NB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
Wealthy Street	US-131 SB Ramps	MDOT - City of Grand Rapids	Urban Principle Arterial - Trunkline
White Creek Avenue	17 Mile Road	KCRC - Cedar Springs	Urban Minor Arterial - Local
Wilson Avenue	M-11 28th Street	MDOT - City of Grandville	Urban Principle Arterial - Trunkline
Wilson Avenue	Chicago Drive	City of Grandville	Urban Principle Arterial - Local

Appendix D

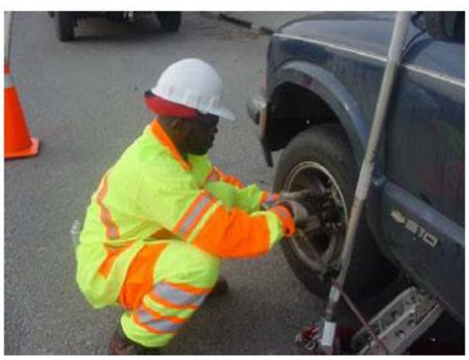
Freeway Courtesy Patrol Study
(2007)

FEASIBILITY EVALUATION FOR IMPLEMENTING A FREEWAY SERVICE PATROL

Prepared For:

Michigan Department of Transportation

MICHIGAN DEPARTMENT OF TRANSPORTATION
GRAND REGION OFFICE
GRAND RAPIDS, MICHIGAN



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DETROIT – FARMINGTON HILLS – GRAND RAPIDS – TRAVERSE CITY

October 12, 2007 – DRAFT

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INTRODUCTION

As cities continue to expand outward and traffic volumes continue to increase, a higher demand is placed on freeway systems that, in many cases, were designed for the traffic of earlier decades. However, because of the significant costs associated with widening existing freeways and building new freeways, it has not always been feasible or practical for agencies to continuously expand transportation networks to keep up with the increasing traffic demand. Instead, many agencies have searched for other solutions to increase the capacity of the transportation system, such as Intelligent Transportation Systems (ITS). The idea of ITS is to use technology to maximize the efficiency of a roadway. Some of the technology involved may include traffic cameras, vehicle detectors, Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), 511 traveler information, and traffic information websites. The goals of this technology are to identify unplanned incidents more quickly, notify motorists of traffic conditions so that they may choose an alternate route or will be prepared for a backup, increase safety for motorists, and clear incidents from the roadway more quickly and efficiently.

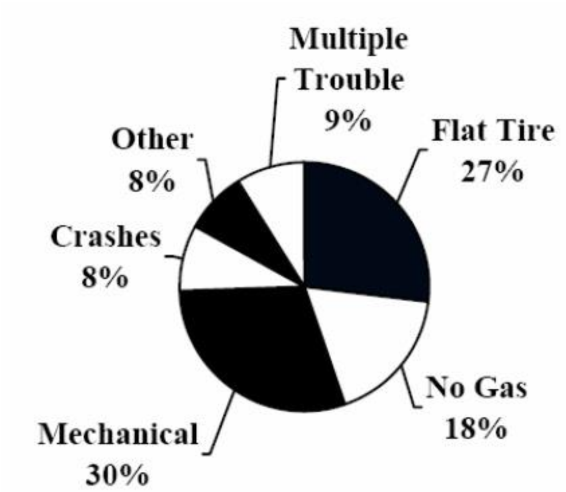
ITS systems are designed to reduce congestion levels as well as to decrease the number of incidents on a freeway. This includes the initial incident, which can be a collision, a disabled or abandoned vehicle, or debris in the roadway, as well as secondary collisions that result from the initial incident. According to the Federal Highway Administration (FHWA), incident-related delay accounts for between 50 and 60 percent of congestion delay in most metropolitan areas. The FHWA also references a study conducted in Minnesota that found that 13 percent of all peak period crashes are secondary crashes that are the direct result of an earlier crash. In addition, nearly 40% of all on-duty law enforcement officer deaths are traffic-related. These figures show that unplanned incidents are not only costly in terms of congestion, but they may also create hazardous situations to those not even involved in the initial incident. An effective incident management plan will use all available resources to clear freeway incidents as quickly and safely as possible.

FREEWAY SERVICE PATROLS

To improve the safety and efficiency of the freeway system, many cities and states have implemented a Freeway Service Patrol (FSP). Although the name, hours of service, operational procedures, and equipment may vary from one location to the next, the goal remains the same: to clear incidents as quickly as possible and reduce the likelihood of congestion and secondary incidents. The services provided vary depending on the situation, and typically range from providing assistance to emergency responders at the scene of a crash, to changing a flat tire or providing gas to a stranded motorist.

The Freeway Courtesy Patrol (FCP) in Detroit, Michigan is one example. The FCP operates 24 hours per day, 7 days per week, and in 2006 provided assistance to more than 34,000 stranded motorists in Wayne, Oakland, and Macomb counties in southeast Michigan. The incident types for these assists are shown in **Figure 1**. It is interesting to note that only 8% of the assists were crash-related, an indication that there are a significant number of disabled vehicles on the freeway. In nearly 85% of the assists, the service provided was directly related to the problem, indicating that FCP drivers are able to mobilize a large number of disabled vehicles at the scene and get motorists back on the road. FCP drivers also stopped more than 15,000 times to tag an abandoned vehicle, and more than 2,000 times to remove debris from the roadway.

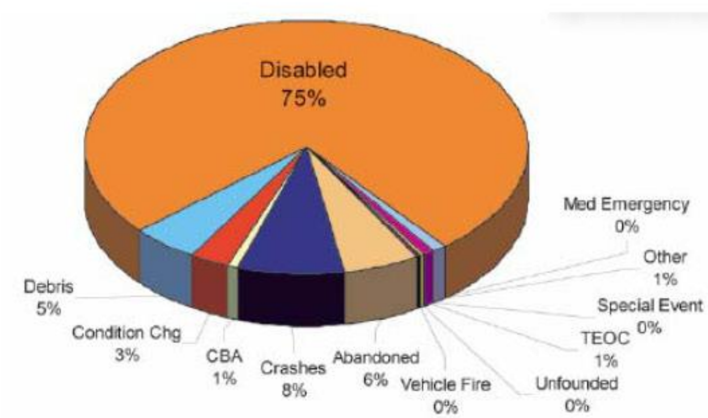
Figure 1. Detroit FCP Occupied-Vehicle Assists by Vehicle Problem.



Source: MDOT

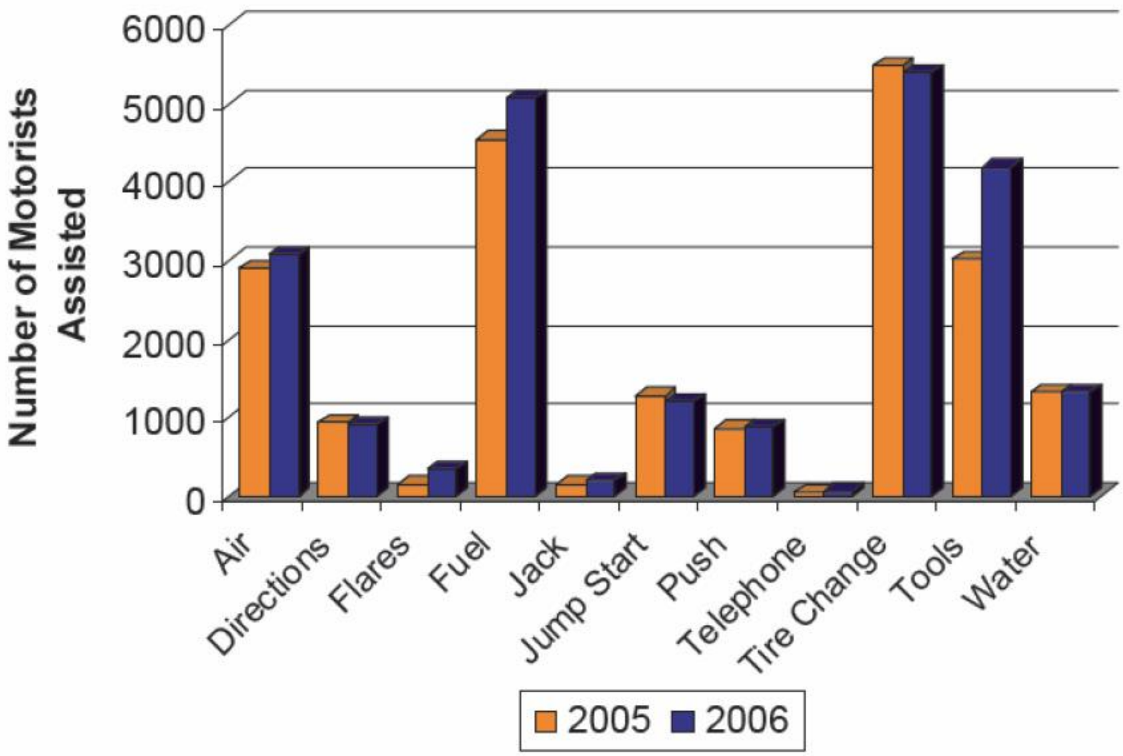
Another example of a service patrol in action is the Hampton Roads Safety Service Patrol (SSP) in Virginia Beach, Virginia. SSP drivers patrol approximately 662 lane miles (103 centerline miles) of freeways in the Hampton Roads area 24 hours per day, 7 days per week. In 2006, there were 44,211 assists provided to motorists by the SSP. A breakdown of the assists provided is shown in **Figures 2 and 3**. The results once again show that disabled vehicles account for the majority of assists, with crashes accounting for only a small percentage of the total assists. Of the services provided for disabled vehicles, the most common were tire changes (5,399) and fuel (5,064).

Figure 2. Hampton Roads SSP Assists by Incident Type.



Source: Hampton Roads Smart Traffic Center

Figure 3. Hampton Roads SSP Assists by Service Provided.



Source: Hampton Roads Smart Traffic Center

For this analysis, the main two sources of data were reports and performance measures from the Detroit FCP and Hampton Roads SSP. While data was also available from other FSPs around the country, the variation in services provided and operational procedures between centers would only serve to complicate the analysis process. Furthermore, since some procedures and policies of an FSP are affected by state laws, it was important to consider what is being done at the Detroit FCP. Data from smaller operations, such as the proposed FSP in Grand Rapids, was difficult to obtain and in many cases was not as complete. Therefore, it was concluded that a relatively accurate picture of what a Grand Rapids FSP may look like could be determined based upon these two operations.

TRAFFIC IN GRAND RAPIDS

FREEWAY CHARACTERISTICS

The Grand Rapids metropolitan area is the second largest in Michigan with a population of approximately 750,000. The area has been growing steadily for many years and this growth is expected to continue during the foreseeable future. There are many characteristics of the freeways and traffic in the area that are unique to the area.

The most heavily traveled freeway in the metropolitan area, US-131, is actually not an Interstate route. Nonetheless, it is the main north-south route through the city, passing through the western and southern parts of downtown. Most of the freeway between I-96 and M-11 (28th St) was built in the late 1950s and early 1960s, and while the rebuilding of the US-131 "S-Curve" in 2000 has alleviated many of the problems on that segment of the freeway, there are still several areas, particularly south of downtown, that have geometric issues. These issues include limited left-shoulder widths, short merge lanes for oncoming traffic, and exit and entrance ramps on the left. Combined with averages daily traffic volumes of over 100,000 vehicles per day in some locations, these factors have resulted in US-131 being the most incident-prone freeway in the metropolitan area. The highest incident rates on US-131 occur between Hall St. and Market Ave, where many of these factors are present.

The second most traveled freeway, I-196, is also known as the Gerald R. Ford freeway. This freeway crosses through the northern part of downtown and was built a few years after US-131. Several bridge projects have occurred on I-196 in the past few years, with the goal of rebuilding and widening the freeway to three lanes in each direction east of downtown. Similar to US-131, the freeway has narrow shoulders in some areas and a few left-hand exit and entrance ramps. The highest incident rates on I-196 occur between M-45 (Lake Michigan Dr) and Lane Ave, where the freeway curves up and down the hill on the west side of downtown.

I-96 travels from southeast to northwest through the area, and is the main route for motorists heading toward Muskegon to the west and toward Lansing and Detroit to the east. The freeway passes far to the northeast of the downtown area and serves as somewhat of a bypass of the central area of the city. At the time of construction the land surrounding I-96 was relatively undeveloped, so many of the geometric issues on US-131 and I-196 are not present on I-96. However, there are two areas, between I-196 and Fulton St to the east, and between Plainfield Ave and Alpine Ave to the north, where incident rates are slightly higher.

M-6, also known as the Paul B. Henry freeway or the "South Beltline", is a new freeway in the Grand Rapids area. The eastern segment between I-96 and M-37 (Broadmoor Ave) opened to traffic in 2001, while the rest of the freeway west to I-196 opened in 2004. M-6 was built according to modern design guidelines, and has so far not experienced significant traffic volumes. However, as the southern part of Kent County continues to grow in the coming years, this freeway will likely begin to see higher traffic volumes.

ANALYSIS AREA

Annual Average Daily Traffic (AADT) volumes for 2005 were obtained from MDOT to assist in determining the areas to be included in the FSP analysis. In general, segments with AADTs of at least 40,000 vehicles were included, as well as connecting segments of less than 40,000 vehicles. The resulting area is referred to as the "analysis area" throughout this report, and includes:

- US-131 from 100th St to 10 Mile Rd
- I-196 from 32nd Ave to I-96
- I-96 from Fruit Ridge Ave to M-50 (Alden Nash Ave)
- M-6 from I-196 to I-96

It should be noted that although most of M-6 had AADTs of less than 40,000 vehicles, it was analyzed because it also serves as a connection between the other three routes. A map showing the AADTs of the analysis area is shown in **Figure 4**.

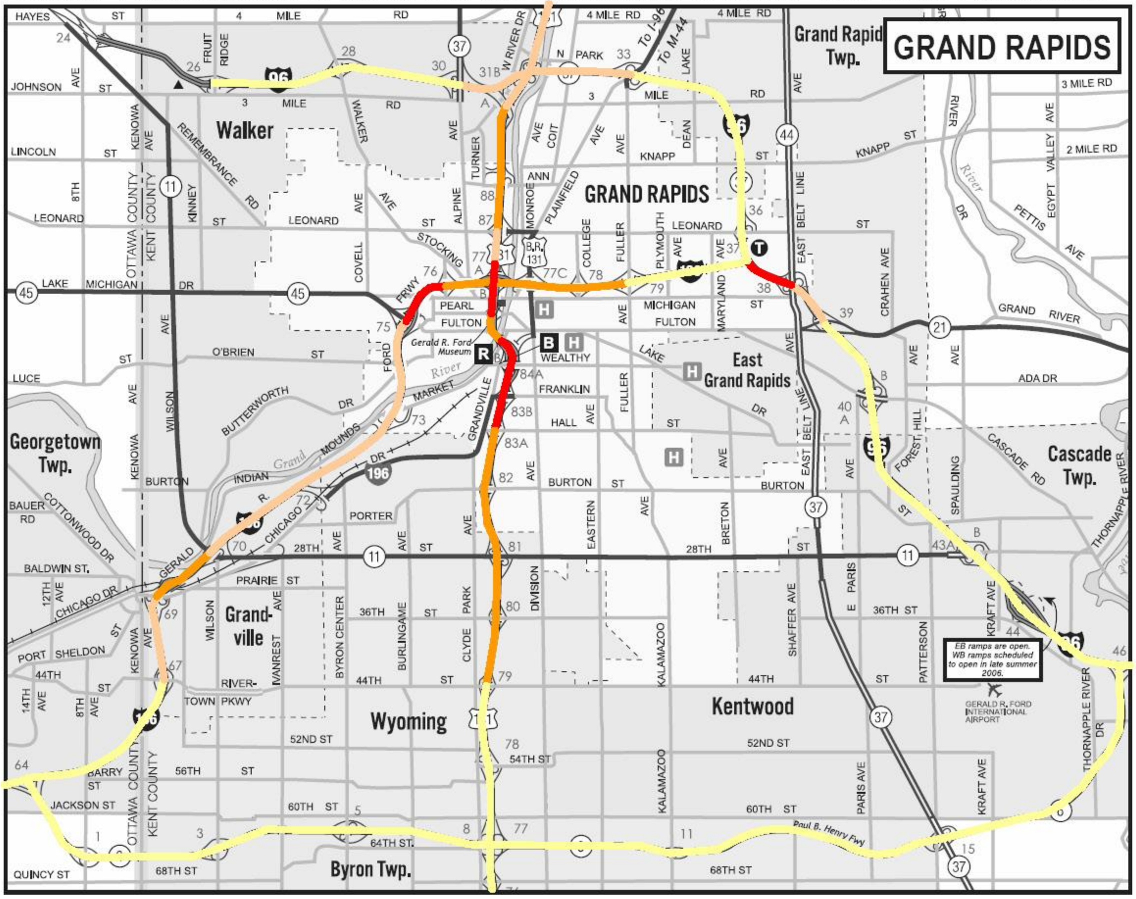
Figure 4. 2005 AADTs for Grand Rapids, Michigan.

