AGENDA

Grand Haven Charter Township Planning Commission
Monday, May 4, 2015 – 7:30 p.m.

I. Call to Order

II. Roll Call

III. Pledge to the Flag

IV. Approval of the April 20, 2015 Meeting Minutes

V. Correspondence

VI. Public Comments/Questions on Agenda Items Only (Limited to 3 minutes)

VII. Public Hearings
A. Special Land Use application – Outdoor Pond (Bierman)

VIII. Old Business
A. Special Land Use application – Outdoor Pond (Bierman)

IX. New Business
A. Site Plan Review – Flagstar Bank

X. Reports
A. Attorney's Report
B. Staff Report
- Next Resilient Grand Haven meeting TBD due to conflict with ZBA Meeting

C. Other

XI. Extended Public Comments/Questions on Non-Agenda Items Only (Limited to 4 minutes)

XII. Adjournment

Note: Persons wishing to speak at public hearings, on agenda items, or extended comments, must fill out a "Speakers Form" located on the counter. Completed forms must be submitted to the attorney prior to the meeting.

MEETING MINUTES
GRAND HAVEN CHARTER TOWNSHIP
PLANNING COMMISSION
APRIL 20, 2015

I. CALL TO ORDER

Kantrovich called the meeting of the Grand Haven Charter Township Planning Commission to order at 7:30 p.m.

II. ROLL CALL

Members present: Kantrovich, Kieft, Gignac, Robertson, Taylor, Reenders, LaMourie & Wilson
Members absent: None
Also present: Fedewa and Attorney Bultje

Without objection, Kantrovich instructed Fedewa to record the minutes.

III. PLEDGE TO THE FLAG

IV. APPROVAL OF MINUTES

Without objection, the minutes of the March 30, 2015 meeting were approved.

V. CORRESPONDENCE – None

VI. PUBLIC COMMENTS ON AGENDA ITEMS ONLY – None

VII. NEW BUSINESS

A. Preliminary Site Plan Review – McCarthy Special Land Use Site Condominiums for Two-Family Dwellings

Fedewa provided an overview of the proposal through a memorandum dated April 16th.

The applicant, Bryan McCarthy, was represented by the engineer James Milanowski, P.E. The focus of Milanowski's discussion included:

- Does not agree with staff that installation of a sidewalk, boundary fence, or fence around the retention basins is necessary. Agreeable to installing a crosswalk for the existing non-motorized pathway.
- Residue of Lots 56 – 58 of the Peach Plains Sub No. 1 are not included in the development proposal.
- 15678 Mercury Drive will likely remain in its current location. Possible that 15648 Mercury Drive will remain in its location as well. 15660 Mercury likely be moved to Lot 52 of Peach Plains Sub No. 1.

- Plans have not been submitted to the Ottawa County Road Commission, Ottawa County Health Department, or Ottawa County Water Resources Commissioner.
- The applicant intends to rent the units, but leaves the option open to sell.
- Has not determined if the Peach Plains Sub No. 1 contains plat restrictions in regard to permitted housing types (*i.e., single family vs. two family dwellings*).

Discussion points from the Planning Commissioners included:

- Attorney Bultje questioned if two family dwellings are a permissible housing type within the Peach Plains Sub No. 1. Applicant must determine if there are plat restrictions.
- In recent years, all new residential developments have been required to install sidewalks.
- Two family dwellings will offer more housing choices.
- Desire to protect the tree canopy in the rear yard of the proposed Unit 4, which encompasses 3.6 acres of land.
- Questioned if the units will be rented or sold.

VIII. OLD BUSINESS

A. Review and Discussion – Draft of Goals and Objectives for Resilient Grand Haven Master Plan Update

Discussion points from the Planning Commissioners included:

- Need to reduce the number of goals, define priorities, identify goals that act more as a vision statement, and the final goals must be attainable.
- Must be mindful of private property rights when crafting the goals and objectives. A balance must be found between economic development and protecting the natural assets of the Township.
- Consideration must be given to the possible impact of the US-231 Bypass.
- Information learned from the Community Engagement Workshop should be implemented into the Master Plan Update process, and future projects.

IX. REPORTS

A. Attorney Report - None

B. Staff Report

- Next Resilient Grand Haven Meeting – April 22nd @ 7pm in GHT Board Room
- Special Land Use application for Outdoor Pond – May 4th agenda
- PUD Amendment application for Copper Stone Site Condominiums

- Special Land Use application for Single Family Dwelling in AG District

C. Other
- Commissioner Reenders asked for an update on the Schultz Landscaping Site Plan
  - Fedewa provided an update – rear yard has been paved, new bins installed, staff gave an extension to bring the storage container into compliance. The new deadline is April 30th.
- Commissioner Kantrovich asked for an update on the proposed pathway expansion
  - Fedewa provided an update – survey results indicated the highest percentage of "yes votes" will be during a Presidential General Election. Therefore, the Township Board opted to postpone this ballot initiative until the fall of 2016.

X. EXTENDED PUBLIC COMMENTS ON NON-AGENDA ITEMS ONLY – None

XI. ADJOURNMENT

Without objection, the meeting adjourned at 9:03 p.m.

Respectfully submitted,

Stacey Fedewa
Acting Recording Secretary

GRAND HAVEN CHARTER TOWNSHIP

Community Development Memo

DATE: April 28, 2015

TO: Planning Commission

FROM: Stacey Fedewa, Planning & Zoning Official

RE: Special Land Use Application – Outdoor Pond at 13040 Always Lane

BACKGROUND

The new property owners, Paul and Gulen Bierman, submitted a Special Land Use application to simultaneously construct a new Single Family Dwelling and Outdoor Pond at 13040 Always Lane. Currently the parcel is vacant land situated at the end of Always Lane.

The Pond will be used for two primary purposes:

1. Personal enjoyment, and
2. Soil needed during the construction of the single family dwelling.

The applicant has provided a permit from the Ottawa County Water Resources Commissioner (OCWRC), which approves the construction of the pond.

SPECIAL LAND USE REQUIREMENTS	
Section 19.07.29A Provisions	**Compliance**
Used for recreation, pleasure, or agricultural only	Meets standard
Compliance with setback requirements of zoning district (RR)	Meets standard
To protect the safety of the general public the Planning Commission can require the pond to be enclosed by a wall or fence.	Not enclosed—Planning Commission has discretion
Constructed to applicable requirements of Conservation District, OCWRC, and MDEQ	CD – n/a OCWRC – Yes MDEQ – n/a
Slope of the banks must be a minimum of 1:3	Meets standard
Pond shall not cause or contribute to the erosion of any adjacent, abutting, or nearby land.	Staff unaware of any issues
Pond shall not create stagnant water	Meets standard – aeration device

Staff does not believe a wall or fence needs to be required in order to protect the safety of the general public. As you will see from the aerial included on page 1, the parcel is in a rural and isolated location. Additionally, there are numerous outdoor ponds within the vicinity that are not enclosed. The applicant does not intend to use the pond as a swimming pool

RECOMMENDATION

Based on the findings outlined above, staff recommends approval of the Outdoor Pond Special Land Use application. If the Planning Commission agrees with the aforementioned recommendation, the following motion can be offered:

> **Motion** by _____, supported by _____ to approve the Outdoor Pond Special Land Use application submitted by Paul Bierman for property located at 13040 Always Lane, based on the application meeting applicable requirements and standards set forth by the Grand Haven Charter Township Zoning Ordinance.

Please contact me prior to the meeting with questions or concerns.

RECOMMENDATION

1. This approval is based on the affirmative findings that each of the following standards has been fulfilled:
    A. The proposed use is consistent with, and promotes the intent and purpose of this Ordinance.
    B. The proposed use is of such location, size, density, and character as to be compatible with adjacent uses of land and the orderly development of the district in which situated and of adjacent districts.
    C. The proposed use does not have a substantially detrimental effect upon, nor substantially impair the value of, neighborhood property.
    D. The proposed use is reasonably compatible with the natural environment of the subject premises and adjacent premises.
    E. The proposed use does not unduly interfere with provision of adequate light or air, nor overcrowd land or cause a severe concentration of population.
    F. The proposed use does not interfere or unduly burden water supply facilities, sewage collection and disposal systems, park and recreational facilities, and other public services.
    G. The proposed use is such that traffic to, from, and on the premises and the assembly of persons relation to such use will not be hazardous, or inconvenient to the neighborhood, nor unduly conflict with the normal traffic of the neighborhood, considering, among other things: safe and convenient routes for pedestrian traffic, particularly of children, the relationship of the proposed use to main thoroughfares and to streets and intersections, and the general character and intensity of the existing and potential development of the neighborhood.
    H. The proposed use is consistent with the health, safety, and welfare of the Township.
2. The application meets the site plan review standards of Section 23.06 of the Zoning Ordinance. Specifically, the Planning Commission finds as follows:
    A. The uses proposed will not adversely affect the public health, safety, or welfare. Uses and structures located on the site take into account topography, size of the property, the uses on adjoining property and the relationship and size of buildings to the site.
    B. The site will be developed so as not to impede the normal and orderly development or improvement of surrounding property for uses permitted in this ordinance.
    C. Safe, convenient, uncontested, and well defined vehicular and pedestrian circulation is provided for ingress/egress points and within the site. Drives, streets and other circulation routes are designed to promote safe and efficient traffic operations within the site and at ingress/egress points.
    D. The arrangement of public or private vehicular and pedestrian connections to existing or planned streets in the area are planned to provide a safe and efficient circulation system for traffic within the township.
    E. Removal or alterations of significant natural features are restricted to those areas which are reasonably necessary to develop the site in accordance with the requirements of this Ordinance. The Planning Commission has required that landscaping, buffers, and/or

greenbelts be preserved and/or provided to ensure that proposed uses will be adequately buffered from one another and from surrounding public and private property.

F. Areas of natural drainage such as swales, wetlands, ponds, or swamps are protected and preserved insofar as practical in their natural state to provide areas for natural habitat, preserve drainage patterns and maintain the natural characteristics of the land.

G. The site plan provides reasonable visual and sound privacy for all dwelling units located therein and adjacent thereto. Landscaping shall be used, as appropriate, to accomplish these purposes.

H. All buildings and groups of buildings are arranged so as to permit necessary emergency vehicle access as requested by the fire department.

I. All streets and driveways are developed in accordance with the Ottawa County Road Commission specifications, as appropriate.

J. Appropriate measures have been taken to ensure that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Provisions have been made to accommodate storm water, prevent erosion and the formation of dust.

K. Exterior lighting is arranged so that it is deflected away from adjacent properties and so it does not interfere with the vision of motorists along adjacent streets, and consists of sharp cut-off fixtures.

L. All loading and unloading areas and outside storage areas, including areas for the storage of trash, which face or are visible from residential districts or public streets, are screened.

M. Entrances and exits are provided at appropriate locations so as to maximize the convenience and safety for persons entering or leaving the site.

N. The site plans conforms to all applicable requirements of County, State, Federal, and Township statutes and ordinances.

O. The general purposes and spirit of this Ordinance and the Master Plan of the Township are maintained.

Recvd 2/6/15 SLF

GRAND HAVEN CHARTER TOWNSHIP

SPECIAL LAND USE APPLICATION

Fees
Original Application - $125.00 plus a $1,000.00 escrow*
Special Land Use Amendment – $100.00 plus a $500.00 escrow*

Applicant information
Name Paul Bierman
Phone Cell: 638-7236 Fax
Address 16360 Baldwins Rd. - Grand Haven

Owner information *(If different from applicant)*
Name
Phone Fax
Address

Property information
Address/Location Always Ln. Pvt.
Parcel # 70-07-10-400-014
Property size *(acres)* 4.54 Acres
Current Zoning Residential Master-Planned Zoning

Description of Proposed Use/Request *(attach additional pages as needed)*
Digging Pond