Source: MDOT

CRASH RATES

An analysis of crashes on freeways in the Grand Rapids area was performed in order to identify the areas that may benefit most from the implementation of an FSP. UD-10 crash report summaries were obtained from the state database for all freeways in the analysis area for 2005 and 2006. Data from earlier years was also available but not used, since much of M-6 did not open until November 2004. Each crash was then assigned to a freeway segment based on location. Shown below in **Figure 5** are the crash rates for each segment, expressed in both annual crashes per mile as well as crashes per one-hundred-million vehicle miles (100MVM). The results show that the crash rates are higher for segments that have higher AADTs. The freeway segments with geometric issues, as discussed in the previous section, also have higher crash rates. A more detailed breakdown of the annual crash rates for each segment, as well as the number of crashes per 100 million vehicle miles, can be found in **Appendix A**.

Figure 5. Annual number of crashes per centerline mile for freeways in the Grand Rapids area.



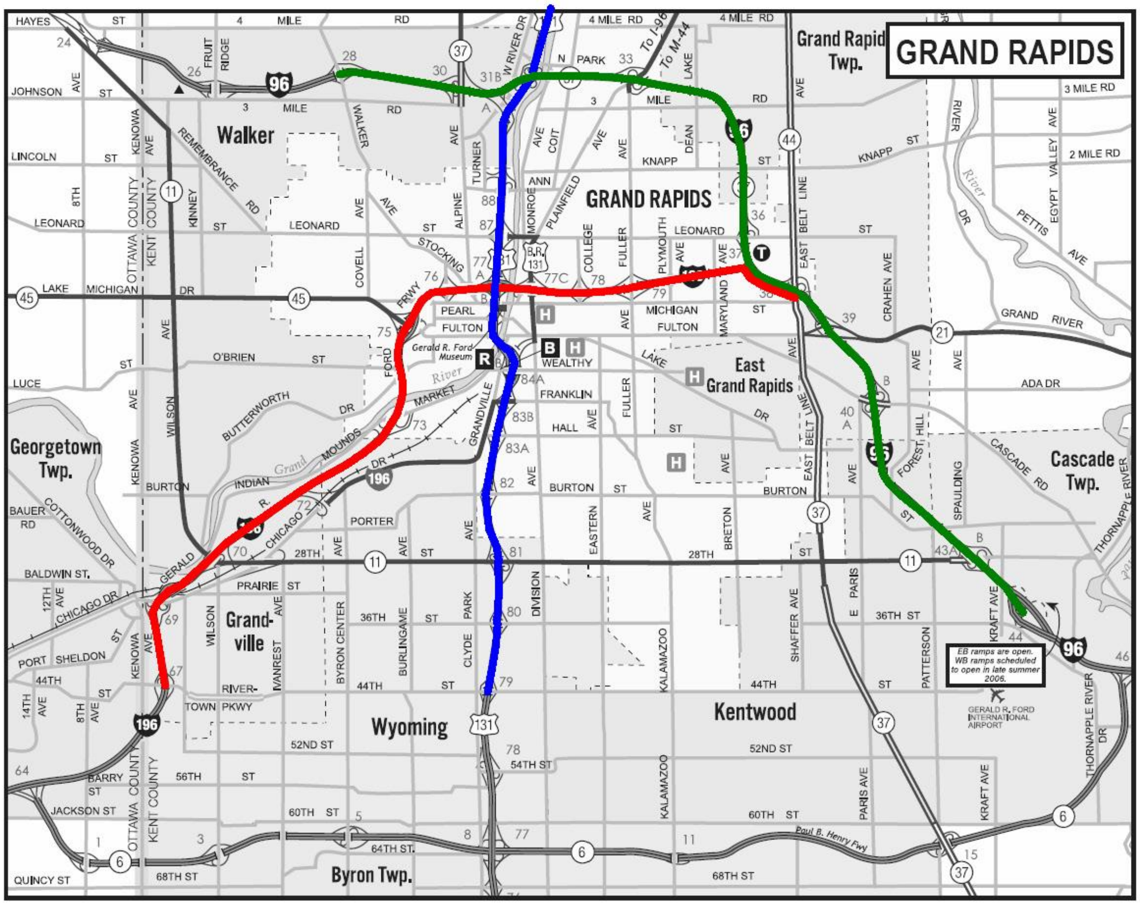
KEY: 0 – 29.9 | 30 – 49.9 | 50 – 79.9 | 80 + (Crashes per Centerline Mile)

One of the warrants used by the Ohio Department of Transportation in determining whether or not to implement a service patrol is a three-year crash history on a two-mile segment of freeway of at least 200 crashes, or approximately 33 crashes per centerline mile per year. Using an annual crash rate of 30 crashes per centerline mile as a minimum level for providing FSP coverage for a freeway segment, there are several locations in the Grand Rapids area that could benefit from the services of an FSP. These include:

- US-131 from 44th St to West River Dr
- I-196 from 44th St to Fuller Ave
- I-96 from M-37 (Alpine Ave) to M-44 CONN (Plainfield Ave)
- I-96 from I-196 to M-21 (Fulton St)

These segments represent approximately 45% of the centerline miles of freeway within the study area, yet it is estimated that more than 70% of incidents within the study areas would occur within these areas. Based on a typical urban FSP route length of 10-20 centerline miles per route, and including additional segments needed to create continuous and balanced routes, a possible coverage map for a three-route operation in these areas was developed, and is shown below in **Figure 6**.

Figure 6. Possible Route Map for Three-Route FSP.

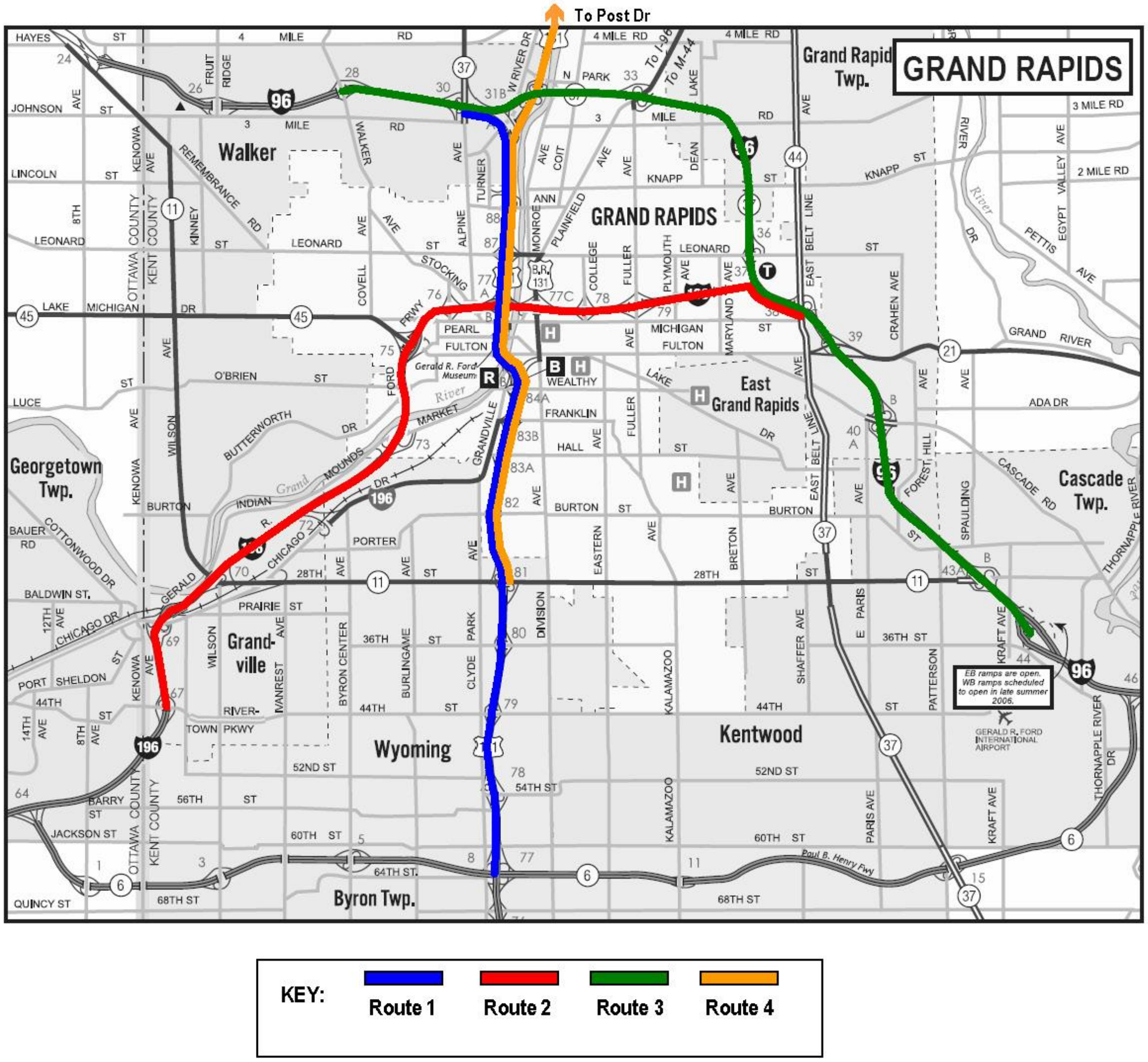


KEY: Route 1 Route 2 Route 3

Route 1 covers US-131 between 44th St and West River Dr, Route 2 covers the I-196/I-96 corridor between 44th St and M-37/M-44 (East Beltline Ave), and Route 3 covers I-96 between Walker Ave and 36th St. There is a section of Routes 2 and 3 that overlap due to the need for Route 2 to turn around; however this is also an area with a high number of crashes, so extra coverage on this segment would probably be beneficial. In addition, Route 3 has been extended on each end into areas with approximately 25 crashes per centerline mile, to provide a balance in total mileage of each route.

Route 1, which is along US-131, is likely to encounter more assist situations than the other two routes, due to higher volumes and crash rates. Therefore, it would be advisable that a fourth FSP patroller, if available, would be added to the US-131 corridor by providing double coverage in the high-crash locations and extending coverage north and south to areas of 25 or more crashes per centerline mile, as shown below in **Figure 7.**

Figure 7. Possible Route Map for Four-Route FSP.



TIME OF DAY IMPACTS

In addition to knowing where accidents are occurring, it is also important to know when they occur. For this part of the analysis, 15-minute interval count data obtained from a vehicle detector installed along US-131 near Hall St was used to create a travel profile. Three weeks of count data from both August 2006 and January 2007 were averaged to create an approximate daily travel profile. Although the data was collected for US-131 at Hall St, it is assumed that similar time-of-day traffic patterns exist on other area freeways as well. Because there are significant differences between weekdays and weekends, the data was further analyzed by separating the counts into a group for weekdays (Monday-Friday) and a group for weekends (Saturday-Sunday). Similarly, the crash data was also separated into 15-minute intervals based on the reported time of the incident and into groups for weekdays and weekends. The results of these analyses are shown in **Figures 8 and 9**. In addition, the number of crashes in Grand Rapids and number of assists for the FCP in Detroit were compared, as shown in **Figure 10.**

Figure 8. Weekday Volumes (at Hall St) and Crashes (in Analysis Area).

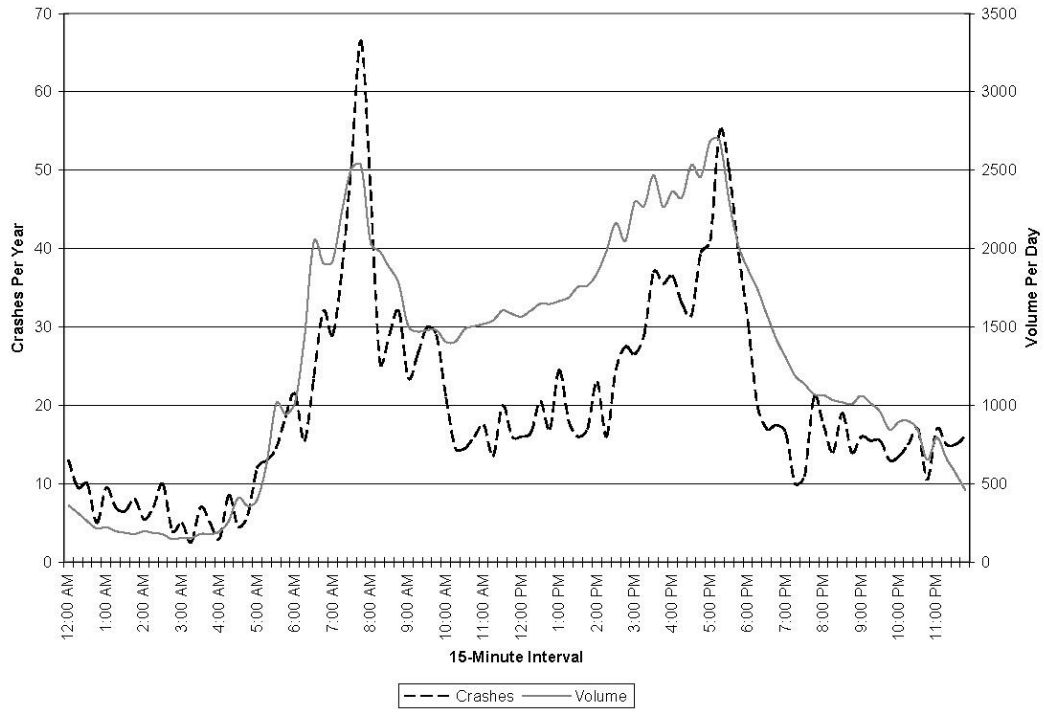


Figure 9. Weekend Volumes (at Hall St) and Crashes (in Analysis Area).