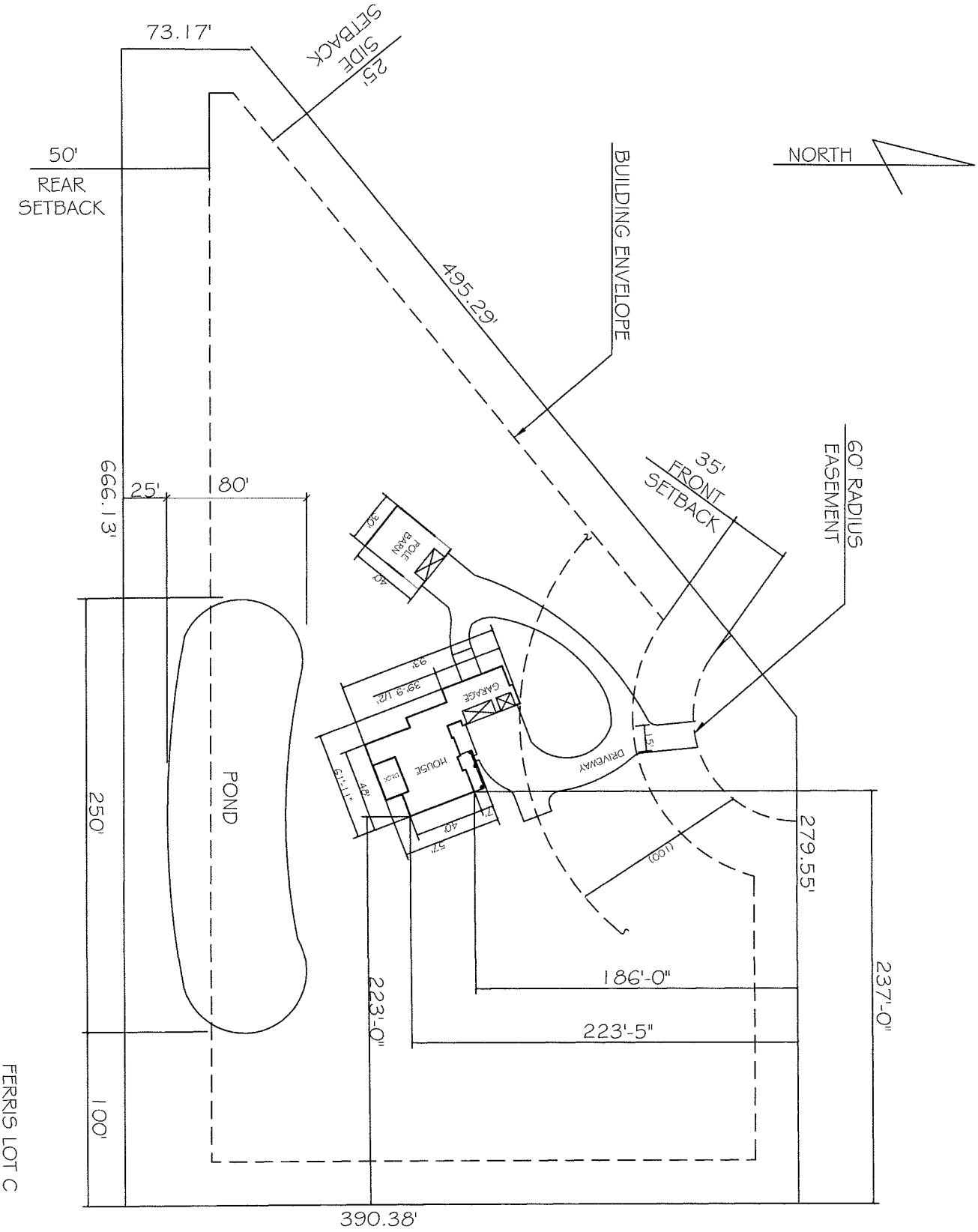
NOTE: *The architect, engineer, planner, or designer shall be responsible for utilizing the Township Ordinance books and following all applicable requirements, including those of Chapters 19 and 23 of the Zoning Ordinance. Initially, submit five copies of the required information for staff review. Once staff has granted tentative approval, additional copies will be required as requested by staff.*

If approval of this application requires/includes the extension of a municipal sanitary sewer main, an additional $5,000.00 escrow fee shall be required, and an additional $2,000.00 escrow fee shall be required for the installation of a lift station.

I hereby attest that the information on this application form is, to the best of my knowledge, true and accurate.

Signature of applicant *Date* 2-10-15

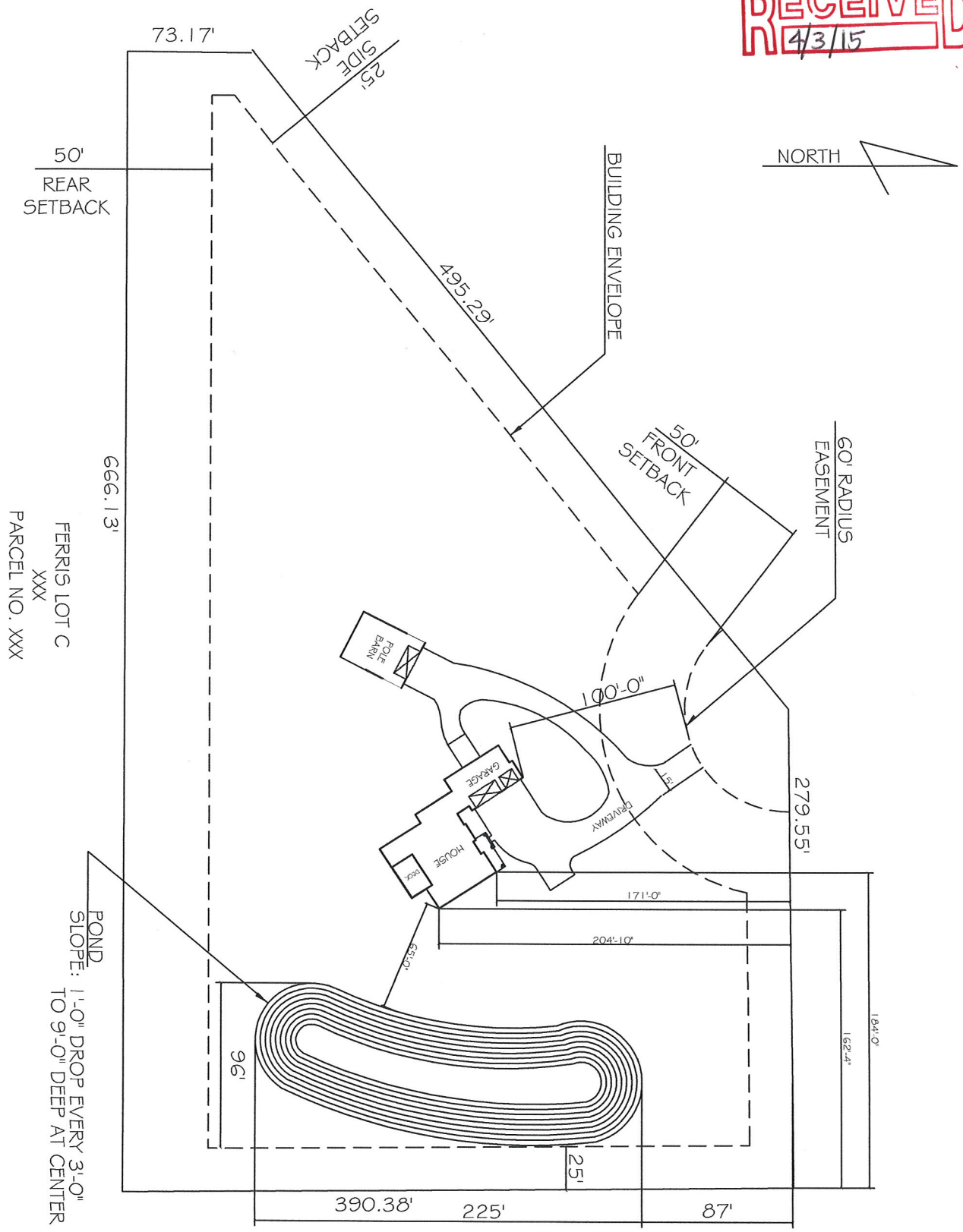
** To cover cost of legal and consulting fees, may be increased as necessary*



FERRIS LOT C
XXX
PARCEL NO. XXX

Dwg No. 15-538 scale: 1/4" date: 1/15	PotterHomeDesign Lorrie Potter	BIERMAN FERRIS LOT C Residence	Builder: –

RECEIVED
4/3/15



— Dwg No. 15-538 scale: 1/4" date: 1/15	PotterHomeDesign Lorrie Potter	BIERMAN FERRIS LOT C Residence	Builder: —

GRAND HAVEN CHARTER TOWNSHIP

Community Development Memo

DATE: April 29, 2015

TO: Planning Commission

FROM: Stacey Fedewa, Planning & Zoning Official

RE: Flagstar Bank Site Plan Review

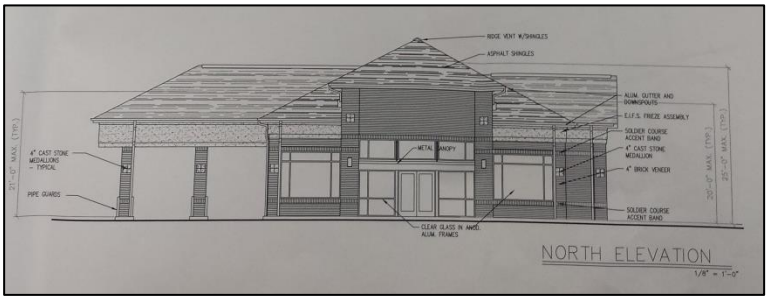
BACKGROUND

A Site Plan Review application was received on March 25, 2015 for 17250 Hayes Road (*Parcel 70-07-04-100-032*). The application proposes to demolish the existing structure (*formerly the Big Boy restaurant*), and construct a 2,840 square foot Flagstar Bank. The 1.4 acre site will include a drive through canopy, storm water detention area, new landscaping, and redesigned parking lot that reduces the amount of impervious surface.

The applicant has received preliminarily approval from the Ottawa County Water Resources Commissioner. The MDEQ, MDOT, and OCRC do not have jurisdictional involvement in the project.

Weather permitting, the proposed construction timetable is:

- May: Demolition
- June: Construction
- November: Grand opening



Documents included for review are:

1. Site Plan Review application
2. Site Plans dated 4-29-2015
3. Elevation Drawings
4. Floor Plan
5. Proposed Signage Plan
6. Traffic Impact Assessment
7. Prein&Newhof review of the Ottawa County Water Resources Commissioner
8. Letter of No Authority from Ottawa County Road Commission

ZONING REQUIREMENTS	
Chapter 15: C-1 Commercial District	**Provisions**
Permitted Use	✓
Design Requirements (*lot area, width, setbacks*)	✓
Chapter 15A: US-31 and M-45 Area Overlay Zone	**Provisions**
Landscaping Improvements	✓
Access Management Improvements	✓*
Architectural Improvements	✓
Woodland Protection	n/a
Full Compliance	✓
Chapter 20: General Provisions	**Provisions**
Landscaping	✓
Chapter 20A: Outdoor Lighting Requirements	**Provisions**
LZ 3 Requirements	✓
Sharp Cut-Off Fixtures (*prevent light pollution*)	✓
Chapter 23: Site Plan Review	**Provisions**
Final Site Plan Review	✓
Chapter 24: Parking, Loading Spaces, and Signs	**Provisions**
Off Street Parking (*using Overlay District standards*)	✓
Signs (*proposes 1 freestanding sign, 2 wall signs, 3 directional signs*)	✓**

* Access Management Improvements: Section 15A.06.8.A requires the access drive to have a minimum 60 feet of throat depth (*only 40 feet exists*). Staff recommends approving a Modification of Access Standards, which allows the Planning Commission to modify the standards of the Overlay Zone when a practical difficulty exists that makes compliance unreasonable.

** The proposed wall signs and directional signs meet the applicable standards. However, the freestanding sign requires two minor adjustments. The signs require separate permits. Therefore, staff expects the adjustments to be made prior to application for the sign permits.
Lastly, a traffic impact analysis was performed, which made the following conclusions:

1. Currently, all study intersection approaches and movements operate acceptably at a Level of Service (LOS) D (*considered acceptable*) or better during both peak periods.
2. Future traffic operations with the proposed Flagstar Bank will be similar to existing conditions and minor changes to vehicle delay and LOS will not be discernable.

RECOMMENDATION

Based on the findings outlined above, staff recommends approval of the Site Plan Review application. If the Planning Commission agrees with the aforementioned recommendation, the following motion can be offered:

> **Motion** by _____, supported by _____ to approve the Site Plan Review application for construction of a Flagstar Bank located at 17250 Hayes Road, based on the application meeting all requirements and standards set forth by the Grand Haven Charter Township Zoning Ordinance.

REPORT

1. The application meets the site plan review standards of Section 23.06 of the Zoning Ordinance. Specifically, the Planning Commission finds as follows:
    A. The uses proposed will not adversely affect the public health, safety, or welfare. Uses and structures located on the site take into account topography, size of the property, the uses on adjoining property and the relationship and size of buildings to the site.
    B. The site will be developed so as not to impede the normal and orderly development or improvement of surrounding property for uses permitted in this ordinance.
    C. Safe, convenient, uncontested, and well defined vehicular and pedestrian circulation is provided for ingress/egress points and within the site. Drives, streets and other circulation routes are designed to promote safe and efficient traffic operations within the site and at ingress/egress points.
    D. The arrangement of public or private vehicular and pedestrian connections to existing or planned streets in the area are planned to provide a safe and efficient circulation system for traffic within the township.

E. Removal or alterations of significant natural features are restricted to those areas which are reasonably necessary to develop the site in accordance with the requirements of this Ordinance. The Planning Commission has required that landscaping, buffers, and/or greenbelts be preserved and/or provided to ensure that proposed uses will be adequately buffered from one another and from surrounding public and private property.

F. Areas of natural drainage such as swales, wetlands, ponds, or swamps are protected and preserved insofar as practical in their natural state to provide areas for natural habitat, preserve drainage patterns and maintain the natural characteristics of the land.

G. The site plan provides reasonable visual and sound privacy for all dwelling units located therein and adjacent thereto. Landscaping shall be used, as appropriate, to accomplish these purposes.

H. All buildings and groups of buildings are arranged so as to permit necessary emergency vehicle access as requested by the fire department.

I. All streets and driveways are developed in accordance with the Ottawa County Road Commission specifications, as appropriate.