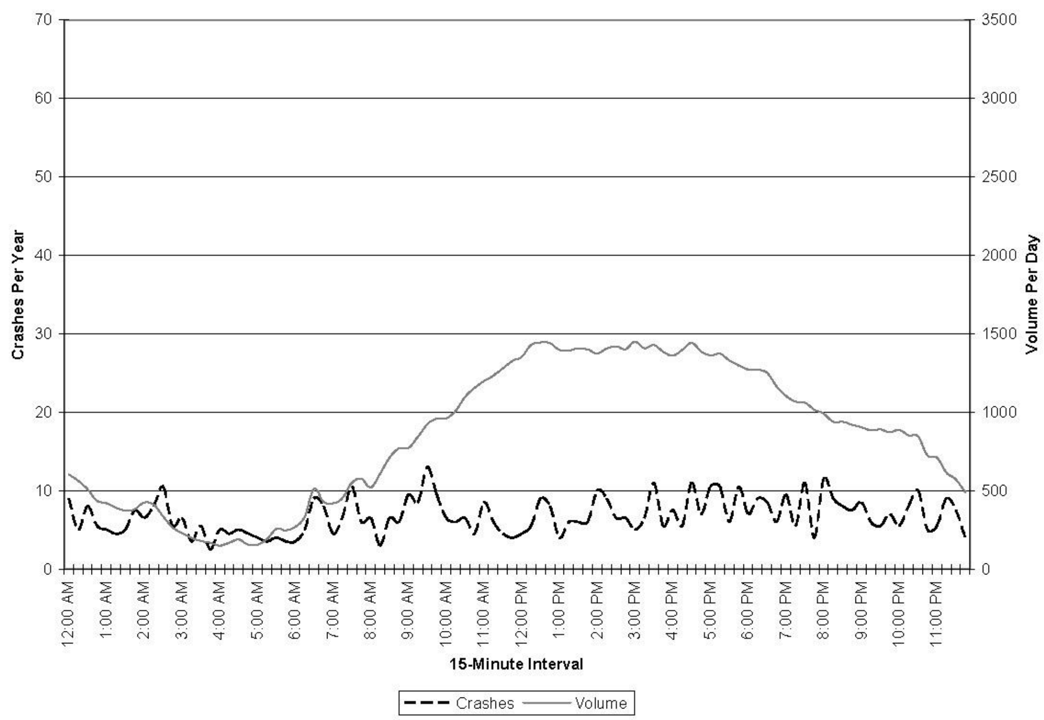
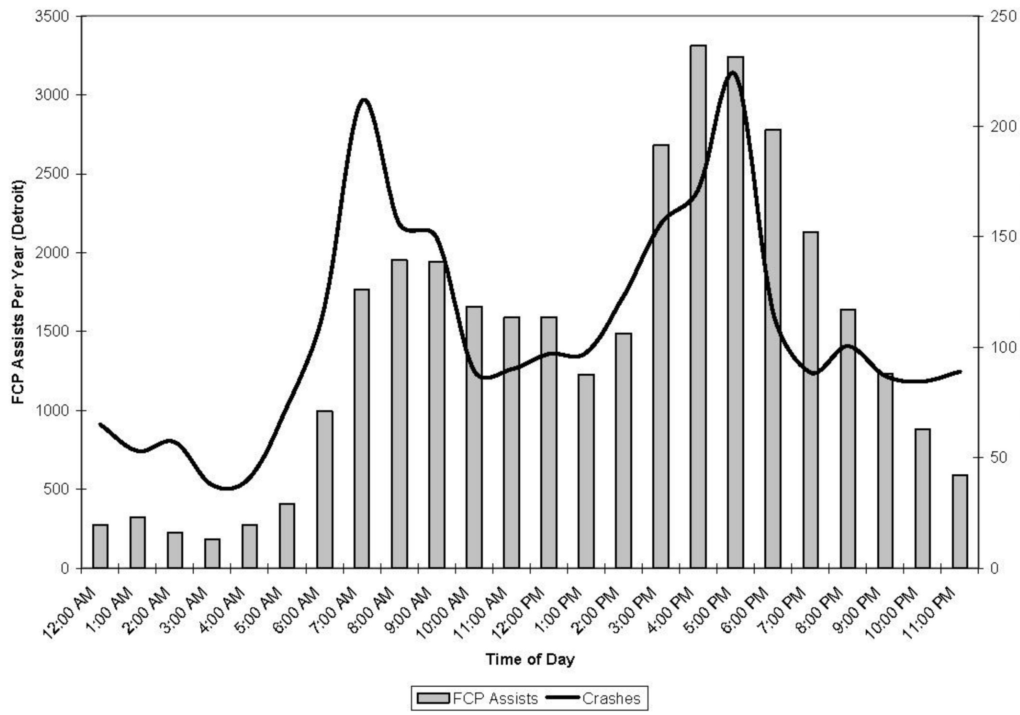


Figure 10. FCP Assists (Detroit) and Crashes (Grand Rapids) for an Average Day.



CLEARANCE TIMES

The West Michigan Traffic Management Center (WMTMC) started operation in April 2006 and has been recording observed incidents in an Activity Log since then. However, the control room is sometimes unaware of minor incidents and therefore the clearance times may reflect a higher percentage of major incidents. In addition, since the WMTMC is not a 24-hour operation, incidents occurring during the night are not recorded. The times shown in **Table 1** for the WMTMC are based on 1,090 recorded incidents observed during one year of control room operation from July 1, 2006 through June 30, 2007. Times from Detroit and Hampton Roads are also included for comparison. Since many incidents are not included, these times are approximations that are based only upon the data currently available. In most cases, the recorded WMTMC clearance time indicates the time for all involved vehicles to be cleared from the freeway, not the amount of time an incident blocked a lane of traffic. A further analysis using times from local law enforcement dispatch data may be warranted for future analysis of incident clearance times in Grand Rapids.

Table 1. Incident Clearance Times.

Incident Type	Grand Rapids WMTMC	Detroit FCP	Hampton Roads SSP
Crash	45 min	24 min	26 min
Disabled	56 min	14 min	8 min
Debris	41 min	---	6 min

* Grand Rapids: Time from WMTMC notification to incident removal
Detroit/Hampton Roads: Time from FCP/SSP arrival to incident removal

ESTIMATED ASSISTS

The data from the Detroit FCP and the Hampton Roads SSP both indicate that for every crash assist there are nine assists for other types of incidents. Data from other FSPs and a study from the FHWA are also consistent with this ratio. In the Grand Rapids analysis area there was an average of 2,576 crashes per year. Incident data obtained from the WMTMC indicates that the control room currently observes about half of the reported incidents within its coverage area and hours. Therefore, it was also assumed that the FSP might only assist in half of the crashes in a year. It should be noted that although this assumption seems reasonable given the assumed FSP coverage area and frequency, it is likely that the actual percentage would be higher or lower.

Assuming the same crash to total incident rate as the other TMCs, there would be the potential for almost 13,000 assists per year in the analysis area. However, the operating hours and coverage area would also impact the actual number of assists. **Table 2** shows the estimated number of assists depending upon the hours of operation and patrol area of the FSP.

Table 2. Estimated FSP Assists for Grand Rapids Area

Operational Hours	Crash Percentage	Analysis Area	3 Routes	4 Routes
Mon-Fri, 6AM-10AM & 2PM-6PM	41.4%	5330	3790	4140
Mon-Fri, 6AM-8PM	57.8%	7440	5290	5780
7 Days, 6AM-8PM	73.3%	9440	6710	7330
7 Days, 24 Hours	100.0%	12880	9160	10010

* 3-Route and 4-Route coverage areas are shown in Figures 6 and 7 respectively.

ESTIMATED COSTS

The cost of providing an FSP is highly dependant upon the number of vehicles on the road and number of hours that services are provided. The coverage area of the FSP does not necessarily affect the cost significantly, and mostly impacts the frequency of the service. The number of trucks in the fleet is not a significant cost factor. A larger fleet will have a higher initial cost, however each truck will be used less and will therefore need less maintenance and will not need to be replaced as soon. For purposes of this analysis, the operating cost of the trucks and drivers that would be out on the freeway will be analyzed, as well as the cost of a supervisor to manage and dispatch for the FSP. Not included in the cost are initial startup costs, building costs, or MDOT management costs.

To illustrate typical FSP costs, information provided by the Hampton Roads SSP was reviewed. The SSP operates one truck per shift on each of 11 routes, 24 hours per day, 7 days per week. The SSP also operates two additional trucks during peak hours, which assist on other routes as needed. Staffing for the SSP is supplied by URS, the SSP contractor. Based on the averaged burdened rate (base salary plus overhead and benefits) that VDOT pays URS, with adjustments taken into account for the differences in size and location of the two operations, estimated costs for employees and vehicles were determined for a Grand Rapids FSP and are shown in **Tables 3 and 4**.

For estimation purposes, the cost of a building or an FSP Manager was not included, as it is likely that the FSP could share dispatch space with the WMTMC, and that one person could function as both the FSP Manager and the WMTMC Operations Manager for at least the first few years of operation. The total estimated cost for Supervisors/Dispatchers, Patrollers, and vehicles needed to operate the FSP are shown in **Table 5**.

Table 3. Estimated Cost for Supervisors/Dispatchers.

FSP Hours of Operation	Staffing Hours Per Day	Estimated Hourly Cost Per Full-Time Supervisor/ Dispatcher	Supervisor/ Dispatcher Annual Cost
Mon-Fri, 6AM-10AM & 2PM-6PM	10	$40.00/hr	$ 104,000
Mon-Fri, 6AM-8PM	16		$ 166,400
7 Days, 6AM-8PM	16		$ 232,960
7 Days, 24 Hours	27		$ 393,120

Table 4. Estimated Cost for FSP Drivers.

FSP Hours of Operation	Estimated Hourly Cost Per Full-Time Patroller	Estimated Hourly Cost Per FSP Vehicle	Staffing Hours Per Day	Annual Cost Based On One Patroller Per Route	
				3 Routes	4 Routes
Mon-Fri, 6AM-10AM & 2PM-6PM	$30.00/hr	$15.00/hr	10	$ 351,000	$ 468,000
Mon-Fri, 6AM-8PM			16	$ 561,600	$ 748,800
7 Days, 6AM-8PM			16	$ 786,240	$ 1,048,320
7 Days, 24 Hours			27	$ 1,326,780	$ 1,769,040

Table 5. Estimated Total Cost.

FSP Hours of Operation	Annual Cost Based On One Patroller Per Route	
	3 Routes	4 Routes
Mon-Fri, 6AM-10AM & 2PM-6PM	$ 455,000	$ 572,000
Mon-Fri, 6AM-8PM	$ 728,000	$ 915,200
7 Days, 6AM-8PM	$ 1,019,200	$ 1,281,280
7 Days, 24 Hours	$ 1,719,900	$ 2,162,160

* includes cost for one foreperson/dispatcher during operation hours

ESTIMATED BENEFITS

It is challenging to estimate all of the benefits that would be result from the implementation of an FSP. There were no previous studies available that evaluated the costs and benefits of an FSP prior to implementation. Two methods were used as a part of this study to estimate the potential benefits of an FSP: an estimation of traveler delay cost using a model developed by URS, and an evaluation of benefit-cost analyses by other TMCs.

UNPLANNED INCIDENT DELAY MODEL

In order to estimate traveler delays as the result of unplanned incidents, the URS office in Atlanta, Georgia developed a delay prediction model. The model analyzes the capacity of the freeway both with and without the incident, and calculates the vehicle-hours of delay and costs based on the difference between demand and the reduced capacity of the freeway. Although the model was developed in Georgia, the principles of the model apply in other locations as well. The model is currently being used by the Michigan ITS Center (MITSC) to estimate delays in the Metro Detroit area.

For this analysis, crash and disabled vehicle data were obtained from the first year of operation of the West Michigan TMC (WMTMC). Unlike UD-10 data, the WMTMC event logs contain specific incident information. This type of information is very important for the model; duration is a key factor in determining the length of a queue, and reduction in capacity is directly related to the number of lanes that are blocked. The capacity reduction factors used by the model are shown below in **Table 6**, and represent the percentage of the original capacity that exists during an incident.

Table 6. Capacity Reduction Factors.

# Of Freeway Lanes In Each Direction	Shoulder Disablement	Shoulder Crash	Lanes Blocked				
			One	Two	Three	Four	Five
2	0.95	0.81	0.35	0	NA	NA	NA
3	0.99	0.83	0.49	0.17	0	NA	NA
4	0.99	0.85	0.58	0.25	0.13	0	NA
5	0.99	0.87	0.65	0.4	0.2	0.1	0

By analyzing all of the crashes that were recorded within the WMTMC coverage area, it was found that 131 out of 409 crashes, or approximately one-third, resulted in a delay cost for motorists, including one crash that cost motorists over $300,000 in delay costs. However, only 17 out of 337 incidents involving disabled vehicles, or about 1 in 20, created a delay for motorists, with the highest delay cost being just over $14,000. Combined, the total delay cost was approximately $2.17 million for one year. The results of the analysis, without the presence of an FSP, are shown in **Table 7**.

Table 7. Delay Model Results without FSP.

	Crashes	Disabled Vehicles
Number	409	337
Average Cost	$ 5,165.33	$ 163.12
Maximum Cost	$ 308,099.30	$ 14,205.31
5 Highest Cost	$ 735,905.00	$ 48,185.45
% of Total	34.8%	87.7%
TOTAL COST	$ 2,112,620.76	$ 54,969.91
	$2,167,590.67	

To estimate the impact an FSP may have on reducing these costs, a study completed for the Northern Virginia Safety Service Patrol was evaluated. The study found that the SSP was able to reduce the duration of incidents in its service area by 17%, as compared with not providing the service. Assuming the same percentage could be achieved in Grand Rapids, the model was run a second time with all of the durations reduced by 17%. The model indicates a reduction in delay costs of nearly $675,000, or just over 30%. The results of this second analysis are shown below in **Table 8**.

Table 8. Delay Model Results with FSP.

	Crashes	Disabled Vehicles
Number	409	337
Average Cost	$ 3,558.40	$ 112.37
Maximum Cost	$ 212,249.61	$ 9,786.04
5 Highest Cost	$ 506,964.95	$ 33,194.96
% of Total	34.8%	87.7%
TOTAL COST	$ 1,455,384.44	$ 37,868.77
	$1,493,253.22	

The costs associated with operating an FSP within the current ITS network were calculated assuming that one patroller would be needed for US-131 from M-11 (28th St) to West River Dr, and one for I-196/I-96 from BS I-196 (Chicago Dr) to M-21 (Fulton St). In addition, operational hours of 6AM-8PM were assumed to match those of the WMTMC control room. The results are shown below in **Table 9**.

Table 9. Benefits and Costs based on Delay Model.

	Benefit	Cost
Delay Reduction	$674,337.46	
Forepersons/Dispatchers		$ 166,400.00
Patrollers for 2 Routes		$ 374,400.00
TOTAL	$ 674,337.46	$ 540,800.00
Benefit/Cost Ratio	**1.25**	

Since the benefit/cost ratio is greater than 1, the benefits of the service would outweigh the costs. It is also important to realize that reductions in congestion due to unplanned incidents are only one benefit out of many that an FSP would provide. Additional items that would further add to the benefits include:

- Decreased air pollution
- Reduced fuel consumption
- Prevention of some secondary collisions
- Savings for local law enforcement
- Increased convenience and security for motorists
- Positive public relations
- Customer feedback

Like any other model, there are limitations that have an impact on the accuracy of the modeling results. Some of the factors impacting traffic flow that were not considered by this model include:

- Changes in lane closures during an incident.
- Changes in demand during an incident with a long duration.
- An incident that blocks all lanes, but still allows traffic to pass on the shoulder(s).
- Weather conditions and the impact on freeway speeds and capacity.
- Multiple emergency vehicles at a scene and “gawker” delays.
- ITS devices that alert drivers and allow them to take an alternate route.
- Traffic reports provided by the media that may advise motorists to take a different route.
- Alternate routes that are available once a motorist is in a queue.
- Accuracy of the WMTMC log data, since exact start times are not always reported or known.

Unfortunately, many of these variables are very difficult, if not impossible, to calculate. However, it may be possible to refine and calibrate this model to better fit traffic in the Grand Rapids area in the future, particularly following the expected installation of vehicle detection sensors throughout the system.

ANALYSIS OF BENEFIT/COST RATIOS OF OTHER TMCS

This method involved using the reported cost-benefit ratios of the Detroit FCP and Hampton Roads FSP, which includes the benefits of reductions in congestion and excess fuel usage, combined with the known operational costs of each operation, to determine the total dollar benefit of each service. Since the number of assists are also know, a benefit per assist can be calculated for each location. Assuming a linear relationship between benefit per assist and average motorist delay, as reported by the Texas Transportation Institute’s 2005 Urban Mobility Report, a local benefit per assist could be approximated. **Table 10** shows the calculations that were performed to estimate the amount of benefit per assist that might be realized in the Grand Rapids area. The result of the calculations was an estimated benefit of approximately $600 per assist.

Table 10. Anticipated Benefit Per Assist for Grand Rapids.