J. Appropriate measures have been taken to ensure that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Provisions have been made to accommodate storm water, prevent erosion and the formation of dust.

K. Exterior lighting is arranged so that it is deflected away from adjacent properties and so it does not interfere with the vision of motorists along adjacent streets, and consists of sharp cut-off fixtures.

L. All loading and unloading areas and outside storage areas, including areas for the storage of trash, which face or are visible from residential districts or public streets, are screened.

M. Entrances and exits are provided at appropriate locations so as to maximize the convenience and safety for persons entering or leaving the site.

N. The site plans conforms to all applicable requirements of County, State, Federal, and Township statutes and ordinances.

O. The general purposes and spirit of this Ordinance and the Master Plan of the Township are maintained.

GRAND HAVEN CHARTER TOWNSHIP

SITE PLAN REVIEW APPLICATION

Fees

Development located within the Township's Overlay District - $110.00 plus a $2,000.00 escrow*

Development not located within the Township's Overlay District $100.00 plus a $1,000.00 escrow*

Applicant information

Name MBA Architects, Michael A. Boggio, Jr.

Phone (248) 258-5155 Fax (248) 258-2843

Address 30100 Telegraph Rd. Suite 216 Bingham Farms, MI 48025

Owner information *(If different from applicant)*

Name Same as Applicant

Phone _____ Fax _____

Address _____

Property information

Address/Location 17250 Hayes St. Grand Haven, MI 49417

Parcel # 70-07-04-100-032

Property size *(acres)* 1.67 acres

Current Zoning C-1 Commercial Master-Planned Zoning C-1 Commercial

Description of Proposed Use/Request *(attach additional pages as needed)*

Commercial Building - Bank

NOTE: *The architect, engineer, planner, or designer shall be responsible for utilizing the Township Ordinance books and following all applicable requirements, including those of Chapter 23 of the Zoning Ordinance. Initially, submit five copies of the required information for staff review. Once staff has granted tentative approval, additional copies will be required as requested by staff.*

If approval of this application requires/includes the extension of a municipal sanitary sewer main, an additional $5,000.00 escrow fee shall be required, and an additional $2,000.00 escrow fee shall be required for the installation of a lift station.

I hereby attest that the information on this application form is, to the best of my knowledge, true and accurate.

Signature of applicant

3/31/15
Date

** To cover cost of legal and consulting fees, may be increased as necessary*

For Office Use Only

Date Received _____ Fee Paid? _____

Materials Received: Site Plans _____ Location Map _____

Survey _____ Landscape Plan _____

Date Approved by P.C. _____

Dated copy of approved minutes sent to applicant? _____ *Date Sent* _____

PLANNING COMMISSION USE ONLY

Approval _____

Tabled _____

Denied _____

Conditional Approval _____

The following conditions shall be met for approval:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

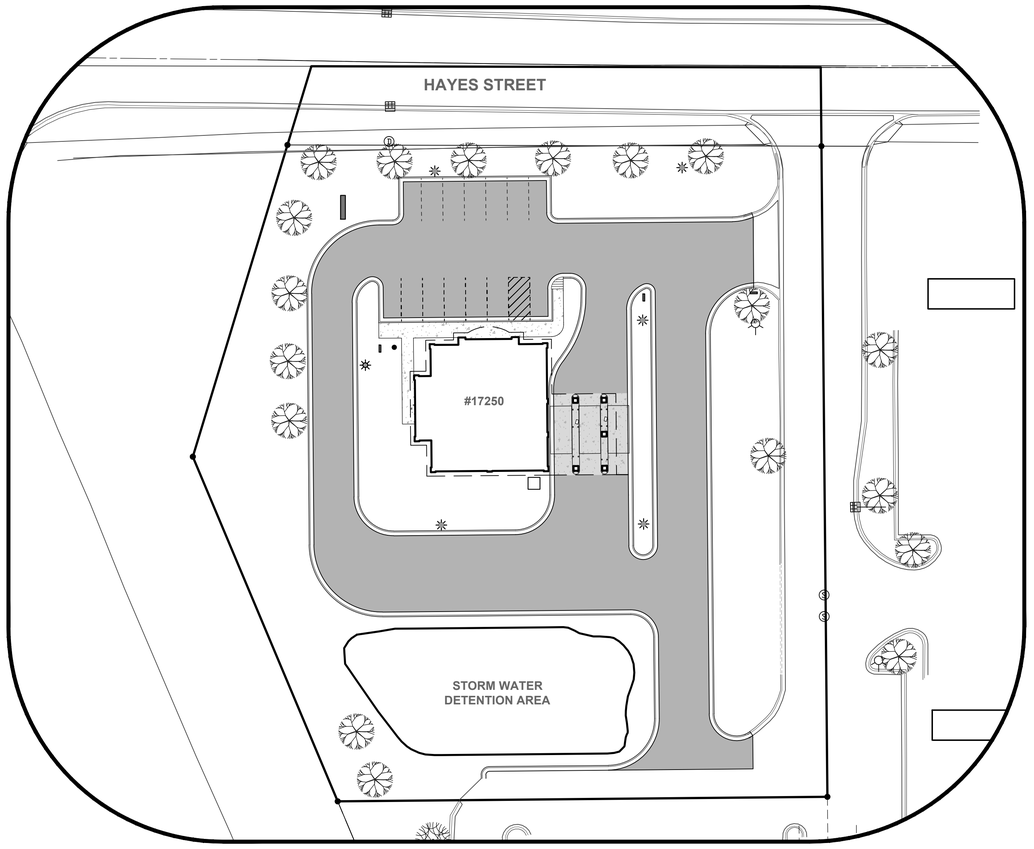
_____ _____

Signature of Planning Commission Chair *Date*

FLAGSTAR BANK

TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

SITE PLAN



UTILITY COMPANY CONTACTS

Gas	Michigan Gas Utilities	Todd Subka	(616) 844-7519
Electric	Consumers Energy	Daniel Leatherman	(616) 494-5305
Telephone	AT&T	Rick Arendsen	(616) 392-9968
Cable	Charter Communications	Craig Melland	(616) 836-9207

811 Know what's **below.** **CALL** before you dig.

UTILITY LOCATIONS ARE DERIVED FROM ACTUAL MEASUREMENTS OR AVAILABLE RECORDS. THEY SHOULD NOT BE INTERPRETED TO BE EXACT LOCATIONS NOR SHOULD IT BE ASSUMED THAT THEY ARE THE ONLY UTILITIES IN THIS AREA.

NOTE:
EXISTING UTILITIES AND SERVICE LINES IDENTIFIED AS "PLAN" WERE OBTAINED FROM AVAILABLE AS-BUILT RECORD DRAWINGS. THE CONTRACTOR SHALL VERIFY THE LOCATION, DEPTH AND STATUS OF ALL UTILITIES AND SERVICE LINES PRIOR TO NEW CONNECTIONS.

SHEET INDEX

LEGAL DESCRIPTION

The land referred to in this Commitment, situated in the County of Ottawa, Township of Grand Haven, State of Michigan, is described as follows:
Part of the Northwest 1/4 *of Section 1/4 of Section 4, Town 7 North, Range 16 West, Grand Haven Township, Ottawa County, Michigan, Commencing at the North 1/4 post, thence North 89 degrees 52 minutes 30 seconds West 606.70 feet along the North line of said Section, thence South 16 degrees 52 minutes 43 seconds West 171.08 feet, thence South 22 degrees 47 minutes 30 seconds East 359.56 feet, thence East to the North and South 1/4 line at a point 495 feet South of the place of beginning, thence North on the North and South 1/4 line 495 feet to the place of beginning, Grand Haven Township, Ottawa County, Michigan, EXCEPT that part of the Northwest 1/4 of Section 4, Town 7 North, Range 16 West, Grand Haven Township, Ottawa County, Michigan described as beginning at the North 1/4 corner of Section 4 (said corner being 65.51 feet West of the South 1/4 corner of Section 33, Town 8 North, Range 16 West); thence North 89 degrees 52 minutes 30 seconds West 393.17 feet along the North line of Section 4; thence South 00 degrees 31 minutes 36 seconds East 305.89 feet; thence South 89 degrees 28 minutes 24 seconds West 205.30 feet; thence South 22 degrees 47 minutes 30 seconds East 202.80 feet; thence South 89 degrees 52 minutes 30 seconds East 511.47 feet to the North & South 1/4 line at a point 495.00 feet South of the place of beginning; thence North on the North and South 1/4 line 495.00 feet to the point of beginning.
Tax Item No. 70-07-04-100-032

NEDERVELD
www.nederveld.com
800.222.1868
GRAND RAPIDS
217 Grandville Ave., Suite 302
Grand Rapids, MI 49503
Phone: 616.575.5190
ANN ARBOR
CHICAGO
COLUMBUS
HOLLAND
INDIANAPOLIS
ST. LOUIS

PREPARED FOR:

MBA ARCHITECTS
MIKE BOGGIO

30100 Telegraph Rd., Suite 216
Bingham Farms, MI 48025
Phone: 248.258.5155

REVISIONS:

Title: Site Plan Submittal	V. Date: 03-20-15
Drawn: ER / BEM Checked: RJB	S. Date: 03-20-15
Title: Site Plan Submittal	V. Date: 03-24-15
Drawn: ER / BEM Checked: RJB	S. Date: 03-24-15
Title: Site Plan Submittal	V. Date: 04-24-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-24-15
Title: Site Plan Submittal	V. Date: 04-29-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

FLAGSTAR BANK

INDEX/COVER SHEET

17250 HAYES RD

PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:

STATE OF MICHIGAN
ROGER JACK BARR II
ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

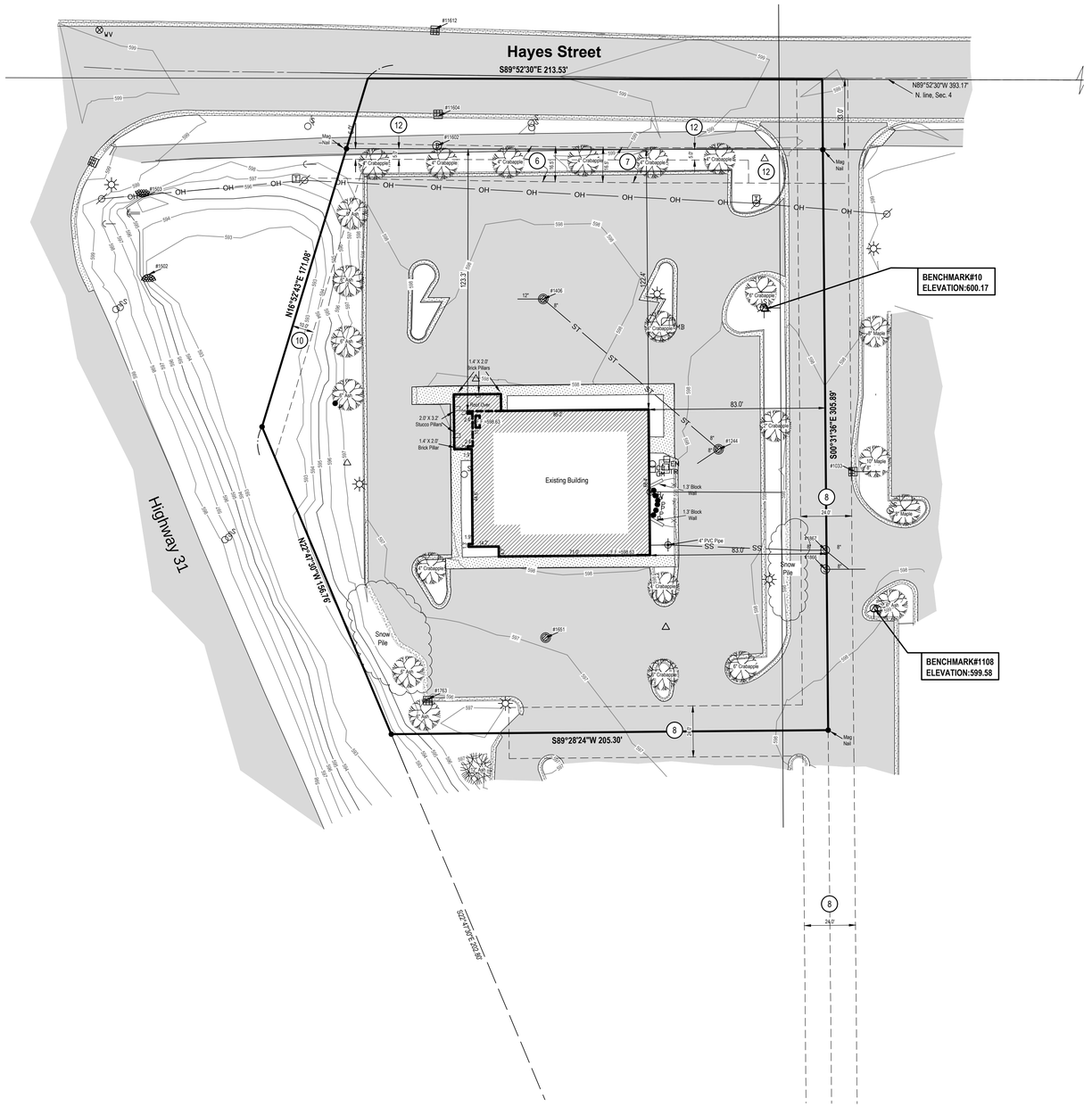
SHEET NO:
C-100

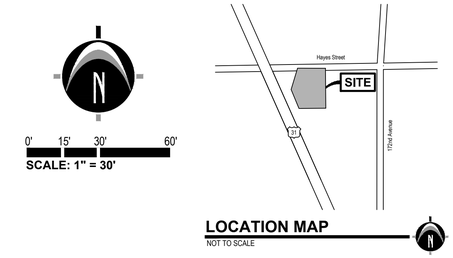
SHEET: 1 OF 9

15200045-CPI.dwg BM 4/27/2015 1545

LEGEND

- Benchmark
- Catch Basin - Round
- Catch Basin - Square
- CO Cleanout
- Culvert
- Deciduous Tree
- EM Electric Meter
- Evergreen Tree
- GM Gas Meter
- Guy Anchor
- Hydrant
- Iron - Set
- Iron - Found
- Light Pole
- MB Mailbox
- M Manhole
- P Post
- T Phone Riser
- S Sign
- S Sanitary Sewer Manhole
- TR Transformer
- Utility Pole
- WV Water Valve
- OH Overhead Utility
- SS Sanitary
- ST Storm
- X X Fence
- Asphalt
- Concrete
- Gravel
- Building
- D Deeded Distance
- C Computed Distance