	Detroit FCP	Hampton Roads SSP
Reported Annual Operating Cost	$2,300,000	$4,832,545
Reported Benefit/Cost Ratio	16.1	6.2
Calculated Annual Benefit	$37,030,000	$29,961,779
Reported Number Of Assists	34351	44211
Calculated Benefit Per Assist	$1,078	$678
Annual Delay Per Traveler (hr)	57	26
Benefit Decrease Per Delay-Hour Decrease	$12.90	
Grand Rapids Delay Per Traveler (hr)	19	
Grand Rapids Benefit Per Assist	**$587**	

The total dollar amount of benefit will vary depending on the coverage area and hours of operation. The estimated benefits shown in **Table 11** are based on the number of estimated assists for each coverage area. The actual benefit would vary depending on the actual number of assists provided by the FSP.

Table 11. Maximum Estimated Benefit for Varying FSP Coverage.

Operational Hours	Analysis Area	3 Routes	4 Routes
Mon-Fri, 6AM-10AM & 2PM-6PM	$ 3,128,710	$ 2,224,730	$ 2,430,180
Mon-Fri, 6AM-8PM	$ 4,367,280	$ 3,105,230	$ 3,392,860
7 Days, 6AM-8PM	$ 5,541,280	$ 3,938,770	$ 4,302,710
7 Days, 24 Hours	$ 7,560,560	$ 5,376,920	$ 5,875,870

Similar to the incident delay modeling results, these benefits include the reduction in congestion as the result of an FSP service. In addition, these numbers also include the cost of excess fuel usage, so it is reasonable that the benefits are higher in this analysis. However, the following potential factors are still not included:

- Decreased air pollution
- Prevention of some secondary collisions
- Savings for local law enforcement
- Increased convenience and security for motorists
- Positive public relations
- Customer feedback

The benefit to cost ratio of implementing an FSP varies depending on the number of FSP drivers on the road at a given time, as well as the number of potential assists that may exist within the coverage area. **Table 12** shows the estimated benefit to cost ratios, which are dependent upon the number of hours of operation and the coverage area. As expected, the ratios decrease as the numbers of employees and hours increase. All of the benefit-to-cost ratios below are generally in the range of 3:1 to 5:1.

Table 12. Estimated FSP Benefit/Cost Ratios for possible FSP routes.

FSP Hours of Operation	Number of Routes	
	3 Routes	4 Routes
Mon-Fri, 6AM-10AM & 2PM-6PM	4.9	4.2
Mon-Fri, 6AM-8PM	4.3	3.7
7 Days, 6AM-8PM	3.9	3.4
7 Days, 24 Hours	3.1	2.7

RECOMMENDATIONS

It is recommended that MDOT begin the process of creating an FSP for the Grand Rapids area to improve safety and clearance times associated with incident management. As development continues to occur and the Grand Rapids area expands, congestion is likely to only get worse. Unplanned incidents can create significant issues particularly on urban freeways, including traveler delay, air pollution, and the increased potential for a secondary collision. By providing a safer environment for incident management activity and clearing incidents as quickly as possible, such services are beneficial not only to the motorist directly receiving the service, but also to the first responder community and other travelers.

Crash data obtained during the first year of operation of the WMTMC and from the state TMS database indicate that there are several sections of freeway in the Grand Rapids metropolitan area that have a disproportionately large number of incidents. In addition, it is estimated that there could be upwards of 13,000 potential assists per year in the analysis area, and approximately 10,000 per year within the 4-route coverage area.

In order to get the FSP started in the Grand Rapids area, it is recommended that the program start relatively small and grow incrementally. Providing service during peak hours only, or during the normal WMTMC operating hours, would be recommended as a first step. Three routes operating from 6AM-8PM should be able to assist approximately 5,000 motorists per year. Because of the similarity in operating hours with the WMTMC, dispatchers for the FSP could be located at the WMTMC and work with the Control Room Operators to handle freeway incidents. The benefit to cost ratio at this service level ranges from 3:1 to 5:1. If an FSP is started in the Grand Rapids area, it is recommended that additional analyses be conducted to confirm that the motoring public is receiving benefits from the service and to calculate a benefit-cost ratio for the FSP.

It may be beneficial to utilize an FSP service on freeway segments that have CCTV and DMS field devices, in order to assist with FSP dispatching and associated incident notification. Approximately 70% of the coverage area identified for the initial FSP deployment is currently covered by CCTV cameras. It may be desirable to fill in the gaps in CCTV coverage prior to implementing an FSP, especially in areas with high crash rates. However, there are many FSPs which patrol areas not covered by CCTV, so this would not necessarily be required.

Additionally, before an FSP is started, some issues that will require consideration include:

- Laws of the State of Michigan regarding the services and operation of an FSP
- Cooperation from towing operators and potential impacts on their businesses
- MDOT vs. Contractor operation of the service
- Vehicle ownership and maintenance

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APPENDIX A - CRASH RATE DATA

Table A1. Annual Crash Rates for US-131.

Segment	Crashes Per CL Mile	Crashes Per 100MVM
100th St - 84th St	18.7	117.5
84th St - 76th St	14.6	107.2
76th St - M-6	19.6	86.1
M-6 - 54th St	17.3	80.4
54th St - 44th St	25.6	103.3
44th St - 36th St	60.6	221.4
36th St - 28th St	50.1	154.9
28th St - Burton St	73.6	209.9
Burton St - Hall St	77.2	215.4
Hall St - Franklin St	107.5	298.1
Franklin St - Market Ave	127.5	352.5
Market Ave - Pearl St	50.8	136.3
Pearl St - 6th St	116.3	365.1
6th St - Leonard St	46.2	121.8
Leonard St - Ann St	56.6	166.6
Ann St - I-296	71.7	209.1
I-296 - I-96	38.8	188.8
I-96 - West River Dr	49.5	200.9
West River Dr - Post Dr	29.2	152.2
Post Dr - 10 Mile Rd	24.4	132.3

Table A2. Annual Crash Rates for I-196.

Segment	Crashes Per CL Mile	Crashes Per 100MVM
32nd Ave - M-6	24.0	156.1
M-6 - Kenowa Ave	10.4	76.0
Kenowa Ave - 44th St	15.5	113.6
44th St - Chicago Dr	36.7	216.5
Chicago Dr - 28th St	55.8	237.4
28th St - Chicago Dr	34.4	173.9
Chicago Dr - Market Ave	36.8	189.7
Market Ave - Lake Michigan Dr	39.5	216.5
Lake Michigan Dr - Lane Ave	90.0	521.3
Lane Ave - US-131	74.4	367.1
US-131 - Ottawa Ave	71.5	268.1
Ottawa Ave - College Ave	60.7	225.2
College Ave - Fuller Ave	57.9	229.1
Fuller Ave - I-96	22.1	118.8

Table A3. Annual Crash Rates for I-96.

Segment	Crashes Per CL Mile	Crashes Per 100MVM
Fruit Ridge Ave - Walker Ave	20.2	124.7
Walker Ave - Alpine Ave	25.1	122.6
Alpine Ave - US-131	47.7	434.4
US-131 - Plainfield Ave	35.1	166.8
Plainfield Ave - Leonard St	14.5	90.7
Leonard St - I-196	26.1	168.2
I-196 - East Beltline Ave	83.6	231.1
East Beltline Ave - Fulton St	41.9	115.9
Fulton St - Cascade Rd	26.2	104.3
Cascade Rd - 28th St	20.2	121.9
28th St - 36th St	25.2	200.1
36th St - M-6	17.8	141.6
M-6 - Alden Nash Ave	12.4	78.2

Table A4. Annual Crash Rates for M-6.

Segment	Crashes Per CL Mile	Crashes Per 100MVM
I-196 - 8th Ave	9.9	107.7
8th Ave - Kenowa Ave	12.4	127.5
Kenowa Ave - Wilson Ave	7.8	79.9
Wilson Ave - Byron Center Ave	8.9	76.4
Byron Center Ave - US-131	10.9	79.7
US-131 - Kalamazoo Ave	7.5	46.7
Kalamazoo Ave - Broadmoor Ave	11.7	82.6
Broadmoor Ave - I-96	10.1	107.3

Appendix E

Identified Capacity Deficiencies and Solutions

2035 GVMC Base Road Capacity Deficiencies file goes here

Appendix F

Travel Time Index Report

GVMC Travel Time Study Report

March, 2010

Table of Contents

1. Introduction

A travel time study was initiated in 2007 with an objective of providing travel time and speed data in the travel demand model. A second objective of this study is to provide congestion indicator for use in subsequent congestion management process.

A portable GPS receiver was used in this study to automatically record vehicle position, travel speed and time during the data collection process at short time interval, which is every two second. Also, GPS data are compatible with GVMC's GIS architecture, thereby make it possible to display individual vehicle trajectories on GVMC's GIS map and to obtain travel time data and speed data for highway segments and corridors. In addition, compared with traditional manual travel time data collection, GPS technique only needs one person in the vehicle, and obtain much accurate and detailed data.

The travel time study used float vehicle technique, which means the driver should follow the flow of traffic. During the data collection period, the driver attempts to pass the same number of vehicles as pass it.

Due to the limitation of resources, only a few of routes within GVMC area were selected for travel time collection, including M6, I196, I96, US131, M44, 28^{th} street, 44^{th} street. The selected routes were divided into several segments, and each segment was traversed at a half hour interval during the AM peak (7:00-9:00am), PM peak (4:00-6:00pm), and off peak period(9:00am-4:00pm) on three school days. Additionally, AM peak and PM peak travel time data for three other routes, including Division street, Fulton street, and

Alpine Ave., was obtained from the consultant company Iteris, which is conducting an ongoing traffic signal optimization project for the city of Grand Rapids. The surveyed routes in this study are shown in Figure 1 below.

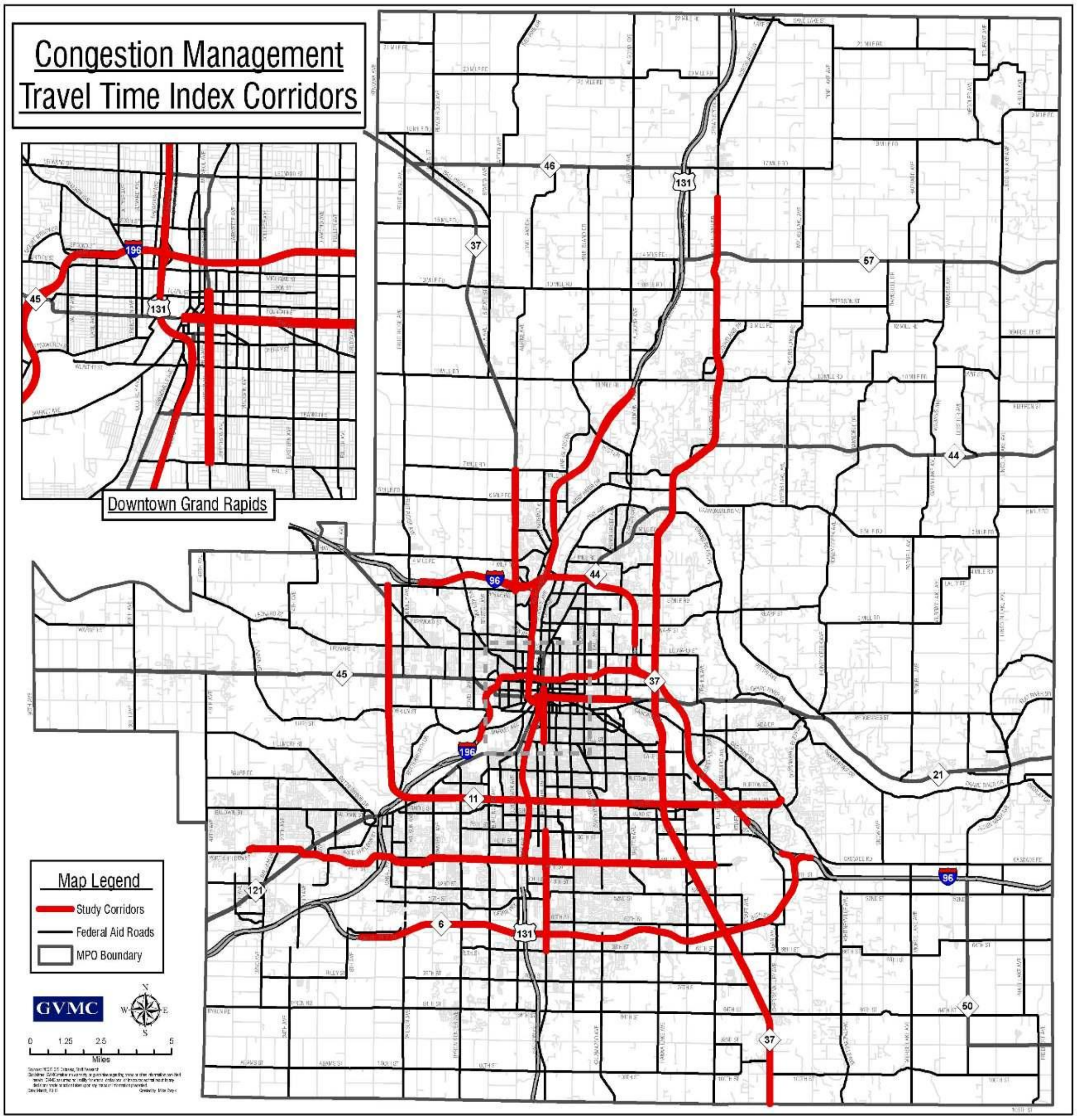

Figure 1 Surveyed Corridors in the Study

2. Scope of Study

The study area will encompass Kent county and a part of Ottawa county. All freeways, MDOT trunklines will be included in this study or in future studies. Other federal-aid routes in the MPO area are also planned to be included.

3. Methodology

The GPS equipment and the laptop used in the study are shown in Figure 2 below. The GPS model is Gramin GPSMAP 76CSx, which has the capability to record position, time and speed of individual vehicle at a short interval of every two second. Coupled with GIS map, it can record vehicle trajectories on the map so that travel time and speed for individual highway segments and routes can be calculated.

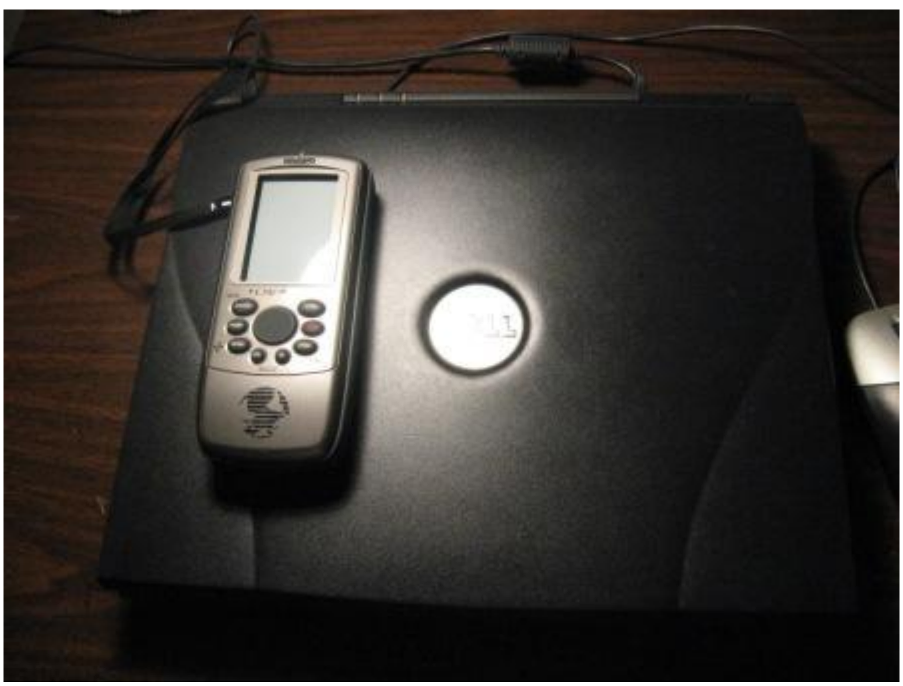

Figure 2 GPS Equipment

The floating vehicle technique was used in the travel time study. In the floating vehicle technique, the testing vehicle stays floating with the existing traffic, and the driver attempts to pass as many vehicle as pass the testing vehicle.