0' 15' 30' 60'

SCALE: 1" = 30'

LOCATION MAP

NOT TO SCALE

STRUCTURE INFORMATION

Structure 1033
Rim Elev. = 597.27
Inv. 8" E. 594.52

Structure 1244
Rim Elev. = 597.27
Inv. 8" NW 594.94
Inv. 8" SW 594.93

Structure 1406
Rim Elev. = 597.49
Inv. 12" W. 594.15
Inv. 8" SE 594.17

Structure 1502
Inv. 48" 592.57

Structure 1503
Inv. 60" 592.86

Structure 1651
Rim Elev. = 597.13
Water Level = 594.01
(Could not see any pipes)

Structure 1763
Rim Elev. = 595.91
Water Level = 593.50
(In snow bank & cannot see any pipes)

Structure 1866
Rim Elev. = 597.53
Inv. 8" E. 588.04

Structure 1867
Rim Elev. = 597.51
Inv. 8" E. 587.99
Inv. 8" W. 588.04

STRUCTURE INFORMATION FROM PREV. NEDERVELD SURVEY 13200084TO

Structure 11602
Rim Elev. = 598.65
Inv. 30" W. 593.26
Inv. 24" E. 594.39
Inv. 12" N. 593.55

Structure 11604
Rim Elev. = 598.41
Inv. 12" N. 594.76
Inv. 12" S. 594.71

Structure 11612
Rim Elev. = 598.36
Inv. 12" S. 595.31

TITLE INFORMATION

The Title Description and Schedule B items hereon are from First American Title Commitment No. 689259, dated January 5, 2015

TITLE DESCRIPTION

The land referred to in this Commitment, situated in the County of Ottawa, Township of Grand Haven, State of Michigan, is described as follows:
Part of the Northwest 1/4 *of Section 1/4 of Section 4, Town 7 North, Range 16 West, Grand Haven Township, Ottawa County, Michigan, Commencing at the North 1/4 post, thence North 89 degrees 52 minutes 30 seconds West 606.70 feet along the North line of said Section, thence South 16 degrees 52 minutes 43 seconds West 171.08 feet, thence South 22 degrees 47 minutes 30 seconds East 359.56 feet, thence East to the North and South 1/4 line at a point 495 feet South of the place of beginning, thence North on the North and South 1/4 line 495 feet to the place of beginning, Grand Haven Township, Ottawa County, Michigan, EXCEPT that part of the Northwest 1/4 of Section 4, Town 7 North, Range 16 West, Grand Haven Township, Ottawa County, Michigan described as beginning at the North 1/4 corner of Section 4 (said corner being 65.51 feet West of the South 1/4 corner of Section 33, Town 8 North, Range 16 West); thence North 89 degrees 52 minutes 30 seconds West 393.17 feet along the North line of Section 4; thence South 00 degrees 31 minutes 36 seconds East 305.89 feet; thence South 89 degrees 28 minutes 24 seconds West 205.30 feet; thence South 22 degrees 47 minutes 30 seconds East 202.80 feet; thence South 89 degrees 52 minutes 30 seconds East 511.47 feet to the North & South 1/4 line at a point 495.00 feet South of the place of beginning; thence North on the North and South 1/4 line 495.00 feet to the point of beginning.
Tax Item No. 70-07-04-100-032

*NOTE: There appears to be a typo in the description provided; Part of the Northwest 1/4 of Section 1/4 of Section 4 appears to contain an extra line of text, further deed research is recommended

SCHEDULE B - SECTION II NOTES

(3) Right of Way in favor of Consumers Power Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 284, page 197 affects the entire subject property.

(6) Easement in favor of Michigan Bell Telephone Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 1127, page 259 affects the subject property as shown hereon.

(7) Easement in favor of Michigan Bell Telephone Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 1486, page 459 affects the subject property as shown hereon.

(8) Terms and Conditions contained in Declaration of Non-Exclusive Driveway and Utility Easement as disclosed by instrument recorded in Liber 3520, page 404 and First Amendment to Declaration of Non-Exclusive Driveway and Utility Easement recorded in Liber 5709, page 459 affect the subject property as shown hereon.

(9) Easement for Underground Electric Line in favor of Consumers Energy Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 3782, page 696 affects the subject property, but the route of said easement is not specific enough to show hereon.

(10) Ameritech Easement in favor of Michigan Bell Telephone Company, d.b.a. SBC Ameritech Michigan and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 3801, page 780 affects the subject property as shown hereon.

(12) Bicycle Path and Walkway Easement in favor of Grand Haven Charter Township and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 5660, page 622 affects the subject property as shown hereon. Consent and Acknowledgement of Easement recorded in Instrument No. 2011-0003676 affects the subject property as shown hereon.

BENCHMARKS

BENCHMARK #10 ELEV. = 600.17 (NAVD88)
Top of largest pumper nozzle on hydrant located near West side of drive on the South side of Hayes Street being 108'± South of the centerline of Hayes Street & 28'± West of the East property line.

BENCHMARK #1108 ELEV. = 599.58 (NAVD88)
Top flange bolt under "E" of E.J.I.W. on hydrant near the Northwest building corner (Grand Haven 9) 0.5'± A.G.L. located 249'± South of the centerline of Hayes Street & 22'± East of the East property line.

SURVEYOR'S NOTES

1) Utility locations are derived from actual measurements or available records. They should not be interpreted to be exact locations nor should it be assumed that they are the only utilities in this area.
2) NOTE TO CONTRACTORS: 3 (THREE) WORKING DAYS BEFORE YOU DIG, CALL MISS DIG AT TOLL FREE 1-800-482-7171 FOR UTILITY LOCATIONS ON THE GROUND.
3) This topographic survey was performed during a period of snow and ice covering. While every effort was made to located all features, snow and/or ice may have prevented all features from being visible.

811 Know what's **below.** **CALL** before you dig.

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NOTE:
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MIKE BOGGIO

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Phone: 248.258.5155

REVISIONS:

Title: Site Plan Submittal	V. Date: 03-20-15
Drawn: ER / BEM Checked: RJB	S. Date: 03-20-15
Title: Site Plan Submittal	V. Date: 03-24-15
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Title: Site Plan Submittal	V. Date: 04-29-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

FLAGSTAR BANK

Existing Conditions Plan

17250 HAYES RD

PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:

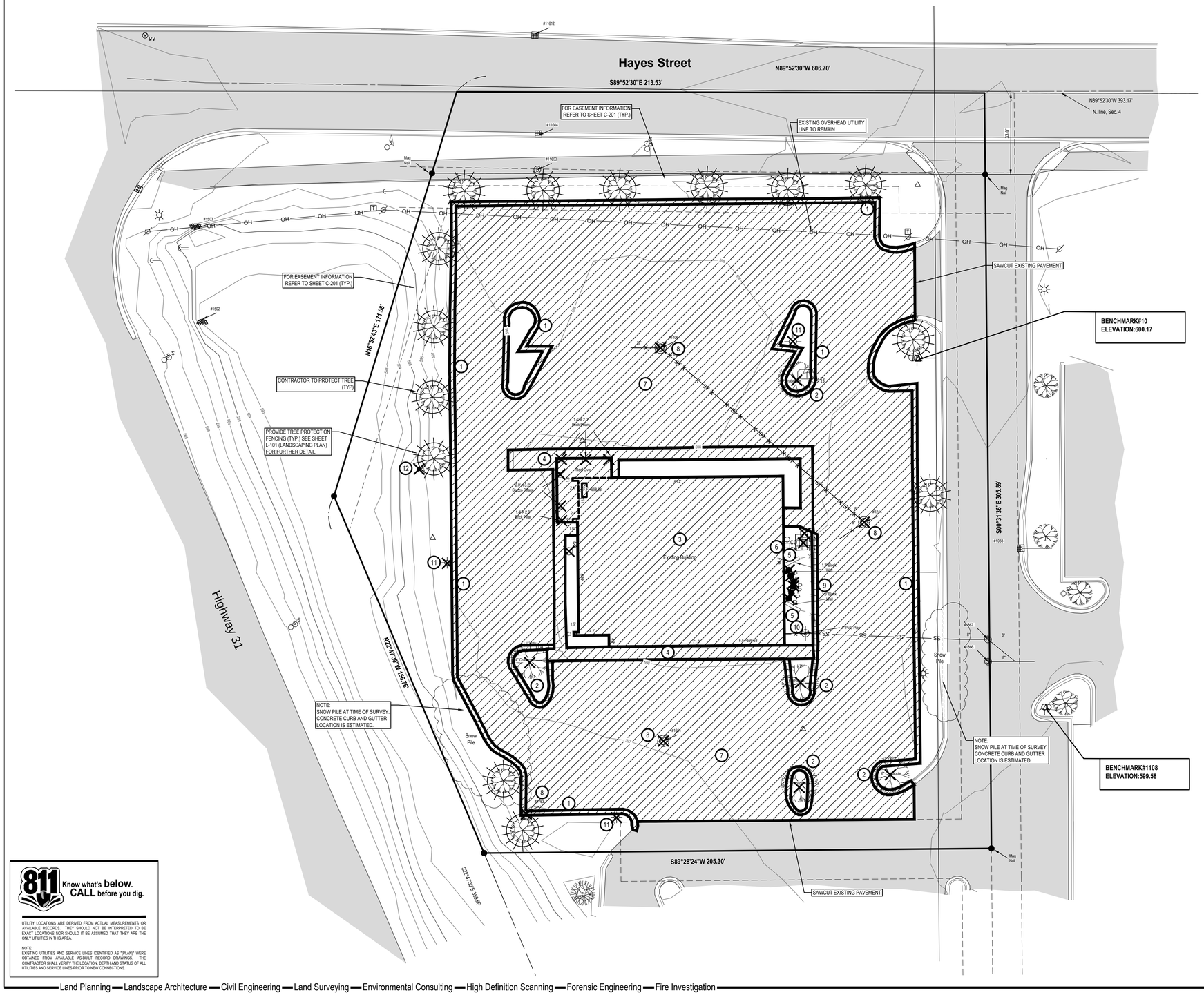
STATE OF MICHIGAN
ROGER JACK BARR II
ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

SHEET NO:
C-201

SHEET: 2 OF 9

15200045-CP1.dwg BM 4/27/2015 15:45



0' 10' 20' 40'

SCALE: 1" = 20'

REMOVAL / DEMOLITION NOTES

1. REMOVE EXISTING CONCRETE CURB & GUTTER
2. REMOVE EXISTING TREES/SHRUBS
3. REMOVE EXISTING STRUCTURE
4. REMOVE EXISTING CONCRETE SIDEWALK
5. REMOVE EXISTING BLOCK WALL
6. REMOVE EXISTING GAS METER & CO
7. REMOVE EXISTING ASPHALT DRIVEWAY / PARKING LOT
8. REMOVE EXISTING STORM SEWER
9. REMOVE EXISTING FENCE
10. REMOVE EXISTING SANITARY SEWER FROM EXISTING BUILDING TO 4" PVC PIPE
11. REMOVE EXISTING LIGHT POLE
12. REMOVE EXISTING PYLON SIGN

LEGEND

- EXISTING GRADE CONTOUR
- EXISTING BITUMINOUS, CONCRETE & BUILDING REMOVAL
- EXISTING UTILITY LINE REMOVAL
- EXISTING TREE REMOVAL
- PROTECT TREE DURING CONSTUCTION

REMOVAL / DEMOLITION NOTES

1) THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES AT LEAST THREE WEEKS PRIOR TO THE BEGINNING OF CONSTRUCTION OPERATIONS. THERE ARE EXISTING UNDERGROUND UTILITIES WHICH CROSS THE PROPOSED REPLACEMENT WORK AREAS. ALTHOUGH THEIR EXACT LOCATION CANNOT BE DETERMINED, IT IS KNOWN THESE UTILITIES ARE LOCATED WHERE DIGGING IS REQUIRED. THE CONTRACTOR SHALL CONDUCT THE REQUIRED EXCAVATION IN THESE AREAS WITH EXTREME CAUTION.
2) ALL EXISTING UTILITY INFORMATION SHOWN IS TAKEN FROM EXISTING RECORDS, AND FIELD VERIFIED WHERE ACCESSIBLE ONLY. INFORMATION OBTAINED FROM EXISTING RECORDS MAY NOT BE COMPLETE OR ACCURATE. THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THIS PLAN HAVE BEEN DETERMINED FROM THE BEST INFORMATION AVAILABLE AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THEIR ACCURACY. THE CONTRACTOR SHALL FIELD VERIFY FOR ACCURACY, LOCATION AND CONDITION.
3) BEFORE ANY WORK IS STARTED ON THE PROJECT AND AGAIN BEFORE FINAL ACCEPTANCE BY THE TOWNSHIP AND BY THE OWNER, REPRESENTATIVES OF THE TOWNSHIP, THE OWNER AND THE CONTRACTOR SHALL MAKE AN INSPECTION OF THE EXISTING SEWERS WITHIN THE WORK LIMITS WHICH ARE TO REMAIN IN SERVICE AND WHICH MAY BE AFFECTED BY THE WORK. THE CONDITION OF THE EXISTING UTILITIES AND THEIR APPURTENANCES SHALL BE DETERMINED FROM FIELD OBSERVATIONS AND EXISTING VIDEO TAPES. RECORDS OF THE INSPECTIONS SHALL BE KEPT IN WRITING BY THE CONTRACTOR.
4) THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR DEMOLITION WORK.
5) ALL EXISTING UTILITIES, SEWERS AND WATER LINES ARE TO REMAIN UNDISTURBED UNLESS OTHERWISE NOTED ON THE PLANS. THE CONTRACTOR SHALL CONTACT AND COORDINATE WITH ALL APPLICABLE UTILITY COMPANIES, MUNICIPALITIES AND AGENCIES BEFORE COMMENCING ANY WORK.
6) THE CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES REGARDING REMOVAL OF EXISTING POLES, OVERHEAD WIRES, UNDERGROUND UTILITIES, GUY WIRES, GAS LINES, ETC. ALL ADJUSTMENT OR RECONSTRUCTION WORK, EXCEPT FOR THOSE STRUCTURES OTHERWISE NOTED ON THE PLANS, SHALL BE PERFORMED BY THE CONTRACTOR. EXISTING APPURTENANCES SUCH AS UTILITY POLES AND VALVES BOX SHALL NOT BE DISTURBED BY THE CONTRACTOR DURING CONSTRUCTION.
7) THE CONTRACTOR SHALL MAINTAIN EXISTING UTILITY SERVICE TO ALL ADJOINING PROPERTIES.
8) ALL DEBRIS SHALL BE REMOVED FROM THE SITE, AND NO STOCKPILING ON SITE SHALL BE ALLOWED UNLESS APPROVED BY THE OWNER OR THEIR REPRESENTATIVES.
9) THE CONTRACTOR SHALL LIMIT SAWCUT AND PAVEMENT REMOVAL TO ONLY THOSE AREAS WHERE REQUIRED OR AS SHOWN. ALL PAVEMENTS TO BE REMOVED SHALL BE SAWCUT AND REMOVED TO FULL DEPTH AT ALL PAVEMENT LIMITS OR EXISTING JOINTS. IF ANY DAMAGE IS INCURRED TO ANY OF THE SURROUNDING PAVEMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ITS REMOVAL AND REPAIR AT NO ADDITIONAL COST TO ANYONE ELSE, INCLUDING THE TOWNSHIP OR OWNER.
10) ASPHALT AREAS SHOWN TO BE SAWCUT AND REMOVED FULL DEPTH ARE ACTUAL FACE OF PROPOSED CURBS. IT WILL BE NECESSARY TO MAKE OFF-SET SAWCUTS TO PROVIDE CLEARANCE FOR PROPOSED CURBS: THE CONTRACTOR SHALL DETERMINE THE AMOUNT OF OFF-SET NECESSARY TO CONSTRUCT THE PROPOSED CURBS. ADDITIONAL CUTS MAY BE DESIRED TO FACILITATE THE REMOVAL OF THE EXISTING PAVEMENT, BUT THERE WILL BE NO EXTRA PAYMENT FOR ADDITIONAL CUTS. PAVEMENT SHALL BE REMOVED WITHOUT DAMAGING OR UNDERMINING THE REMAINING PAVEMENT. IF ADJACENT PAVEMENT IS DAMAGED, THE CONTRACTOR SHALL MAKE ADDITIONAL FULL DEPTH SAWCUTS AND REMOVE THE DAMAGE AREAS AS NECESSARY.
11) ALL PAVEMENT REMOVAL AREAS SHALL BE FULL PAVEMENT CROSS-SECTION REMOVAL DOWN TO NATIVE SOIL LAYER IN ACCORDANCE WITH THE GEOTECHNICAL REPORT DATED MONTH/DAY/YEAR.
12) EXCAVATIONS RESULTING FROM THE REMOVAL OF ANY STRUCTURE, INCLUDING UTILITIES, ETC., SHOULD BE BACKFILLED TO THE DESIGN SUBGRADE LEVEL USING GRANULAR ENGINEERED FILL THAT IS PLACED AND COMPACTED ACCORDING TO THE GEOTECHNICAL REPORT, IF ANY, PROVIDED BY THE OWNER.
13) ALL TREES WITHIN THE GRADING LIMITS SHALL BE REMOVED UNLESS OTHERWISE NOTED.

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PREPARED FOR:
MBA ARCHITECTS
MIKE BOGGIO

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Bingham Farms, MI 48025
Phone: 248.258.5155

REVISIONS:

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Title: Site Plan Submittal	V. Date: 03-24-15
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Title: Site Plan Submittal	V. Date: 04-24-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-24-15
Title: Site Plan Submittal	V. Date: 04-29-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

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Demolition Plan

17250 HAYES RD
PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:
STATE OF MICHIGAN
ROGER JACK BARR II
ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

SHEET NO:
C-203

SHEET: 3 OF 9

15200045-CP1.dwg BM 4/27/2015 13:45

0' 150' 300' 600'

SCALE: 1" = 300'

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Title: Site Plan Submittal	V. Date: 04-29-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

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1/2 Mile Radius Map

17250 HAYES RD

PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:

STATE OF MICHIGAN
ROGER JACK BARR II
ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

SHEET NO:
C-204

SHEET: 4 OF 9

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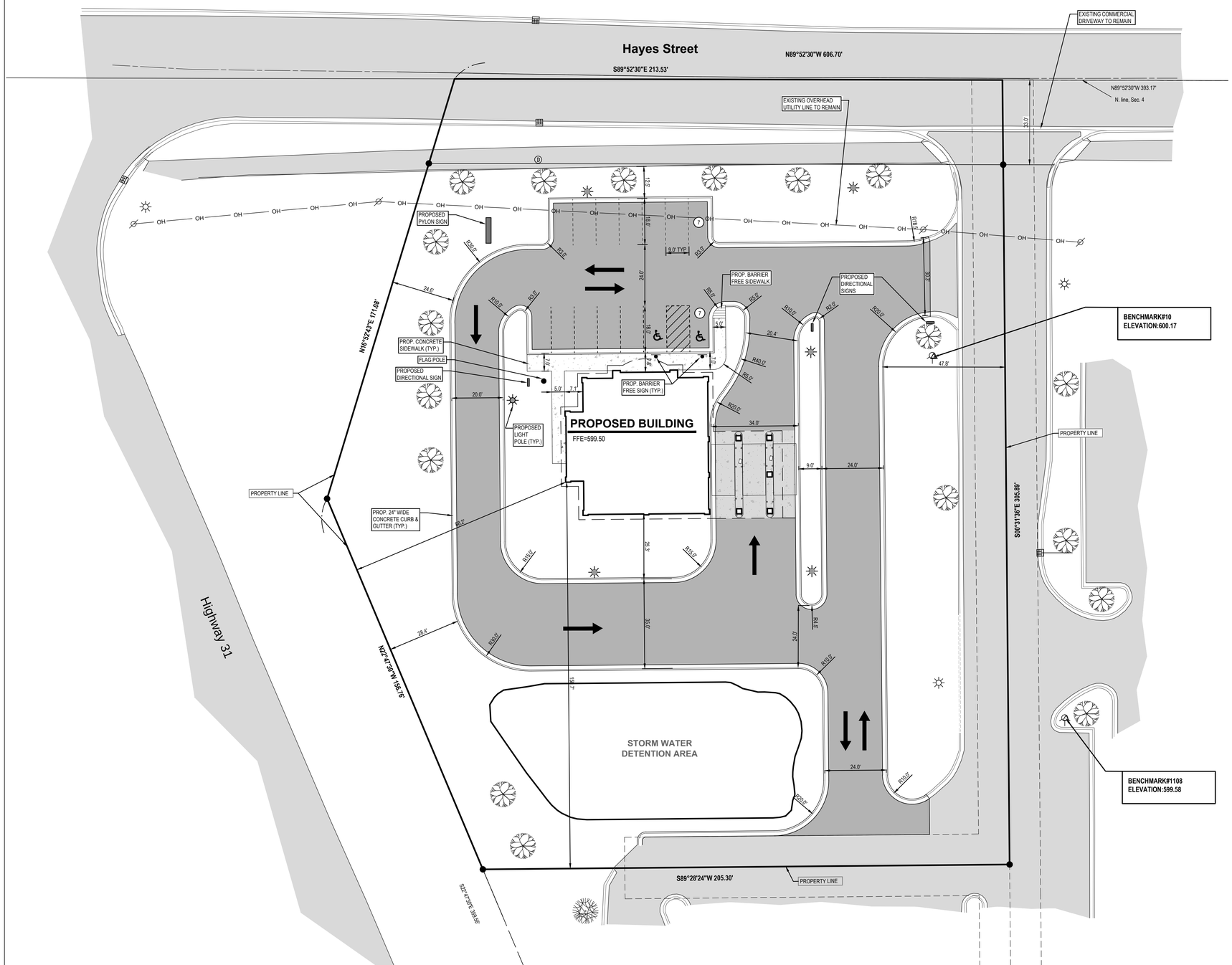

LEGEND

- EXISTING BITUMINOUS
- PROPOSED BITUMINOUS (STANDARD DUTY)
- PROPOSED CONCRETE (STANDARD DUTY)
- PROPOSED CONCRETE (HEAVY DUTY)
- PROPOSED LIGHT POLE
- EXISTING LIGHT POLE

GENERAL NOTES

1) ZONING OF PROPERTY: C-1; COMMERCIAL DISTRICT (US 31 & M-45 OVERLAY ZONE)
   C-1 ZONING REQUIREMENTS
   A) MINIMUM LOT AREA = 35,000 SQ.FT.
   B) MINIMUM LOT WIDTH = 110 FT.
   C) MAXIMUM BUILDING HEIGHT = 35 FT OR 2 1/2 STORIES
   SETBACKS
   A) FRONT YARD = 50 FT.
   B) SIDE YARD = 9 FT.
   C) REAR YARD = 20 FT.
2) SUMMARY OF LAND USE:
   A) TOTAL ACREAGE = 1.4 ACRES (62,895 SQ.FT.) (EXCLUDING R.O.W.)
   B) AREA OF PROPOSED BUILDING = 2,840 SQ.FT.
   C) LOT COVERAGE = 53.4%
3) PARKING REQUIREMENTS:
   A) MINIMUM REQUIRED SPACE PER TOWNSHIP = 9'x18' (24' AISLE)
   B) TYPICAL PARKING SPACE PROVIDED = 9'x18' (24' AISLE)
   C) NUMBER OF SPACES REQUIRED = 14 (BASED ON TOWNSHIP REQUIREMENTS)
   D) NUMBER OF SPACES PROVIDED = 14
4) THIS PROJECT IS NOT LOCATED IN THE 100 YEAR FLOOD PLAIN, BASED ON THE NATIONAL FLOOD INSURANCE PROGRAM RATE MAPS
5) BEST MANAGEMENT PRACTICES WILL BE UTILIZED DURING AND AFTER CONSTRUCTION OF THE PROJECT. MEASURES WILL INCLUDE THE USE OF SEEDING AND MULCHING, SEDIMENT INLET FILTERS, COMPACTION AND PAVING. THE OWNER OF THE SUBJECT PARCEL SHALL HAVE THE RESPONSIBILITY TO MAINTAIN THE PERMANENT SOIL EROSION PROTECTION MEASURES.
6) UTILITIES SHOWN ARE APPROXIMATE LOCATIONS DERIVED FROM ACTUAL MEASUREMENTS OR AVAILABLE RECORDS. THEY SHOULD NOT BE INTERPRETED TO BE EXACT LOCATIONS NOR SHOULD IT BE ASSUMED THAT THEY ARE THE ONLY UTILITIES IN THIS AREA.
7) CONTRACTOR TO FIELD VERIFY ALL INVERTS.
8) ALL LIGHTING SHALL BE SHIELDED FROM ALL ADJACENT PROPERTIES. PROPOSED LIGHTING SHALL CONSIST OF WALL-MOUNTED LIGHTS AND LIGHT POLES, BOTH FITTED WITH SHOEBOX TYPE FIXTURES AND SHALL COMPLY WITH THE LZ 3 LIGHTING ZONE REQUIREMENTS. ALL EXTERIOR LIGHTING WILL COMPLY WITH THE MAXIMUM WATTAGE REQUIREMENTS FOUND IN TABLE 2 OF THE GRAND HAVEN TOWNSHIP ZONING ORDINANCE, AND MAXIMUM MOUNTING HEIGHT SHALL BE 30 FEET. SITE SHALL NOT EXCEED TOTAL POWER LIMITS.
9) THE PERMANENT PARCEL NUMBER FOR THE SITE IS 70-07-04-100-032.
   THE ADDRESS OF THE PROPERTY IS 17250 HAYES STREET.
10) THERE IS CURRENTLY AN EXISTING BUILDING ON THE PARCEL.
    THE EXISTING BUILDING WILL BE DEMOLISHED AS PART OF THIS PROJECT.
11) NO FENCES OR WALLS ARE PROPOSED.
12) PROPOSED SITE PLAN WILL COMPLY WITH CHAPTER 20A (OUTDOOR LIGHTING REQUIREMENTS) AND CHAPTER 24 (PARKING, LOADING SPACES, AND SIGNS) FOR CANOPY LIGHTING AND SIGNAGE.
13) PROPOSED SITE PLAN WILL COMPLY WITH THE LZ 3 LIGHTING ZONE REQUIREMENTS.
14) PROPOSED SITE PLAN WILL COMPLY WITH MAXIMUM WATTAGE REQUIREMENTS FOUND IN TABLE 2, AND MAXIMUM MOUNTING HEIGHT SHALL BE 30 FEET.
15) PROPOSED SITE PLAN WILL COMPLY WITH TOTAL POWER LIMITS.