As shown in the following graph, GPS recorded position, speed and time for each run on the GVMC GIS map, and a spreadsheet was created to document travel time for individual segments, then vehicle travel speed can be calculated based on distance and travel time. Average travel time and speed for AM peak, PM peak and off peak was then obtained with the exception of the data for the three corridors collected by the consulting company, Iteris, which only conducted AM and PM peak travel time study.

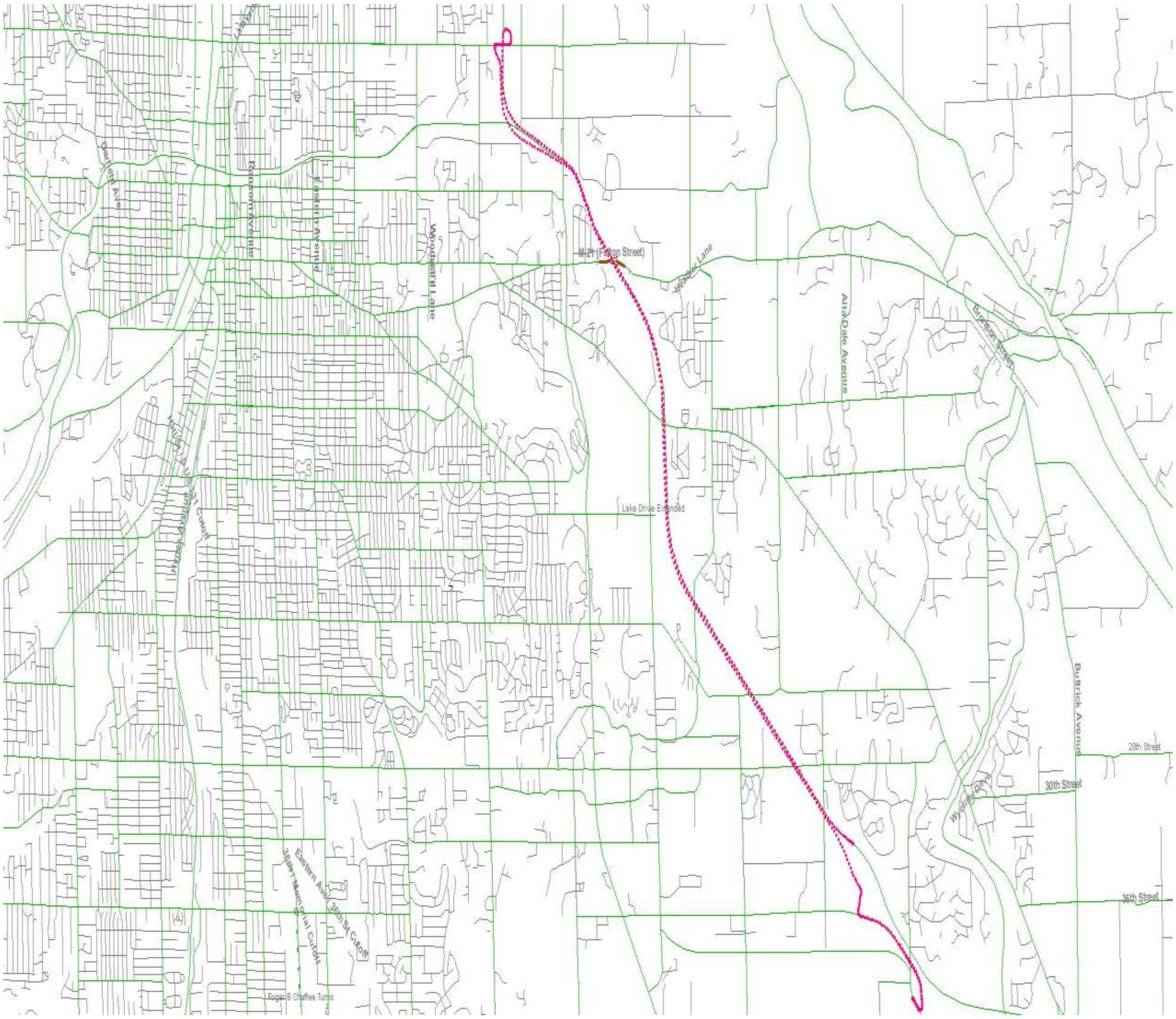

Figure 3 Sample Graph of GPS Record along a section of I 96

ID	818
Longitude	-85566618
Latitude	42939362
PT_ID	818
TIME	11:17:23.0
DATE	09/05/07
COURSE	176.80
SPEED	69.500
ALTITUDE	854.30
DGPS	0
HDOP	2.20

Figure 4 Sample GPS Record

Travel Time Index(TTI) was used in this study to identify congested locations. TTI is the ratio of peak period time to free flow travel time. It indicates the amount of extra time a vehicle takes to travel in the peak period compared to free flow travel. A TTI of 1.5, for example, means a 20-minute free flow travel will take 30 minutes during the peak travel time periods. In this study, a travel time index greater than 1.80 indicates severe congestion, while a travel no congestion time index smaller than 1.35 means for the specific links. Moderate congestion is identified by TTI between 1.35 and 1.80.

TTI during each time period for each segment can be obtained based on the posted speed limit and calculated travel speed. Then the congestion maps for AM peak, Off-peak, and PM peak, as shown in the following Figure 5, 6 and 7, can indicate clearly the congested locations in the GVMC area.

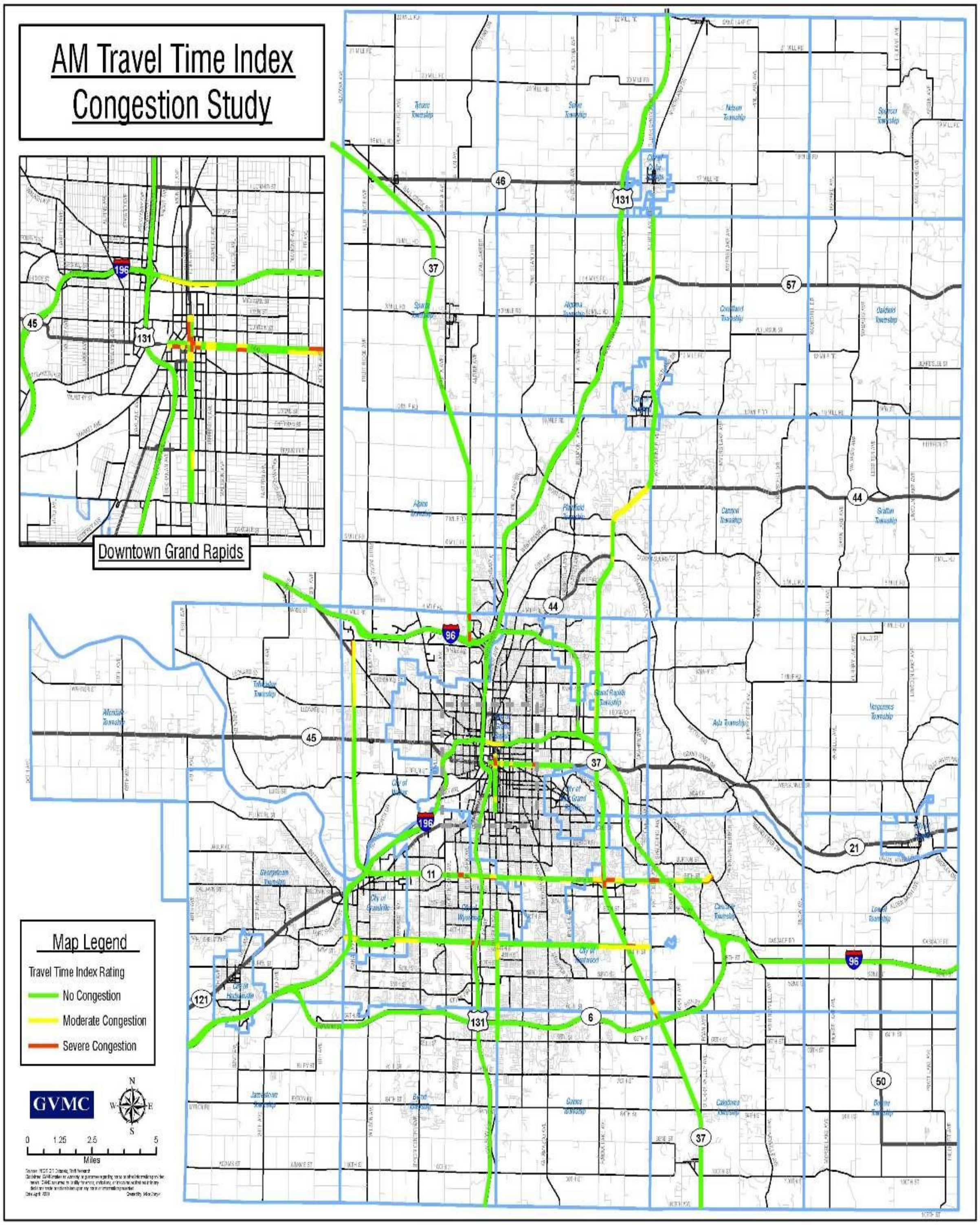

Figure 5 AM Peak Travel Time Index

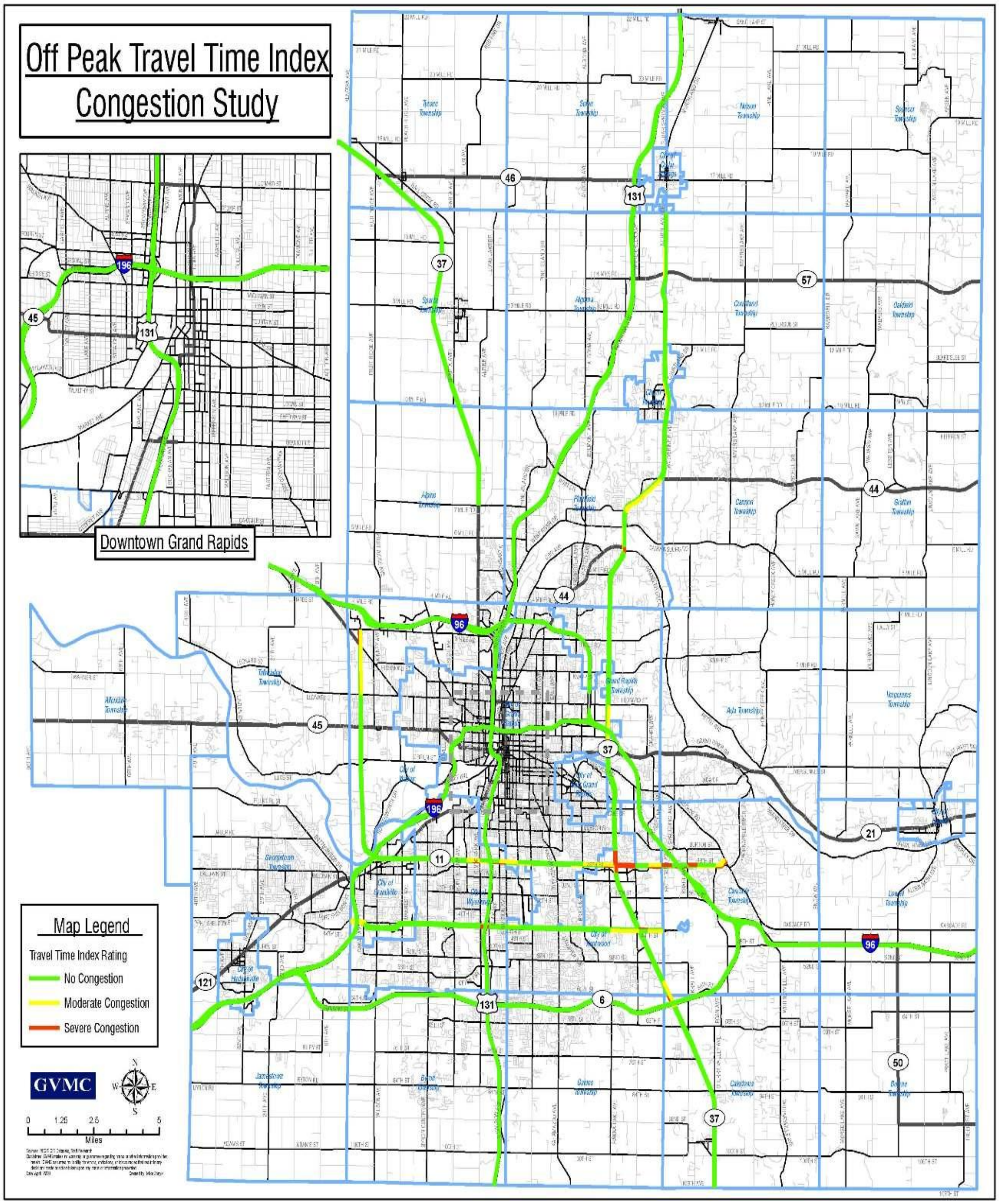

Figure 6 Off Peak Travel Time Index

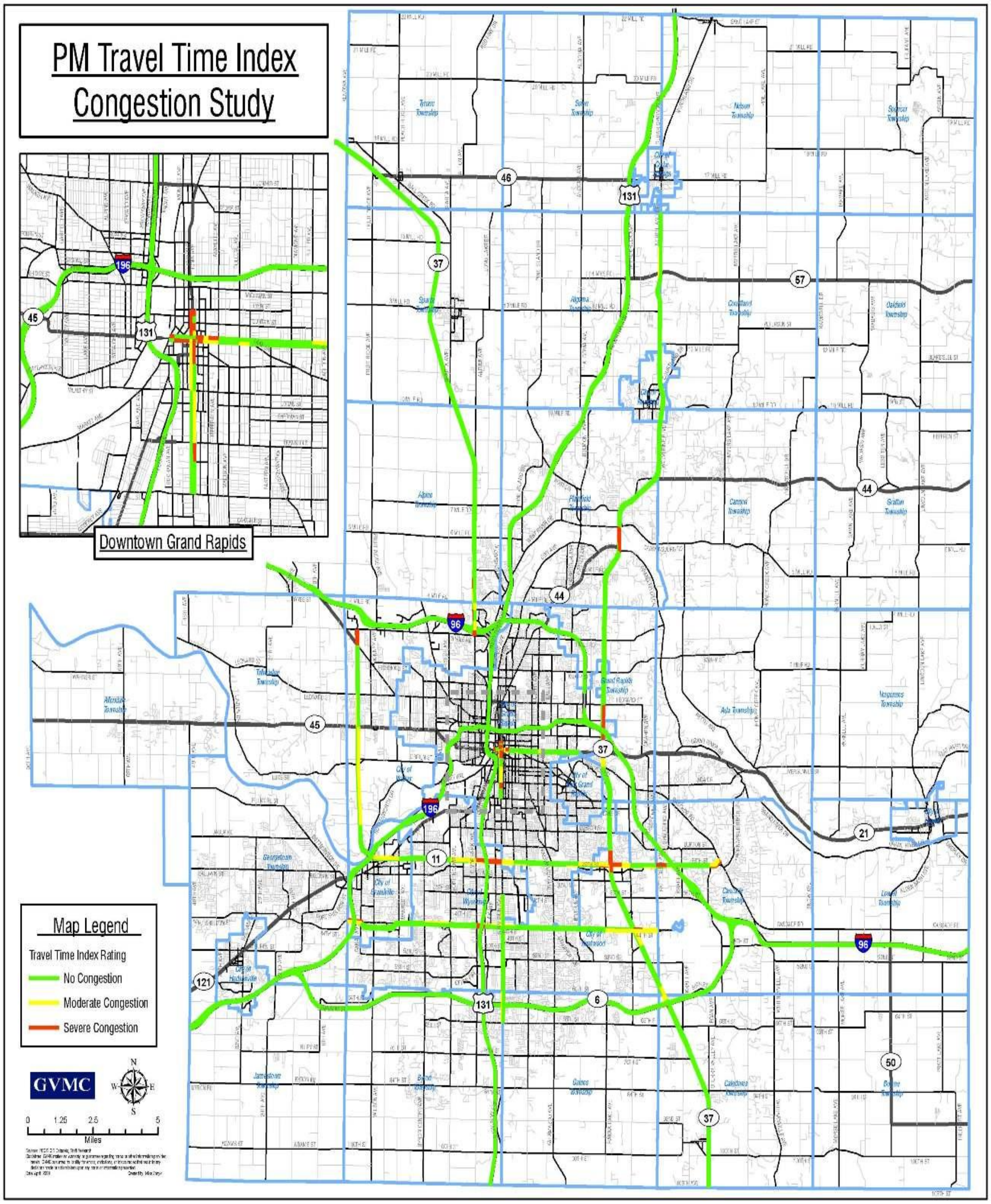

Figure 7 PM Peak Travel Time Index

4. Conclusions

The methodology described in this document works well in the travel time study for specific corridors. The GPS unit is able to provide accurate data of time and travel speed, which would be difficult to measure with traditional manual methods. Also, it's easy to download the digital data from the GPS unit to computer for further calculations and analysis. Therefore, the travel time study achieved its objectives, including providing travel time and speed data for the travel demand model, and providing congestion indicator for use in subsequent congestion management process.