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Site Layout Plan

17250 HAYES RD
PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:
STATE OF MICHIGAN
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ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

SHEET NO:
C-205

SHEET: 5 OF 9

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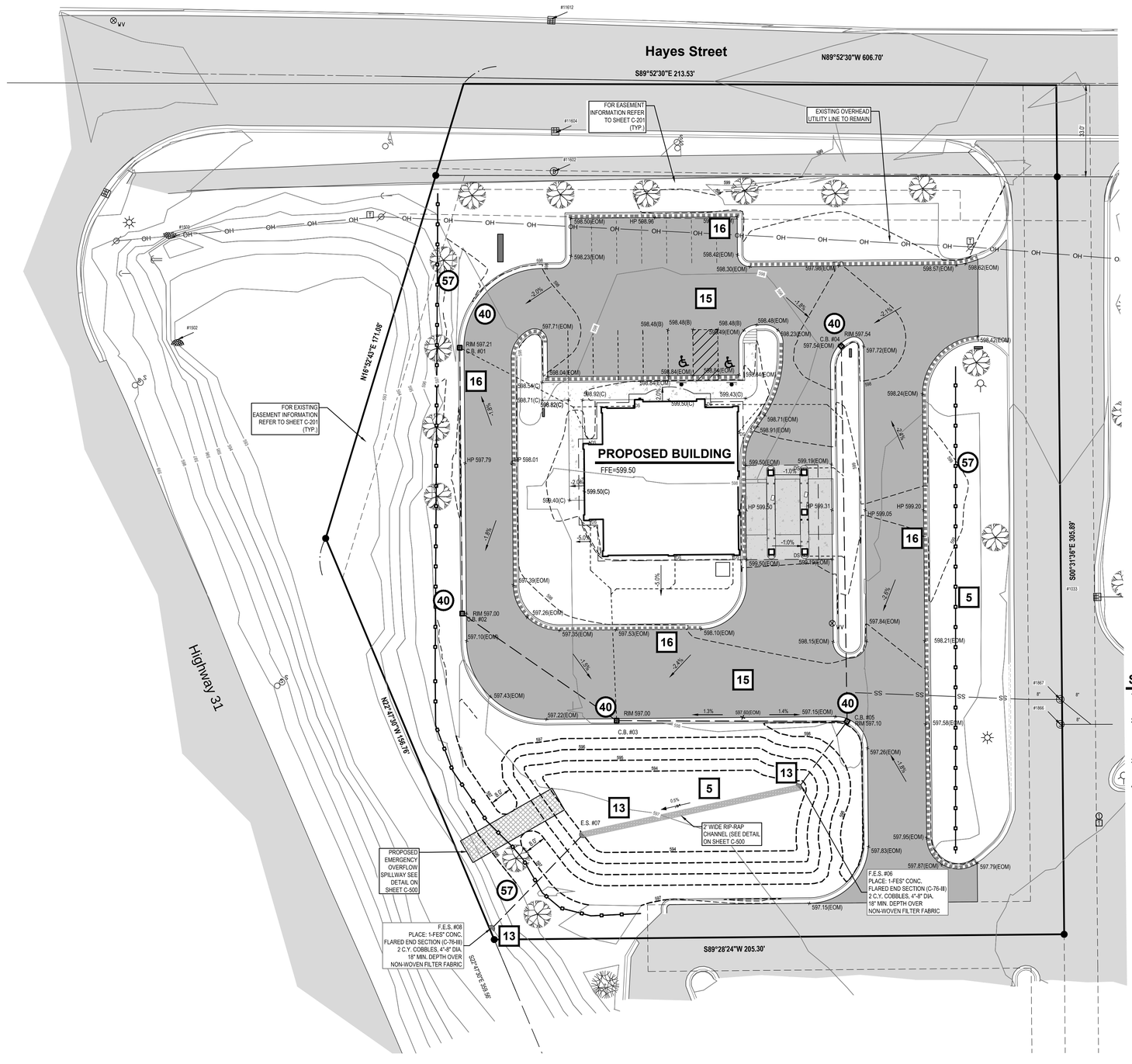
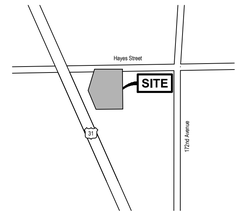




LOCATION MAP

NOT TO SCALE

LEGEND

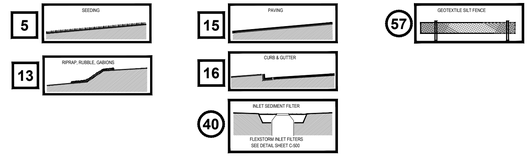
- EX. GRADE CONTOUR
- PROP. GRADE CONTOUR
- PROP. GRADE ELEV. (BLACKTOP)
- PROP. GRADE ELEV. (CONCRETE)
- PROP. GRADE ELEV. (GUTTER)
- PROP. GRADE ELEV. (HIGH POINT)
- EXISTING BITUMINOUS
- PROPOSED BITUMINOUS (REGULAR DUTY)
- PROPOSED CONCRETE (STANDARD DUTY)
- PROPOSED CONCRETE (HEAVY DUTY)
- PROP. SILT FENCE
- PROP. SPILL CURB

SOIL EROSION CONTROL SCHEDULE 2015

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PLACE SILT FENCE												
STRIP & STOCKPILE TOPSOIL												
CONSTRUCT CONNECTION TO STORM SEWER												
ROUGH GRADE SITE												
CONSTRUCT BUILDING FOUNDATION AND BUILDING												
CONSTRUCT IMPROVEMENTS AROUND BUILDING												
CONSTRUCT UTILITY LINES TO BUILDING												
FINISH GRADE SITE												
PAVE SITE												
RESPREAD TOPSOIL/COMPACTION												
SEED DISTURBED AREAS												
SITE RESTORATION/CLEAN UP												

SOIL EROSION AND SEDIMENTATION CONTROL NOTES

1) CONTRACTOR SHALL POSSESS THE SOIL EROSION AND SEDIMENTATION CONTROL PERMIT PRIOR TO START OF ANY EARTH WORK.
2) CONTRACTOR SHALL MODIFY THIS SOIL EROSION AND SEDIMENTATION CONTROL PLAN TO SHOW THE ADDITIONAL CONTROL MEASURES INTENDED TO BE USED DURING CONSTRUCTION. SUBMIT MODIFICATIONS TO THE CONTROLLING AGENCY, THE OWNER, AND THE ENGINEER.
3) EROSION PROTECTION SHALL BE PROVIDED AT ALL STORM SEWER INLETS AND OUTLETS. ALL BARE EARTH SHALL BE STABILIZED WITH SEEDING.
4) LOCATION AND TYPE OF EROSION CONTROL MEASURES ARE IDENTIFIED ON THE SKETCH BY KEY NUMBERS, e.g. ☐ RELATING TO THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY UNIFIED KEYING SYSTEM AND BEST MANAGEMENT PRACTICES.
   DENOTES TEMPORARY PRACTICES
   DENOTES PERMANENT PRACTICES



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Title: Site Plan Submittal	V. Date: 04-24-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-24-15
Title: Site Plan Submittal	V. Date: 04-29-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

FLAGSTAR BANK

S.E.S.C. & Grading Plan

17250 HAYES RD

PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:

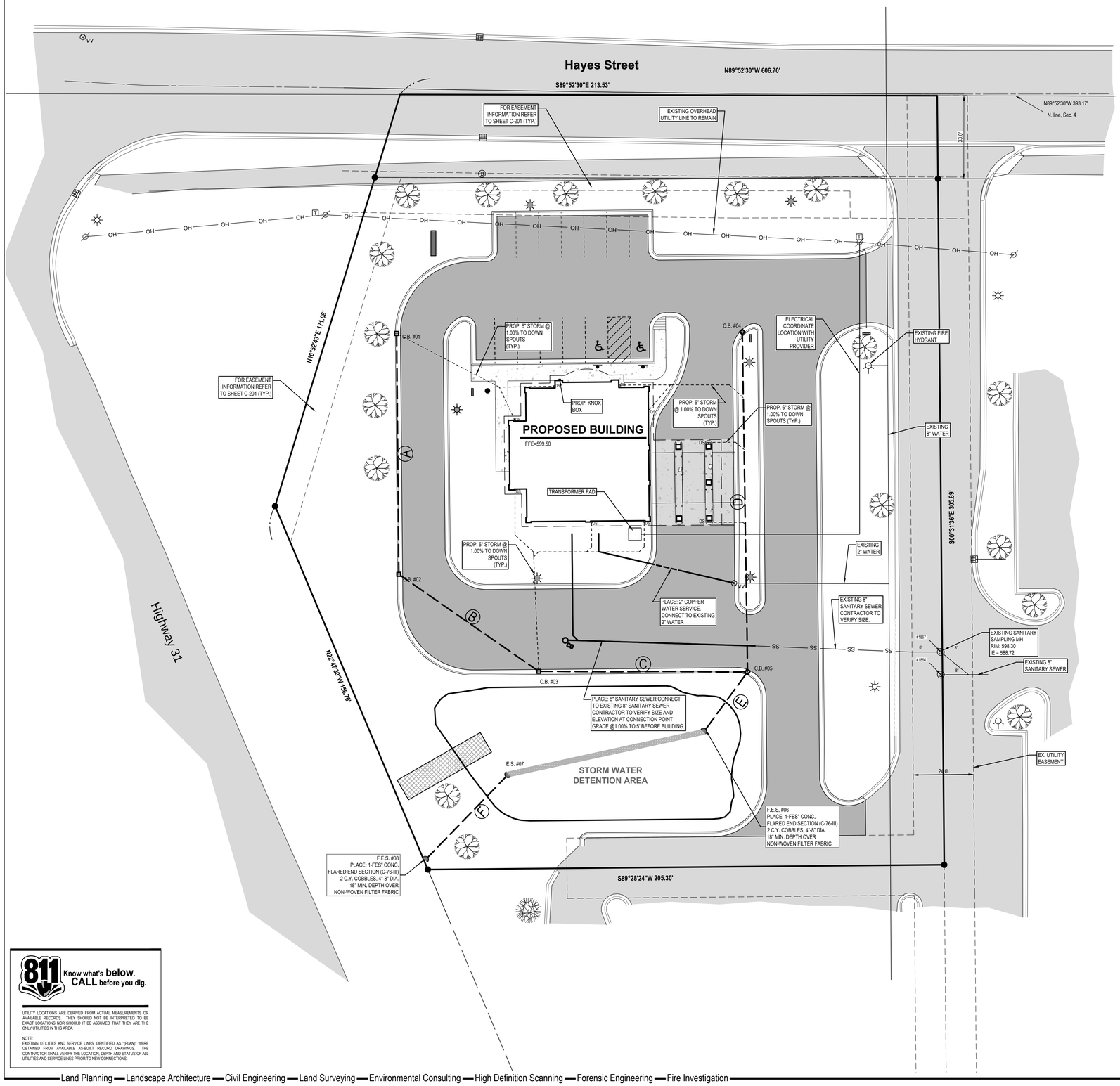
STATE OF MICHIGAN
ROGER JACK BARR II
ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

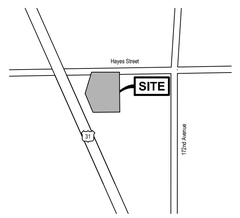
SHEET NO:
C-300

SHEET: 6 OF 9

15200045-CP1.dwg BM 4/27/2015 15:45



SCALE: 1" = 20'