Appendix: Travel Time Index for Corridors

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
28th St. WEST	Cascade	Thornhills Ave	0.42	40	1.63	24.48	1.63	24.48	1.71	23.37	1.66
	Thornhills Ave	Chaelevoix	0.72	40	0.97	41.08	1.13	35.33	0.97	41.27	1
	Chaelevoix	Kraft Ave	0.38	40	1.58	25.33	1.82	21.93	1.25	31.93	1.47
	Kraft Ave	I 96 on Ramp	0.23	40	1.02	39.37	1.11	36.01	1.03	38.74	1.04
	I 96 on Ramp	Hotel Ave	0.48	40	1.06	37.89	1.26	31.64	1.24	32.25	1.16
	Hotel Ave	Patterson Ave	0.27	40	1.92	20.87	1.84	21.7	1.85	21.66	1.87
	Patterson Ave	Acquest Ave	0.5	40	1.1	36.41	1.39	28.73	1.08	37.14	1.14
	Acquest Ave	East Paris Ave	0.5	40	1.04	38.43	1.12	35.79	1.09	36.55	1.08
	East Paris Ave	Lake Eastbrook Blvd	0.32	40	1.48	27.01	2.53	15.8	1.55	25.86	1.65
	Lake Eastbrook Blvd	East Beltline Ave	0.42	40	2.43	16.43	3.01	13.31	2.78	14.4	2.67
	East Beltline Ave	Radcliff Ave	0.432	40	1.45	27.61	1.7	23.49	1.52	26.27	1.52
	Radcliff Ave	Breton Rd	0.824	40	1.35	29.56	1.37	29.11	1.53	26.14	1.42
	Breton Rd	Englewood Ave	0.434	40	1	39.94	0.98	40.76	1.03	38.8	1.01
	Englewood Ave	Kalamazoo Ave	0.577	40	1.22	32.71	1.29	31.1	1.28	31.17	1.26
	Kalamazoo Ave	Eastern Ave	0.965	40	1.03	38.78	1.16	34.34	1.19	33.67	1.12
	Eastern Ave	Madison Ave	0.498	40	1.07	37.27	1.19	33.48	1.14	34.96	1.12
	Madison Ave	Division Ave	0.462	40	1	40.16	1.77	22.63	1.45	27.61	1.26
	Division Ave	Buchanan Ave	0.25	40	1.36	29.4	1.51	26.49	3.52	11.37	1.85
	Buchanan Ave	US131 on Ramp	0.289	40	1.1	36.4	1.23	32.4	2.09	19.14	1.39
	US131 on Ramp	US131 off Ramp	0.133	40	1.08	36.89	0.99	40.41	1.48	27.03	1.19
	US131 off Ramp	Clyde Park Ave	0.328	40	1.33	30.09	1.21	33.03	2.1	19.07	1.52
	Clyde Park Ave	Jenkins Ave	0.279	40	1.08	37.18	1.42	28.19	1.47	27.21	1.27
	Jenkins Ave	De Hoop Ave	0.219	40	2	20	1.55	25.85	1.7	23.52	1.77
	De Hoop Ave	Burlingame Ave	0.498	40	1.04	38.53	1.28	31.37	1.52	26.35	1.24
	Burlingame Ave	Byron Center Ave	0.995	40	1.25	32.01	1.25	32.04	1.08	37.17	1.17
	Byron Center Ave	Ivanrest Ave	0.975	40	1.14	35.17	1.24	32.26	1.3	30.74	1.22
	Ivanrest Ave	Wilson Ave	0.973	40	1.1	36.3	0.99	40.28	1.37	29.15	1.17
	Wilson Ave	Butterworth	0.3	40	1.01	39.59	1	40.03	1.04	38.55	1.02
	Butterworth	Burton	0.97	45	0.93	48.51	0.85	53.2	0.95	47.34	0.92
	Burton St	Lake Michigan Dr	3.02	55	1.35	40.68	1.3	42.28	1.54	35.77	1.41
	Lake Michigan Dr	Leonard St	1	45	1.19	37.93	1.28	35.02	1.28	35.08	1.24
	Leonard St	Rememberance Rd	1.52	55	1.37	40.07	1.49	36.93	1.35	40.62	1.39
	Rememberance Rd	3 Mile Rd	0.48	55	1.71	32.25	1.68	32.65	1.85	29.69	1.76

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
28th St. EAST											
	3 Mile Rd	Rememberance Rd	0.48	55	2.09	26.35	2.18	25.28	2.14	25.65	2.13
	Rememberance Rd	Leonard St	1.52	55	1.21	45.32	1.17	46.91	1.29	42.59	1.23
	Leonard St	Lake Michigan Dr	1	45	1.57	28.58	1.22	36.88	1.77	25.38	1.55
	Lake Michigan Dr	Burton St	3.02	55	1.16	47.48	1.19	46.15	1.17	47.17	1.17
	Burton St	Butterworth	0.97	45	1	45.01	1.12	40.26	1.07	41.88	1.05
	Butterworth	Wilson Ave	0.3	40	1.93	20.76	1.77	22.63	1.97	20.28	1.91
	Wilson Ave	Ivanrest Ave	0.973	40	1.06	37.64	1.05	38.22	1.1	36.33	1.07
	Ivanrest Ave	Byron Center Ave	0.975	40	1.03	38.78	0.94	42.7	0.96	41.54	0.98
	Byron Center Ave	Burlingame Ave	0.995	40	1.3	30.68	1.26	31.84	1.09	36.75	1.2
	Burlingame Ave	De Hoop Ave	0.498	40	1.31	30.61	1.35	29.58	1.33	30.12	1.32
	De Hoop Ave	Jenkins Ave	0.219	40	1.06	37.7	1.11	36.14	1.04	38.62	1.06
	Jenkins Ave	Clyde Park Ave	0.279	40	2.51	15.96	3.44	11.62	1.6	25.07	2.14
	Clyde Park Ave	US131 off Ramp	0.328	40	1.42	28.09	1.41	28.29	1.41	28.36	1.42
	US131 on Ramp	US131 off Ramp	0.133	40	1.25	32.1	1.21	33.03	1.32	30.41	1.27
	US131 off Ramp	Buchanan Ave	0.289	40	2.01	19.88	2.04	19.63	1.89	21.18	1.97
	Buchanan Ave	Division Ave	0.25	40	4.06	9.85	3.42	11.69	1.87	21.41	2.7
	Division Ave	Madison Ave	0.462	40	1.26	31.86	1.33	30.17	1.37	29.22	1.31
	Madison Ave	Eastern Ave	0.498	40	1.39	28.75	1.43	27.99	1.37	29.21	1.39
	Eastern Ave	Kalamazoo Ave	0.965	40	1.36	29.31	1.26	31.68	1.35	29.57	1.34
	Kalamazoo Ave	Englewood Ave	0.577	40	0.96	41.59	0.93	42.97	0.97	41.22	0.96
	Englewood Ave	Breton Rd	0.434	40	1.55	25.87	1.66	24.08	1.59	25.14	1.59
	Breton Rd	Radcliff Ave	0.824	40	1.04	38.34	1.2	33.27	1.16	34.49	1.12
	Radcliff Ave	East Beltline Ave	0.432	40	1.83	21.85	3.26	12.27	2.07	19.35	2.11
	East Beltline Ave	Lake Eastbrook Blvd	0.42	40	1.55	25.87	1.88	21.24	1.38	29.06	1.53
	Lake Eastbrook Blvd	East Paris Ave	0.32	40	1.31	30.64	2.01	19.86	1.67	24	1.55
	East Paris Ave	Acquest Ave	0.5	40	1	40.08	1.09	36.8	0.99	40.56	1.01
	Acquest Ave	Patterson Ave	0.5	40	1.52	26.34	2.23	17.97	1.67	23.97	1.69
	Patterson Ave	Hotel Ave	0.27	40	1.08	37.18	1.18	33.94	1.21	33.07	1.15
	Hotel Ave	I 96 on Ramp	0.26	40	0.98	40.74	1.25	31.95	1.47	27.3	1.19
	I 96 on Ramp	Kraft Ave	0.45	40	1.14	34.94	1.9	21.01	1.46	27.39	1.37
	Kraft Ave	Chaelevoix	0.38	40	1.19	33.61	1.12	35.59	1.28	31.32	1.21
	Chaelevoix	Thornhills Ave	0.72	40	0.94	42.42	1.45	27.54	1.31	30.53	1.15
	Thornhills Ave	Cascade	0.43	40	2.2	18.18	2.25	17.8	2.48	16.14	2.31

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
East Beltline WEST											
	108th st	100th St	1	55	1.29	42.66	1.26	43.73	1.2	45.83	1.25
	100th St	84th St	2.03	45	1.1	40.96	1.03	43.86	0.99	45.48	1.04
	84th St	68th St	2.24	55	1.17	47.21	1.11	49.56	1.12	49.18	1.13
	68th St	M6 on	0.707	55	1.21	45.46	1.02	53.98	1	55.17	1.08
	M6 on	M6 off	0.255	55	1.23	44.8	1.52	36.22	1.23	44.67	1.28
	M6 off	60th St	0.164	55	1.18	46.78	1.47	37.51	1.64	33.45	1.39
	60th St	Patterson S.	0.275	55	1.52	36.26	1.63	33.68	1.67	32.98	1.6
	Patterson S.	Patterson N.	0.238	45	2.04	22.08	1.52	29.65	1.06	42.32	1.42
	Patterson N.	52th St	0.636	45	1.15	39.03	0.99	45.45	0.91	49.34	1.01
	52th St	Barden	0.619	45	0.89	50.32	0.85	52.91	0.81	55.3	0.85
	Barden	44th St	0.548	45	1.02	43.91	1.17	38.43	1.45	31.09	1.19
	44th St	36th St	1.15	45	1.09	41.42	1.02	43.96	1.04	43.2	1.06
	36th St	32nd St	0.573	45	0.94	47.62	0.92	48.94	0.93	48.16	0.94
	32nd St	29th St	0.278	40	1.06	37.8	1.25	32.09	1.12	35.63	1.12
	29th St	28th St	0.232	40	3.42	11.69	2.86	13.99	4.12	9.7	3.52
	28th St	Lake Eastbrook Blvd	0.449	40	1.24	32.2	2.32	17.23	2.13	18.77	1.68
	Lake Eastbrook Blvd	Burton St	0.551	45	0.98	46.14	1.13	39.94	1.29	34.78	1.12
	Burton St	Lake Dr	0.754	45	0.89	50.68	0.96	46.82	1.04	43.44	0.96
	Lake Dr	Cascade Rd	1.35	45	0.98	46.07	0.87	51.72	1.08	41.54	0.99
	Cascade Rd	E Fulton St	0.43	45	1.08	41.77	1.02	43.97	1.48	30.33	1.2
	E Fulton St	Michigan	0.44	45	0.96	47.06	0.96	47.05	1.28	35.2	1.06
	Michigan	I96 EB off	0.169	45	1.04	43.27	1.66	27.09	1.83	24.64	1.38
	I96 EB off	I96 WB off	0.239	45	1.01	44.67	1.47	30.69	2.49	18.07	1.44
	I96 WB off	Bradford St	0.146	45	0.99	45.38	1.41	31.88	2.34	19.2	1.4
	Bradford St	Leonard St	0.5	45	1.07	42.07	1.43	31.55	2.01	22.35	1.4
	Leonard St	Knapp St	1	45	0.95	47.55	0.95	47.47	1	44.92	0.97
	Knapp St	3 Mile Road	1	55	1.09	50.66	1.08	51.07	1.05	52.38	1.07
	3 Mile Road	4 Mile Road	1.03	55	1.1	50.12	1.1	49.99	1.1	50.03	1.1
	4 Mile Road	5 Mile Road	1	55	1.04	52.98	1.07	51.41	1.08	51	1.06
	5 Mile Road	Grand River Dr	0.89	55	1.04	53.13	1.04	53.13	1.07	51.32	1.05
	Grand River Dr	Plainfield Ave	0.125	40	1.62	24.71	2.14	18.73	2.94	13.6	2.1
	Plainfield Ave	Cannonsburg Rd	0.643	40	0.99	40.46	1.19	33.74	1.87	21.44	1.27
	Cannonsburg Rd	7 Mile Road	0.48	40	1.1	36.38	1	40	1.17	34.11	1.11
	7 Mile Road	Belding Rd	1.67	55	1.38	39.73	1.39	39.44	1.32	41.8	1.36
	Belding Rd	10 Mile Rd	2.2	55	1.13	48.48	1.21	45.34	1.1	50.21	1.13
	10 Mile Rd	11 Mile Rd	0.87	55	1.14	48.2	1.25	44.11	1.17	47.19	1.17
	11 Mile Rd	12 Mile Rd	1.16	45	0.94	47.74	0.95	47.31	1.02	44.11	0.97
	12 Mile Rd	13 Mile Rd	1	45	1.1	41	1.08	41.58	1.08	41.81	1.09
	13 Mile Rd	14 Mile Rd	1.22	45	1.22	36.81	1.07	41.96	1.32	34.19	1.22
	14 Mile Rd	15 Mile Rd	0.81	55	1.2	45.93	1.27	43.38	1.24	44.24	1.23
	15 Mile Rd	16 Mile Rd	1.06	55	1.09	50.46	1.16	47.55	1.11	49.41	1.11

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
East Beltline EAST											
	16 Mile Rd	15 Mile Rd	1.06	55	1.11	49.75	1.07	51.4	1.15	47.62	1.12
	15 Mile Rd	14 Mile Rd	0.81	55	1.55	35.57	1.55	35.43	1.37	40.04	1.47
	14 Mile Rd	13 Mile Rd	1.22	45	1.03	43.85	1.06	42.55	1.05	42.78	1.04
	13 Mile Rd	12 Mile Rd	1	45	1.13	39.87	1.11	40.57	1.05	42.87	1.09
	12 Mile Rd	11 Mile Rd	1.16	45	0.89	50.36	0.86	52.38	0.95	47.43	0.91
	11 Mile Rd	10 Mile Rd	0.87	55	1.25	44.14	1.45	38	1.32	41.53	1.31
	10 Mile Rd	Belding Rd	2.2	55	1.23	44.66	1.12	49.12	1.25	43.83	1.22
	Belding Rd	7 Mile Road	1.67	55	1.48	37.07	1.17	47.02	1.25	43.9	1.32
	7 Mile Road	Cannonsburg Rd	0.48	40	1.62	24.76	0.98	40.99	1.02	39.07	1.19
	Cannonsburg Rd	Plainfield Ave	0.643	40	1.49	26.9	1.79	22.3	1.97	20.3	1.71
	Plainfield Ave	Grand River Dr	0.237	40	1.1	36.46	1.41	28.4	1.09	36.55	1.15
	Grand River Dr	5 Mile Road	0.89	55	1.3	42.26	1.19	46.23	1.26	43.5	1.26
	5 Mile Road	4 Mile Road	1	55	1.13	48.75	1.07	51.58	1.05	52.15	1.09
	4 Mile Road	3 Mile Road	1.03	55	1.09	50.68	1.04	52.73	1.04	53	1.06
	3 Mile Road	Knapp St	1	55	1.25	44.09	1.17	47.1	1.15	47.73	1.19
	Knapp St	Leonard St	1	45	1.38	32.62	1.26	35.85	1.31	34.3	1.33
	Leonard St	Bradford St	0.5	45	1.15	39.06	1.09	41.39	1.11	40.64	1.12
	Bradford St	I96	0.382	45	1.18	38.02	1.08	41.72	1	45.04	1.08
	I96	Michigan	0.17	45	1.29	35.01	1.33	33.73	0.95	47.29	1.13
	Michigan	E Fulton St	0.44	45	1.1	40.76	0.97	46.59	0.92	48.76	1
	E Fulton St	Cascade Rd	0.43	45	0.93	48.29	1.16	38.71	1.78	25.25	1.21
	Cascade Rd	Lake Dr	1.35	45	0.97	46.39	0.97	46.22	0.93	48.32	0.95
	Lake Dr	Burton St	0.754	45	1.04	43.34	0.98	46.13	1.01	44.58	1.01
	Burton St	Lake Eastbrook Blvd	0.551	45	1.05	42.85	1.03	43.63	1.16	38.82	1.09
	Lake Eastbrook Blvd	28th St	0.449	40	2.29	17.48	2.87	13.94	2.69	14.89	2.54
	28th St	29th St	0.232	40	1.33	30	1.51	26.51	1.56	25.6	1.45
	29th St	32th St	0.278	40	0.86	46.29	0.88	45.59	0.86	46.67	0.86
	32th St	36th St	0.573	45	1.13	39.74	1.11	40.47	1.13	39.74	1.13
	36th St	44th St	1.15	45	1	44.9	0.96	46.99	0.99	45.45	0.99
	44th St	Barden	0.548	45	1.1	40.86	1.07	42.03	1.03	43.6	1.07
	Barden	52nd St	0.619	45	0.92	48.79	0.84	53.51	1.1	40.86	0.97
	52nd St	Patterson N.	0.65	45	0.89	50.7	0.89	50.71	1.3	34.63	1.02
	Patterson N.	Patterson S.	0.275	45	1.05	43	0.82	54.67	1.31	34.45	1.07
	Patterson S.	60th St	0.257	55	1.69	32.57	1.21	45.5	1.19	46.38	1.35
	60th St	M6 west off	0.185	55	1.81	30.46	2.03	27.06	1.68	32.65	1.79
	M6 west off	M6 esat off	0.242	55	1.41	38.95	1.47	37.35	1.84	29.86	1.57
	M6 east off	68th St	0.704	55	1.08	50.88	1.06	51.84	1.3	42.16	1.16
	68th St	84th St	2.23	55	1.16	47.44	1.15	47.95	1.35	40.67	1.23
	84th St	100th St	2.03	45	1.05	43.05	1.05	42.94	1.27	35.33	1.13
	100th St	108th St	1	55	1.17	46.9	1.16	47.3	1.19	46.31	1.18

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
I 96 WEST											
	Exit 44	43B	0.24	55	0.88	62.4	0.9	60.93	0.84	65.27	0.87
	43B	43A	0.37	70	0.98	71.21	1.05	66.6	1.01	69.13	1.01
	43A	40B	2.55	70	1	69.92	0.99	70.46	0.98	71.25	0.99
	40B	40A	0.41	70	0.95	73.33	0.93	75.14	1.07	65.58	0.99
	40A	Fulton	1.64	70	1.01	69.04	0.99	70.61	1.1	63.77	1.04
	Fulton	38 off	0.35	70	1.02	68.4	1	70	1.06	66.15	1.03
	38 off	38 on	0.54	70	1.01	69.03	1	70.32	1.07	65.68	1.03
	38 on	36 off	0.78	70	1.12	62.51	1.14	61.48	1.18	59.21	1.15
	36 on	33 off	3.06	70	1.01	69.47	1.02	68.73	1.01	69.15	1.01
	33 off	33 on	0.36	70	1.02	68.9	1.06	65.98	1.02	68.36	1.03
	33 on	31B	1.16	70	1.02	68.46	1.01	69.2	1.02	68.38	1.02
	31B	31A	0.22	70	1.07	65.31	1.07	65.2	1.06	66	1.07
	31A	30B	0.75	65	0.97	66.71	0.99	65.86	0.97	66.74	0.98
	30B	30A	0.38	65	1.01	64.17	1	65.16	1	65.23	1
	30A	28 off	1.56	70	1.01	69.21	1.02	68.75	1.03	67.79	1.02
	28 off	28 on	0.71	70	0.95	73.38	0.99	71	0.96	73.04	0.96
	28 on	26 off	1.1	70	1.02	68.39	1.05	66.39	1.04	67.53	1.03
I 96 EAST											
	26 on	28 off	1.13	70	1.06	66.13	1.04	67.08	1.03	68.02	1.04
	28 off	28 on	0.68	70	0.96	72.77	0.98	71.28	0.97	72.37	0.97
	28 on	30 off	1.31	65	1.13	57.73	0.99	65.51	0.97	67.05	1.03
	30 off	30 on	0.33	70	1.28	54.54	1.1	63.89	1.23	56.99	1.22
	31A	31B	1.14	70	1.04	67.13	1.2	58.49	1.06	66.22	1.08
	31B	33 off	1.56	70	1	69.85	1.02	68.5	1.01	69.64	1.01
	33 off	33 on	0.35	70	0.96	73.13	0.99	70.6	1.01	69.24	0.98
	33 on	36 off	2.81	70	1.02	68.67	1.03	67.76	1.03	67.98	1.03
	36 on	38	0.62	70	1.14	61.54	1.15	60.99	1.1	63.47	1.13
	38	39	0.79	70	1.05	66.58	1.05	66.7	1.02	68.47	1.04
	39	40A	1.35	70	0.99	71.01	1	69.78	0.98	71.76	0.99
	40A	40B	0.45	70	0.99	70.76	0.99	70.57	0.97	72.27	0.98
	40B	43A	2.45	70	0.99	70.95	0.99	70.76	0.98	71.77	0.98
	43A	43B	0.49	70	0.98	71.5	1	69.79	1	70.28	0.99
	43B	44 off	0.86	70	1.04	67.31	1.07	65.13	1.05	66.78	1.05

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
M6 WEST											
	I 96	EXIT 15 off	3.88	70	1.04	67.27	1.05	66.42	1.04	67.28	1.04
	EXIT 15 off	EXIT 15 on	0.982	70	1	69.73	1.04	67.08	1.02	68.91	1.02
	EXIT 15 on	Exit 11 off	3.57	70	1.02	68.87	1.03	67.75	1.04	67.34	1.03
	Exit 11 off	Exit 11 on	0.83	70	1.01	69.25	1.02	68.38	1	69.98	1.01
	Exit 11 on	Exit 8 off	1.66	70	1.02	68.42	1.03	68.14	1	69.74	1.02
	Exit 8 off	Exit 8 on	1.39	70	1	69.84	1.05	66.72	1.01	69.51	1.01
	Exit 8 on	Exit 5 off	1.04	70	1.02	68.7	1.02	68.45	1.05	66.94	1.03
	Exit 5 off	Exit 5 on	1.13	70	0.99	70.57	0.98	71.75	0.97	72.01	0.98
	Exit 5 on	Exit 3 off	0.9	70	1.05	66.61	1.05	66.53	1.03	68	1.04
	Exit 3 off	Exit 3 on	1.01	70	1	70.13	1.04	67.33	0.99	70.4	1
	Exit 3 on	Exit 1 off	1.05	70	1	70	1.04	67.5	1.05	66.74	1.03
M6 EAST											
	Exit 1 on	Exit 3 off	1.03	70	1.09	64.33	1.02	68.67	1.04	67.42	1.05
	Exit 3 off	Exit 3 on	0.98	70	1.04	67.46	1.02	68.77	1.03	67.95	1.03
	Exit 3 on	Exit 5 off	1.02	70	1.05	66.38	1.09	64.08	1.06	66.04	1.06
	Exit 5 off	Exit 5 on	1.1	70	1.03	68.13	0.99	70.71	0.99	70.36	1.01
	Exit 5 on	Exit 8 off	1.07	70	1.02	68.62	1.02	68.79	1.01	69.6	1.01
	Exit 8 off	Exit 8 on	1.36	70	1.01	69.12	1	69.94	1	70.09	1
	Exit 8 on	Exit 11 off	1.66	70	1.04	67.17	1.02	68.93	1.06	66.15	1.04
	Exit 11 off	Exit 11on	0.85	70	1.04	67.36	0.99	70.67	1	70.11	1.01
	Exit 11on	Exit 15 off	3.51	70	1.06	66.28	1.01	69.43	1.01	69.24	1.03
	Exit 15 off	Exit 15 on	1.04	70	0.97	71.8	1	70.24	0.97	72.01	0.98
	Exit 15 on	I 96	4.26	70	1	69.94	1.01	69.49	1.02	68.59	1.01

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
44 th West											
	Patterson	Brockton	0.58	45	1.42	31.72	1.33	33.73	1.4	32.25	1.39
	Brockton	Broadmoor	0.33	45	2.39	18.8	2.25	20.01	2.13	21.15	2.25
	Broadmoor	Shaffer	1.1	45	1.08	41.7	1.15	39.18	1.07	42.18	1.09
	Shaffer	Breton	1	35	1.19	37.75	1.32	34.14	1.24	36.42	1.23
	Breton	Stauffer	0.53	35	0.9	38.73	0.97	36.17	1.01	34.54	0.96
	Stauffer	Kalamazoo	0.46	35	1.04	33.75	1.1	31.91	1.13	30.99	1.08
	Kalamazoo	Eastern	1	35	0.98	35.63	1.02	34.17	1.04	33.56	1.01
	Eastern	Madison	0.5	35	0.98	35.65	0.94	37.24	1.08	32.47	1.01
	Madison	Division	0.47	35	1.17	29.99	1.66	21.03	1.39	25.25	1.33
	Division	Clay	0.68	35	1.22	28.59	1.22	28.6	1.41	24.74	1.29
	Clay	US 131 NB on	0.1	35	2.73	12.84	1.61	21.72	1.8	19.47	2.03
	US 131 NB on	US 131 SB off	0.07	35	1.47	23.89	1.29	27.09	1.37	25.54	1.39
	US 131 SB off	Clyde Park	0.16	35	1.39	25.25	1.08	32.41	2.89	12.13	1.63
	Clyde Park	Burlingame	1.06	35	1.05	33.2	1.15	30.39	1.11	31.55	1.09
	Burlingame	Byron Center	0.95	35	1.03	34.14	1.09	32.08	1.4	25.06	1.16
	Byron Center	Ivanrest	0.97	35	1.14	30.62	1.08	32.28	1.1	31.96	1.11
	Ivanrest	Wilson	1.02	35	1.12	40.19	1.25	35.89	1.15	39.28	1.16
	Wilson	Canal	0.52	35	1.11	40.48	1.15	39.28	1.15	39.08	1.13
	Canal	Kenowa	0.54	35	1.13	39.92	1.5	29.92	2.02	22.32	1.46
	Kenowa	8th	1.11	35							1.07
	8th	14th	0.77	35							0.96
	14th	18th	0.54	35							1.64
	18th	28th	1.35	35							1.53
	28th	36th	1.02	35							1.15
44th East											
	36th	28th	1.02	35							1.32
	28th	18th	1.35	35							1.58
	18th	14th	0.54	35							1.18
	14th	8th	0.77	35							1.41
	8th	Kenowa	1.11	35							1.34
	Kenowa	Canal	0.54	35	1.65	27.34	1.54	29.19	1.59	28.31	1.6
	Canal	Wilson	0.52	35	1.05	42.95	1.12	40.35	1.03	43.76	1.05
	Wilson	Ivanrest	1.02	35	1.05	42.72	1.08	41.67	1.05	42.92	1.06
	Ivanrest	Byron Center	0.97	35	1.38	25.41	1.21	28.88	1.25	28	1.29
	Byron Center	Burlingame	0.95	35	1	34.89	1.03	33.92	1.05	33.37	1.03
	Burlingame	Clyde Park	1.06	35	1.19	29.32	1.17	29.94	1.25	27.98	1.21
	Clyde Park	US 131 SB on	0.16	35	2.23	15.67	2.11	16.55	1.95	17.98	1.96
	US 131 SB on	US 131 NB off	0.07	35	1.23	28.43	1.37	25.54	1.45	24.15	1.81
	US 131 NB off	Clay	0.1	35	2.05	17.05	1.97	17.8	2.24	15.62	1.82
	Clay	Division	0.68	35	1.2	29.25	1.17	29.98	1.24	28.12	1.29
	Division	Madison	0.47	35	0.93	37.72	0.93	37.78	0.91	38.29	0.92
	Madison	Eastern	0.5	35	1.18	29.73	1.26	27.75	1.31	26.77	1.27
	Eastern	Kalamazoo	1	35	1.09	32.22	1.1	31.8	1.12	31.25	1.1
	Kalamazoo	Stauffer	0.46	35	1.09	32.25	1.01	34.81	1.01	34.51	0.97
	Stauffer	Breton	0.53	35	1.02	34.3	1.01	34.76	0.95	36.97	0.97
	Breton	Shaffer	1	35	1.07	41.88	1.06	42.41	1.06	42.53	1.08
	Shaffer	Broadmoor	1.07	45	1.39	32.45	1.48	30.42	1.37	32.75	1.41
	Broadmoor	Brockton	0.36	45	1.42	31.63	1.29	34.82	1.38	32.55	1.44
	Brockton	Patterson	0.58	45	1.59	28.39	1.58	28.42	1.6	28.2	1.7

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
I 196 West											
	I 96	Exit 79 off	1.89	70	1.12	61.58	1.14	62.16	1.13	62.28	1.12
	Exit 79 off	Exit 79 on	0.56	70	0.89	62.03	0.89	60.36	0.91	61.27	0.9
	Exit 79 on	Exit 78 off	0.37	70	0.98	58.82	0.94	55.69	0.99	56.57	0.97
	Exit 78 off	Exit 78 on	0.51	70	0.93	46.44	1.18	53.9	1.02	54.61	1.01
	Exit 78 on	Exit 77C off	0.13	70	1.13	46.12	1.19	42.99	1.28	45.84	1.2
	Exit 77C off	Exit 77C on	0.36	70	0.87	59.88	0.92	58.04	0.95	60.4	0.91
	Exit 77C on	Exit 77B off	0.14	70	0.97	55.1	1	53.62	1.03	55.06	1
	Exit 77B off	Exit 77b on	0.26	70	0.97	57.96	0.95	55.11	1	56.27	0.98
	Exit 77B on	Exit 76 off	0.38	70	0.97	57.05	0.96	54.11	1.02	55.69	0.99
	Exit 76 off	Exit 76 on	0.5	70	0.95	58.63	0.94	56.79	0.97	57.69	0.95
	Exit 76 on	Exit 75 off	0.49	70	1.02	54.87	1	50.57	1.09	52.81	1.04
	Exit 75 off	Exit 75 on	0.54	70	0.92	60.1	0.92	59.23	0.93	59.72	0.92
	Exit 75 on	Exit 73 off	1.21	70	1.1	64.2	1.09	63.6	1.1	63.84	1.1
I 196 East											
	Exit 73 on	Exit 75 off	1.25	70	1.24	56.27	1.14	61.18	1.14	61.52	1.18
	Exit 75 off	Exit 75 on	0.29	70	1.13	48.66	0.85	64.51	0.88	62.73	0.96
	Exit 75 on	Exit 76 off	0.58	70	1.19	46.4	0.95	57.69	0.94	58.7	1.03
	Exit 76 off	Exit 76 on	0.54	70	1.18	46.51	1.01	54.31	0.98	56.28	1.06
	Exit 76 on	Exit 77B off	0.37	70	1.22	45.14	1.04	53.08	1	54.77	1.09
	Exit 77B off	Exit 77B on	0.24	70	1.22	45.2	1.04	52.87	1.02	53.69	1.1
	Exit 77B on	Exit 77C off	0.13	70	1.61	34.2	1.06	52.06	1.27	43.35	1.33
	Exit 77C off	Exit 77C on	0.22	70	1.49	36.88	1	55.23	1.09	50.46	1.2
	Exit 77C on	Exit 78 off	0.35	70	1.36	40.54	1.04	52.96	1.24	44.41	1.23
	Exit 78 off	Exit 78 on	0.44	70	0.98	56.31	0.9	61.28	0.93	59.44	0.94
	Exit 78 on	Exit 79 off	0.46	70	0.95	58.07	0.96	57.22	0.94	58.74	0.95
	Exit 79 off	Exit 79 on	0.5	70	1.13	61.9	1.2	58.35	1.16	60.43	1.16
	Exit 79 on	I 96	1.9	70	1.2	58.47	1.18	59.57	1.2	58.53	1.19