LOCATION MAP
NOT TO SCALE

STORM SEWER DRAINAGE STRUCTURES				
PROP.	RIM	INVERTS	DIA.	TYPE
01	597.21	6" SE. INV.=594.35 12" S. INV.=594.35	4'	EJIW 7045
02	597.00	12" N. INV.=594.06 12" SE. INV.=594.06	4'	EJIW 7045
03	597.00	12" NW. INV.=593.86 6" N. INV.=593.86 12" E. INV.=593.86	4'	EJIW 7045
04	597.54	12" S. INV.=594.15	4'	EJIW 7045
05	597.10	12" W. INV.=593.61 12" N. INV.=594.61 15" SW. INV.=593.51	5'	EJIW 7045
06		15" NE. INV.=593.43		FES
07		12" SW. INV.=593.03		FES
08		12" NE. INV.=592.80		FES

STORM SEWER DRAINAGE PIPES				
#	LENGTH	DIA.	SLOPE	MATERIAL
A	96'	12"	0.3%	SLCPP
B	68'	12"	0.3%	SLCPP
C	83'	12"	0.3%	SLCPP
D	135'	12"	0.40%	SLCPP
E	28'	15"	0.3%	SLCPP
F	45'	12"	0.5%	SLCPP

LEGEND

- EXISTING BITUMINOUS
- PROPOSED BITUMINOUS (STANDARD DUTY)
- PROPOSED CONCRETE (STANDARD DUTY)
- PROPOSED CONCRETE (HEAVY DUTY)
- DS — DOWN SPOUTS
- PROPOSED LIGHT POLE
- EXISTING LIGHT POLE

STORM SEWER CONSTRUCTION

1) ALL CATCH BASINS SHOULD BE PROVIDED WITH A MINIMUM 2' SUMP.
2) ALL STORM SEWER SHALL BE SLCPP (MEETING AASHTO M252 AND M294), UNLESS OTHERWISE SPECIFIED.
3) 6" UNDERDRAIN SHALL BE PERFORATED PIPE WITH SOCK, MEETING THE REQUIREMENTS OF AASHTO M-252 AND THE GEOTEXTILE SHALL MEET AASHTO M-288 REQUIREMENTS
4) ALL FLARED END SECTIONS SHALL BE CONCRETE.

811 Know what's **below.** **CALL** before you dig.

UTILITY LOCATIONS ARE DERIVED FROM ACTUAL MEASUREMENTS OR AVAILABLE RECORDS. THEY SHOULD NOT BE INTERPRETED TO BE EXACT LOCATIONS NOR SHOULD IT BE ASSUMED THAT THEY ARE THE ONLY UTILITIES IN THIS AREA.

NOTE:
EXISTING UTILITIES AND SERVICE LINES IDENTIFIED AS "(PLAN)" WERE OBTAINED FROM AVAILABLE AS-BUILT RECORD DRAWINGS. THE CONTRACTOR SHALL VERIFY THE LOCATION, DEPTH AND STATUS OF ALL UTILITIES AND SERVICE LINES PRIOR TO NEW CONNECTIONS.

NEDERVELD
www.nederveld.com
800.222.1868
GRAND RAPIDS
217 Grandville Ave., Suite 302
Grand Rapids, MI 49503
Phone: 616.575.5190
ANN ARBOR
CHICAGO
COLUMBUS
HOLLAND
INDIANAPOLIS
ST. LOUIS

PREPARED FOR:
MBA ARCHITECTS
MIKE BOGGIO

30100 Telegraph Rd., Suite 216
Bingham Farms, MI 48025
Phone: 248.258.5155

REVISIONS:

Title: Site Plan Submittal	V. Date: 03-20-15
Drawn: ER / BEM Checked: RJB	S. Date: 03-20-15
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Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

FLAGSTAR BANK

Utility Plan

17250 HAYES RD
PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:
STATE OF MICHIGAN
ROGER JACK BARR II
ENGINEER
No. 41990
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:
15200045

SHEET NO:
C-400

SHEET: 7 OF 9

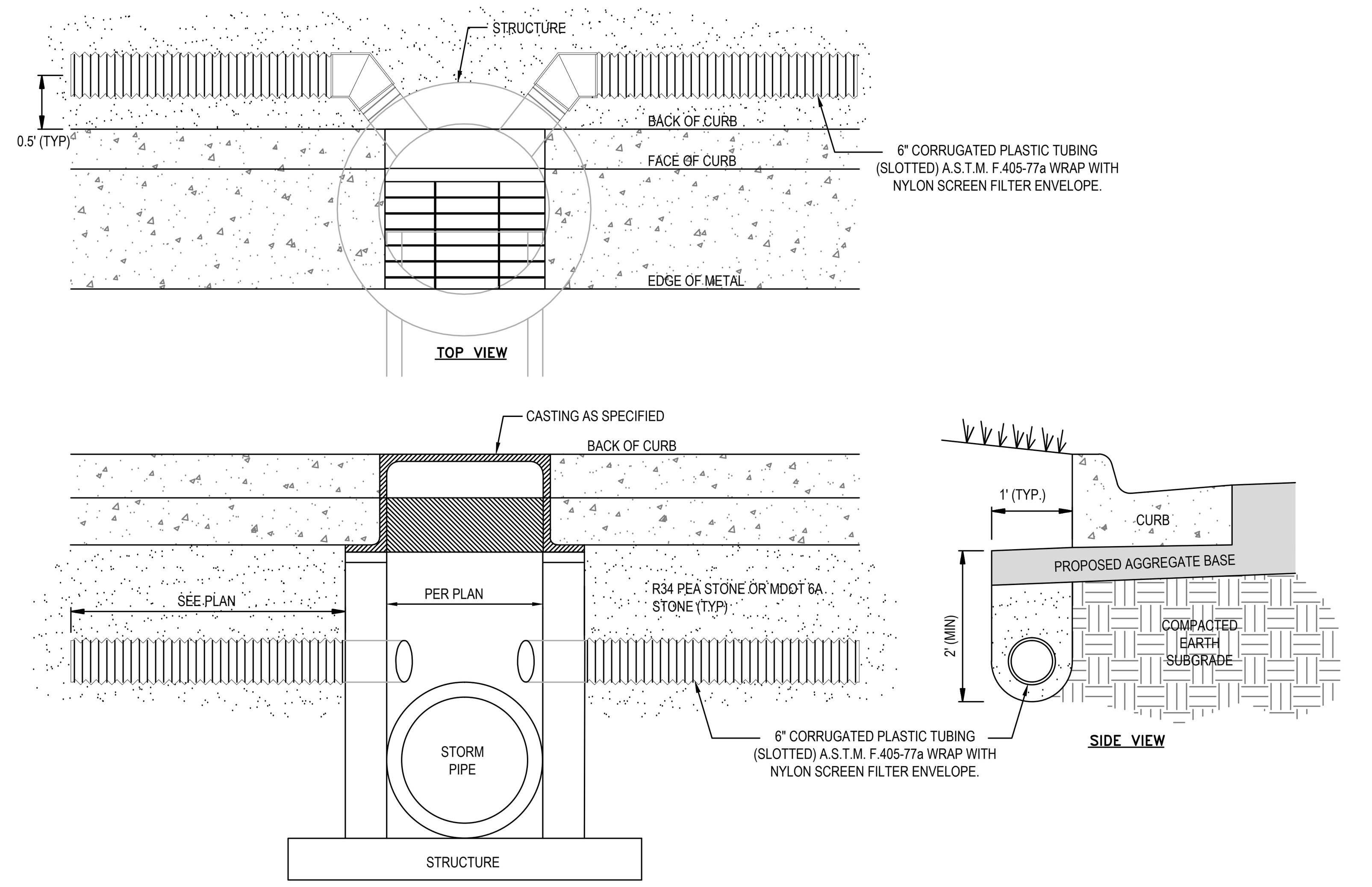
15200045-CP1.dwg BM 4/27/2015 13:45

UTILITY CONSTRUCTION NOTES

1. ALL CATCH BASINS SHALL BE PROVIDED WITH A MINIMUM 3' SUMP.
2. ALL STORM SEWER SHALL BE SMOOTH LINED CORRUGATED POLYETHYLENE PIPE (SLCPP) CONFORMING TO AASHTO M-252 AND M-294 UNLESS OTHERWISE NOTED.
3. 6" UNDERDRAIN SHALL BE PERFORATED PIPE WITH SOCK, MEETING THE REQUIREMENTS OF AASHTO M-252 AND THE GEOTEXTILE SHALL MEET AASHTO M-88 REQUIREMENTS.
4. ALL CATCH BASINS AND MANHOLES SHALL BE CONCRETE, CONFORMING TO ASTM C-478 WITH BUTYL RUBBER GASKETED JOINTS AND BOOT TYPE PIPE CONNECTED, CONFORMING TO ASTM C-923 ARE REQUIRED FOR ALL PIPE CONNECTIONS 24" DIAMETER AND SMALLER.
5. ALL WATERMAIN AND SANITARY SEWER CONSTRUCTION SHALL CONFORM TO GRAND HAVEN TOWNSHIP STANDARD CONSTRUCTION SPECIFICATIONS, INCLUDING POST CONSTRUCTION VIDEO INSPECTION OF THE SANITARY SEWER SYSTEM.