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
US 131 North											
	Exit 79	Exit 80 off	0.71	70	1.2	58.4	1.19	58.84	1.15	61	1.18
	Exit 80 off	Exit 80 on	0.26	70	1.09	64.11	1.11	62.85	1.05	66.89	1.08
	Exit 80 on	Exit 81 off	0.64	70	1.15	61.06	1.13	61.79	1.08	64.82	1.12
	Exit 81 off	Exit 81 on	0.41	55	1.22	57.49	1.11	62.9	1.08	64.73	1.14
	Exit 81 on	Exit 82A off	0.76	55	1.19	46.41	0.91	60.44	0.89	61.87	0.99
	Exit 82A off	Exit 82A on	0.27	55	1.23	44.89	0.88	62.34	0.87	63.18	0.99
	Exit 82A on	Exit 83A off (before Hall)	0.67	55	1.31	41.92	0.95	58.14	0.92	59.65	1.05
	Exit 83A off	Exit 83A on (after Hall)	0.29	55	1	55.21	0.91	60.63	0.9	61.44	0.94
	Exit 83A on	Exit 83B off (before Franklin)	0.2	55	1.04	52.72	0.94	58.5	0.95	57.89	0.98
	Exit 83B off	Exit 83B on (after Franklin)	0.36	55	0.97	56.83	0.92	59.73	0.91	60.3	0.94
	Exit 83B on	Exit 84A off (before Wealthy)	0.24	55	1.06	51.87	1.04	52.88	1.03	53.44	1.04
	Exit 84A off	Exit 84A on (after Wealthy)	0.29	55	0.97	56.6	0.97	56.64	0.96	57.52	0.97
	Exit 84A on	Exit 85B off (after Fulton)	0.61	55	1	55.21	1	55.1	1	55.18	1
	Exit 85B off	Exit 86A off (after Pearl)	0.28	55	0.91	60.57	0.92	60.08	0.94	58.39	0.92
	Exit 86A off	Exit 87off	0.86	55	0.93	59.05	0.96	57.09	1.03	53.44	0.98
	Exit 87 off	Exit 87 on	0.5	55							
	Exit 87 on	Exit 88 off	0.62	55	0.89	61.76	0.87	63.48	0.95	58.08	0.91
	Exit 88 off	Exit 88 on	0.18	55	1	69.68	0.96	72.58	1.07	65.58	1.02
	Exit 88 on	Exit 89 off	0.76	70	1.01	69.29	1.01	69.05	1.03	68.09	1.02
	Exit 89 off	I 96 off	0.95	70	1.03	68.03	1.02	68.89	1.01	69.03	1.02
	I 96 on	Exit 91 off	1.36	70	1.03	67.75	1.03	67.75	1.04	67.52	1.03
	Exit 91 off	Exit 91 on	0.44	70	0.99	70.67	0.97	72.01	0.99	70.97	0.99
	Exit 91 on	Exit 95 off	3.12	70	1.01	69.33	1	70.31	1.02	68.8	1.01
	Exit 95 off	Exit 95 on	0.56	70	0.97	72.53	0.95	73.64	0.99	70.47	0.97
	Exit 95 on	Exit 97 off	1.79	70	1.06	66.05	1.05	66.62	1.04	67.57	1.05

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
US 131 South											
	Exit 97 on	Exit 95 off	1.62	70	1	70.23	0.99	70.58	0.98	71.13	0.99
	Exit 95 off	Exit 95 on	0.69	70	1	70.34	1	70.25	0.98	71.52	0.99
	Exit 95 on	Exit 91 off	3.49	70	1.06	65.8	0.97	72.18	0.99	70.98	1.01
	Exit 91 off	Exit 91 on	0.24	70	1.14	61.66	1.02	68.89	1	69.68	1.06
	Exit 91 on	Exit 89B	1.24	70	1.15	60.86	1.03	67.85	1.02	68.46	1.07
	Exit 89B	Exit 89A	0.39	70	1.2	58.1	1	69.68	1.05	66.88	1.09
	Exit 89A	I 96 East on	0.67	70	1.12	62.78	1	70.02	1.05	66.92	1.06
	I 96 East on	Exit 88 off	0.64	70	1.15	60.84	0.98	71.07	1.05	66.58	1.07
	Exit 88 off	Exit 88 on	0.21	70	0.95	57.72	0.79	69.42	0.84	65.51	0.87
	Exit 88 on	Exit 87 off	0.64	55	0.97	56.61	0.85	64.57	0.9	61.16	0.92
	Exit 87 off	Exit 87 on	0.59	55							
	Exit 87 on	Exit 86A (after 6th)	0.35	55	0.99	55.59	1.03	53.34	0.94	58.44	0.98
	Exit 86A	Exit 85B off (before Bridge)	0.34	55	1.02	53.83	1.04	52.73	0.99	55.33	1.01
	Exit 85B off	Exit 85B on (before Pearl)	0.16	55	0.92	59.62	0.96	57.05	0.91	60.72	0.92
	Exit 85B on	Exit 85A (after Fulton)	0.54	55	0.97	56.68	0.94	58.22	0.98	56.33	0.97
	Exit 85A	Exit 84A off (after cherry)	0.36	55	1.02	53.94	1.06	51.98	1.12	48.89	1.07
	Exit 84A off	Exit 84A on (Second after Wealthy)	0.28	55	0.93	59.19	0.99	55.81	1.13	48.75	1.01
	Exit 84A on	Exit 83B off (before Franklin)	0.27	55	0.97	56.46	1	54.76	1.14	48.27	1.04
	Exit 83B off	Exit 83B on (after Franklin)	0.21	55	0.94	58.6	0.97	56.92	1.08	50.79	1
	Exit 83B on	Exit 83A off (before Hall)	0.45	55	0.91	60.17	0.96	57.46	1.05	52.48	0.97
	Exit 83A off	Exit 83A on (after Hall)	0.18	55	0.91	60.22	0.88	62.2	1.06	51.92	0.96
	Exit 83A on	Exit 82B	0.73	55	0.92	59.95	0.95	58.15	1.11	49.5	0.99
	Exit 82B	Exit 82A on (after Burton)	0.2	55	0.92	59.98	0.93	59.1	0.97	56.43	0.94
	Exit 82A on	Exit 81 off	0.67	55	0.92	59.96	0.93	59.3	0.95	57.8	0.93
	Exit 81off	Exit 81 on	0.4	55	1.07	65.64	1.05	66.39	1.09	64.09	1.07
	Exit 81 on	Exit 80 off	0.7	70	1.08	64.71	1.13	62.15	1.13	61.94	1.11
	Exit 80 off	Exit 80 on	0.26	70	1.11	62.91	1.14	61.63	1.13	61.75	1.13
	Exit 80 on	Exit 79 off	0.76	70	1.14	61.62	1.18	59.18	1.18	59.49	1.16

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
Fulton Street East											
	Market	Ottawa	0.06	25	1.62	15.43			1.04	24	1.27
	Ottawa	Ionia Ave	0.098	25	1.98	12.6			1.84	13.57	1.91
	Ionia Ave	Commerce	0.055	25	1.64	15.23			2.65	9.43	2.03
	Commerce	Division Ave	0.067	25	2.9	8.61			3.63	6.89	3.23
	Division Ave	Sheldon	0.061	25	1.02	24.4			1.14	21.96	1.08
	Sheldon	LaGrave	0.066	25	2.53	9.9			3.36	7.43	2.88
	LaGrave	Jefferson	0.06	25	1.16	21.6			1.74	14.4	1.39
	Jefferson	LaFayette	0.125	25	1.78	14.06			1.67	15	1.72
	LaFayette	College	0.25	25	1.06	23.68			1.03	24.32	1.04
	College	Lake Dr	0.125	25	2	12.5			1.56	16.07	1.75
	Lake Dr	Diamond	0.5	25	1.03	24.32			1.21	20.69	1.11
	Diamond	Fuller	0.25	25	1.44	17.31			0.97	25.71	1.16
	Fuller	Carlton	0.188	30	1.37	21.83			1.06	28.2	1.2
	Carlton	Plymouth	0.554	40	1.07	28.09			1.05	28.49	1.06
	Plymouth	Lakeside Dr	0.423	40	0.85	35.41			0.85	35.41	0.85
	Lakeside Dr	Maryland	0.322	40	0.85	35.13			1.09	27.6	0.96
	Maryland	Cascade Dr	0.1	45	2.17	13.85			1	30	1.37
Fulton Street West											
	Cascade Dr	Maryland	0.1	45	1.33	22.5			0.83	36	1.03
	Maryland	Lakeside Dr	0.322	40	1.01	29.72			0.98	30.51	1
	Lakeside Dr	Plymouth	0.423	40	0.93	32.4			1.08	27.69	1
	Plymouth	Carlton	0.554	40	1.05	28.49			0.95	31.66	1
	Carlton	Fuller	0.188	30	1.95	15.38			1.51	19.91	1.7
	Fuller	Diamond	0.25	25	1.28	19.57			1.22	20.45	1.25
	Diamond	Lake Dr	0.5	25	1.06	23.68			1.17	21.43	1.11
	Lake Dr	College	0.125	25	1.5	16.67			1	25	1.2
	College	LaFayette	0.25	25	1.28	19.57			1.28	19.57	1.28
	LaFayette	Jefferson	0.125	25	1.72	14.52			1.94	12.86	1.83
	Jefferson	LaGrave	0.06	25	1.04	24			1.5	16.62	1.23
	LaGrave	Sheldon	0.066	25	1.79	13.98			2.1	11.88	1.93
	Sheldon	Division Ave	0.061	25	3.08	8.13			2.85	8.78	2.96
	Division Ave	Commercial	0.067	25	1.04	24.12			1.04	24.12	1.04
	Commercial	Ionia Ave	0.055	25	0.51	49.5			1.01	24.75	0.67
	Ionia Ave	Ottawa	0.098	25	0.78	32.07			1.13	22.05	0.92
	Ottawa	Market	0.06	25	0.93	27			4.17	6	1.52

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
Division Ave South											
	Lyon	Pearl	0.065	25	1.6	15.6			2.46	10.17	1.94
	Pearl	Fountain	0.062	25	2.02	12.4			3.02	8.27	2.42
	Fountain	Library	0.075	25	2.41	10.38			2.96	8.44	2.66
	Library	Monroe Center	0.045	25	4.78	5.23			6.17	4.05	5.39
	Monroe Center	Fulton	0.036	25	1.74	14.4			1.16	21.6	1.39
	Fulton	Weston	0.074	25	0.38	66.6			1.5	16.65	0.6
	Weston	Oakes	0.09	25	1.7	14.73			1.39	18	1.53
	Oakes	Cherry	0.086	25	1.13	22.11			1.45	17.2	1.27
	Cherry	Wealthy	0.25	30	0.86	29.03			1.56	16.07	1.11
	Wealthy	Franklin	0.5	30	1.18	21.18			0.83	30	0.98
	Franklin	Deleware	0.185	30	1.28	19.59			0.94	26.64	1.08
	Deleware	Hall	0.315	30	1.14	26.37			1.03	29.08	1.08
	36th	44th	1	35	1.27	27.48			1.5	23.38	1.38
	44th	48th	0.5	35	1.23	28.57			0.99	35.29	1.1
	48th	54th	0.75	35	1.22	28.72			1.17	30	1.19
	54th	60th	0.75	45	0.83	42.19			0.96	36.49	0.89
	60th	68th	0.98	45	1.13	30.95			1.37	25.57	1.24
Division Ave North											
	Hall	Deleware	0.315	30	1.08	27.66			1.01	29.84	1.04
	Deleware	Franklin	0.185	30	1.65	15.14			2.06	12.11	1.83
	Franklin	Wealthy	0.5	30	1.07	23.38			1.4	17.82	1.21
	Wealthy	Cherry	0.25	30	1.11	22.5			1.25	20	1.18
	Cherry	Oakes	0.086	25	1.13	22.11			1.86	13.46	1.41
	Oakes	Weston	0.09	25	1.62	15.43			3.55	7.04	2.22
	Weston	Fulton	0.074	25	2.63	9.51			6.01	4.16	3.65
	Fulton	Moroe Center	0.036	25	1.93	12.96			0.77	32.4	1.1
	Moroe Center	Library	0.045	25	2.16	11.57			1.54	16.2	1.8
	Library	Fountain	0.075	25	1.3	19.29			2.69	9.31	1.75
	Fountain	Pearl	0.062	25	0.9	27.9			0.78	31.89	0.84
	Pearl	Lyon	0.065	25	1.71	14.63			2.46	10.17	2.02
	68th	60th	0.98	45	1.14	30.68			1.16	30.15	1.15
	60th	54th	0.75	45	0.84	41.54			0.84	41.54	0.84
	54th	48th	0.75	35	0.92	38.03			0.91	38.57	0.91
	48th	44th	0.5	35	1.67	20.93			1.24	28.13	1.43
	44th	36th	1	35	1.09	32.14			1.19	29.51	1.14

Corridor	From	To	Distance	Posted Speed Limit	AM TTI	AM Speed	Off Peak TTI	Off Peak Speed	PM TTI	PM Speed	Final TTI
Alpine Avenue South											
	7 Mile Rd	6 Mile Rd	1	50	1.24	44.44			1.12	49.32	1.17
	6 Mile Rd	Lamoreaux Dr	1	50	1.1	50			1.24	44.44	1.16
	Lamoreaux Dr	Menards	0.31	50	0.97	41.33			1.22	32.82	1.08
	Menards	Henze Dr	0.25	50	1.02	39.13			2.36	16.98	1.43
	Henze Dr	4 Mile Rd	0.44	50	1.16	34.43			1.79	22.31	1.41
	4 Mile Rd	Old Orchard Dr	0.23	45	0.92	43.58			1.3	30.67	1.08
	Old Orchard Dr	Center Dr	0.336	45	0.86	46.52			1.89	21.22	1.18
	Center Dr	I-96 EB	0.3	45	0.93	43.2			1.04	38.57	0.98
	I-96 EB	3 Mile Rd	0.16	35	1.04	38.4			4.51	8.86	1.69
Alpine Avenue North											
	3 Mile Rd	I-96 EB	0.16	35	1.25	32			2.15	18.58	1.58
	I-96 EB	Center Dr	0.3	45	1.85	21.6			1.67	24	1.75
	Center Dr	Old Orchard Dr	0.336	45	0.96	41.71			1.09	36.65	1.02
	Old Orchard Dr	4 Mile Rd	0.23	45	2.66	15.05			1.4	28.55	1.83
	4 Mile Rd	Henze Dr	0.44	50	0.98	40.62			1.09	36.84	1.03
	Henze Dr	Menards	0.25	50	1.11	36			0.98	40.91	1.04
	Menards	Lamoreaux Dr	0.31	50	1.15	34.88			0.93	42.92	1.03
	Lamoreaux Dr	6 Mile Rd	1	50	1.28	42.86			1.18	46.75	1.23
	6 Mile Rd	7 Mile Rd	1	50	1.02	53.73			1.28	42.86	1.14