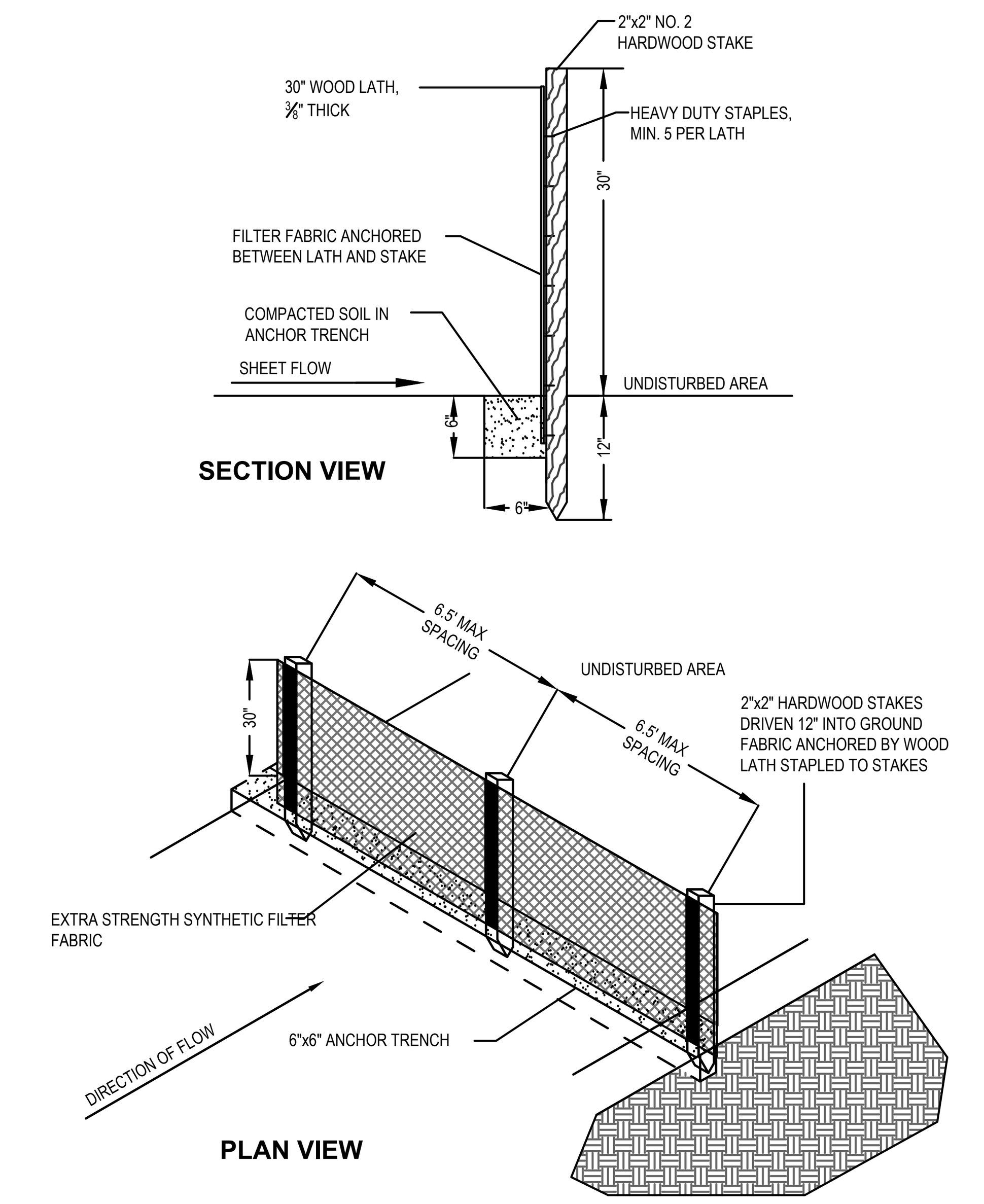
CONSTRUCTION NOTES

1) ALL CONSTRUCTION AND MATERIAL SPECIFICATIONS INCLUDED FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE MDOT CONSTRUCTION AND MATERIALS SPECIFICATIONS (LATEST EDITION) AND THE ORDINANCES OF THE TOWNSHIP. WHERE CONFLICTS OCCUR IN THE ABOVE, THE TOWNSHIP SHALL BE THE GOVERNING AUTHORITY.
2) SOIL BORINGS HAVE BEEN PERFORMED BY THE OWNER AND SHALL BE PROVIDED TO THE CONTRACTOR. VARIATION IN EXISTING SOIL CONDITIONS MAY IMPACT THE EARTHWORK QUANTITIES IF UNUSABLE SOILS ARE ENCOUNTERED DURING CONSTRUCTION. REFER TO GEOTECHNICAL REPORT, IF ANY, FOR FINAL DESIGN SPECIFICATIONS.
3) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES TO THE EXISTING WATER AND SEWERAGE SYSTEM RESULTING FROM NON-CONFORMANCE WITH THE APPLICABLE STANDARDS OR THROUGH GENERAL NEGLIGENCE.
4) ALL WORK, INCLUDING INSPECTIONS AND TESTING COST REQUIRED FOR REMOVAL, RELOCATION OR NEW CONSTRUCTION FOR PRIVATE OR PUBLIC UTILITIES, WILL BE DONE BY AND AT THE EXPENSE OF THE CONTRACTOR AND INCLUDED IN THE BID PRICE FOR THE VARIOUS WORK ITEMS UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL NECESSARY PERMITS FROM THE TOWNSHIP AND COUNTY AND ANY OTHER AGENCY FOR ALL WORK DONE BY THE CONTRACTOR.
5) ANY DEFECTS IN THE CONSTRUCTION, INCLUDING MATERIALS OR WORKMANSHIP, SHALL BE REPLACED OR CORRECTED BY REMOVAL AND REPLACEMENT OR OTHER APPROVED METHODS PRIOR TO ACCEPTANCE BY THE TOWNSHIP OR OWNER WITHOUT ANY ADDITIONAL COST TO THE TOWNSHIP OR OWNER.
6) ALL LAWN AREAS REMOVED OR DISTURBED SHALL BE REPLACED WITH TOPSOIL AND SOD WHERE NEEDED AND SHALL BE RESEEDED AND MULCHED IF SATISFACTORY RE-ESTABLISHMENT OF LAWN DOES NOT OCCUR.
7) ALL PUNCH LIST AND DEFICIENCY WORK SHALL BE COMPLETED WITHIN 1 MONTH OF THE END OF CONSTRUCTION.
8) THE CONTRACTOR SHALL OBTAIN A STREET OPENING PERMIT FROM THE TOWNSHIP BEFORE BEGINNING WORK WITHIN ANY PUBLIC STREET RIGHT-OF-WAY.
9) THE CONTRACTOR SHALL MAINTAIN A CURRENT SET OF CONSTRUCTION DRAWINGS ON SITE AT ALL TIMES.
10) THESE PLANS HAVE BEEN DEVELOPED FOR ELECTRONIC FIELD LAYOUT. DIMENSIONS SHOWN ARE FOR GRAPHIC PRESENTATION ONLY AND SHOULD NOT BE USED FOR LAYOUT. CONTACT THE ENGINEER IF ANY DISCREPANCIES BETWEEN THE PLAN AND ELECTRONIC DATA ARE DISCOVERED.
11) THE WORK LIMITS SHOWN ON THESE PLANS ARE FOR PHYSICAL CONSTRUCTION ONLY. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY LIGHTS, BARRICADES, FLAGMEN, ETC. AS REQUIRED TO PERFORM THE REQUIRED WORK. THE INSTALLATION AND OPERATION OF ALL TEMPORARY TRAFFIC CONTROL AND TEMPORARY TRAFFIC CONTROL DEVICES AS REQUIRED SHALL BE PROVIDED BY THE CONTRACTOR WHETHER INSIDE OR OUTSIDE THESE WORK LIMITS. THE CONTRACTOR SHALL FURNISH, ERECT, MAINTAIN AND SUBSEQUENTLY REMOVE SUCH ADDITIONAL TRAFFIC CONTROL DEVICES LOCATED OUTSIDE THE LIMITS OF CONSTRUCTION AS ARE REQUIRED ON THOSE STREETS WHICH ARE USED AS DETOURS, INCLUDING "ROAD CLOSED" SIGNS AND BARRICADES AT THE POINT WHERE THE ROAD IS CLOSED TO THROUGH TRAFFIC.
12) THE CONTRACTOR SHALL PROTECT LOCATION OF ALL PROPERTY PINS AND BENCHMARKS.
13) ALL WORK CONTEMPLATED SHALL AT ALL TIMES BE SUBJECT TO THE DIRECT INSPECTION OF THE TOWNSHIP, OWNER AND THEIR REPRESENTATIVES. THE TOWNSHIP AND OWNER RESERVES THE RIGHT TO HALT ALL CONSTRUCTION ACTIVITY FOR NONCONFORMANCE OF PLANS, SPECIFICATIONS AND OTHER APPLICABLE STANDARDS OR REGULATIONS.
14) PRICES BID PER FOOT FOR ALL PIPES IS COMPACTED IN PLACE REGARDLESS OF SOIL OR ROCK CONDITIONS.
15) CONTRACTOR IS RESPONSIBLE FOR ALL SIGNS, BARRICADES AND SAFETY FENCES TO DETER PEOPLE FROM ENTERING THE WORK AREA AND FOR MAINTAINING AND PROTECTING THE FLOW OF VEHICULAR AND PEDESTRIAN TRAFFIC AROUND THE JOB SITE. TRAFFIC CONTROLS SHALL BE COORDINATED WITH THE POLICE DEPARTMENT AND THE TOWNSHIP.
16) PRIOR TO ANY CONSTRUCTION OR GRADING, A PROTECTIVE BARRIER, FENCE, POST AND/OR SIGNS CLEARLY INDICATING LIMITS OF WORK/DISTURBANCE SHALL BE INSTALLED INDICATING NO TREE REMOVAL OR DISTURBANCES OUTSIDE LIMITS, THE TOWNSHIP AND OWNER SHALL BE CONTACTED UPON DETERMINATION OF LIMITS IN THE FIELD.
17) ALL ROAD SURFACES, EASEMENTS OR RIGHT-OF-WAYS DISTURBED BY CONSTRUCTION OF ANY PART OF THIS IMPROVEMENT ARE TO BE RESTORED COMPLETELY TO THE SATISFACTION OF THE TOWNSHIP AND THE OWNER.
18) NO PARKING OF CONTRACTOR OR CONTRACTOR EMPLOYEE'S VEHICLES ON ANY PUBLIC STREETS SHALL BE PERMITTED.
19) ALL DISTURBED SIGNS, GUARDRAILS, MAIL BOXES, AND DRIVEWAYS SHALL BE REPAIRED OR REPLACED AS DIRECTED BY THE TOWNSHIP AND THE OWNER.
20) DUST CONTROL: THE CONTRACTOR SHALL SUPPLY ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY SUCH AS CALCIUM CHLORIDE, WATER OR A MOTORIZED DUST-FREE STREET SWEEPING DEVICE TO MAINTAIN ALL ROADWAYS BEING USED FOR ACCESS TO THE CONSTRUCTION SITE AND SHALL ADHERE TO ALL ORDINANCES OF THE TOWNSHIP, COUNTY, MDEQ OR ANY OTHER GOVERNING AUTHORITY.
21) ALL SEWERS, MANHOLES, JUNCTION CHAMBERS AND INLET BASINS MUST BE CLEANED BEFORE ACCEPTANCE BY THE TOWNSHIP AND OWNER.
22) IF MUD, SOIL OR OTHER DEBRIS IS DEPOSITED ON ADJACENT STREETS, ROADS OR OTHER PROPERTY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF SUCH AT THE END OF EACH WORK DAY OR AS REQUIRED DURING THE WORK DAY.
23) ADJUST TO GRADE OR RECONSTRUCT TO GRADE WORK SHALL INCLUDE THE REMOVAL AND REPLACEMENT OF ANY EXISTING CONCRETE BLOCKOUT PAVEMENT. DAMAGED PAVEMENT DOWELS OR OTHER SUCH LOAD TRANSFERS DEVICES SHALL BE REPLACED AS DIRECTED BY THE COUNTY AND THE ENGINEER.
24) ALL EXISTING CASTINGS FOR STRUCTURES TO BE ADJUSTED OR RECONSTRUCTED TO GRADE SHALL BE FIELD CHECKED AT THE TIME OF CONSTRUCTION AND MARKED SUITABLE FOR SALVAGE AND REUSE OR REPLACED.
25) COMPACTED PREMIUM BACKFILL (MDOT CLASS II SAND) WILL BE REQUIRED AT ALL FILL AREAS OR ANY STREETS WHERE REMOVAL AND REPLACEMENT OF PAVEMENT IS REQUIRED AND FOR ALL UNDERGROUND CONSTRUCTION UNDER ANY DRIVEWAY OR PAVEMENT INCLUDING THE 45 DEGREE ANGLE OF INFLUENCE FROM THE OUTSIDE EDGE OF PAVEMENT OR TOP OF CURB. COMPACTION TESTS SHALL BE REQUIRED EVERY 50 FEET UNDER PAVEMENT. PAVEMENT INCLUDES, BUT NOT LIMITED TO, ROADWAY SURFACES, SIDEWALKS, BIKE WAYS, DRIVEWAYS, SHOULDERS, BUILDINGS, ETC.
26) NO BUILDING MATERIAL, EQUIPMENT, VEHICLES OR CHEMICALS SHALL BE STORED OR PLACED OUTSIDE LIMITS OF WORK/DISTURBANCE.
27) STORMWATER POLLUTION PREVENTION ITEMS SHALL BE IN PLACE PRIOR TO COMMENCING CLEARING OPERATIONS, EARTHWORK GRADING, OR ANY OTHER TYPE OF CONSTRUCTION ACTIVITY.
28) ROOF DRAINS, FOUNDATION DRAINS AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE PROHIBITED.
29) CONSTRUCTION NOISE SHALL BE KEPT TO A MINIMUM DURING NIGHTTIME HOURS AND MUST COMPLY WITH MUNICIPAL CODE REQUIREMENTS.



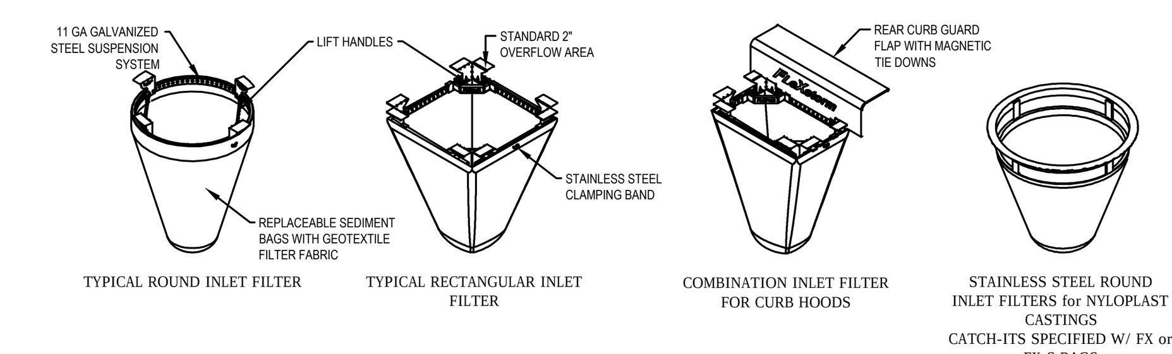
UNDER DRAIN DETAIL

N.T.S.



SILT FENCE DETAIL

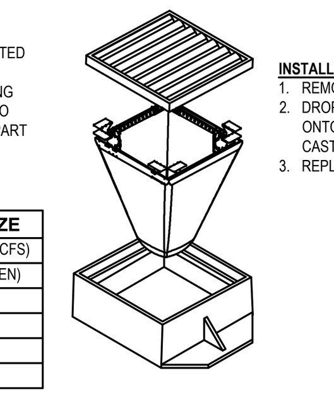
N.T.S.



NOTES:

1. ALL FRAMING IS CONSTRUCTED OF CORROSION RESISTANT STEEL (ZINC PLATED OR GALVANIZED) FOR 7 YEAR MINIMUM SERVICE LIFE.
2. UPON ORDERING CONFIRMATION OF THE DOT CALLOUT, PRECAST OR CASTING MAKE AND MODEL, OR DETAILED DIMENSIONAL FORMS MUST BE PROVIDED TO CONFIGURE AND ASSEMBLE YOUR CUSTOMIZED FLEXSTORM INLET FILTER. PART NUMBER ALONE IS NOT SUFFICIENT.
3. FOR WRITTEN SPECIFICATIONS AND MAINTENANCE GUIDELINES VISIT WWW.INLETFILTERS.COM

SPECIFICATIONS FOR STANDARD BAGS BY NOMINAL SIZE			
NORMAL BAG SIZE	SOLIDS STORAGE (CuFt)	FILTERED FLOW RATE AT 50% MAX (CFS)	
		FX (WOVEN)	IL (NONWOVEN)
SMALL	16	12	0.90
MEDIUM	2.10	1.70	1.30
LARGE	3.80	2.70	1.90
XL	4.20	3.60	2.60



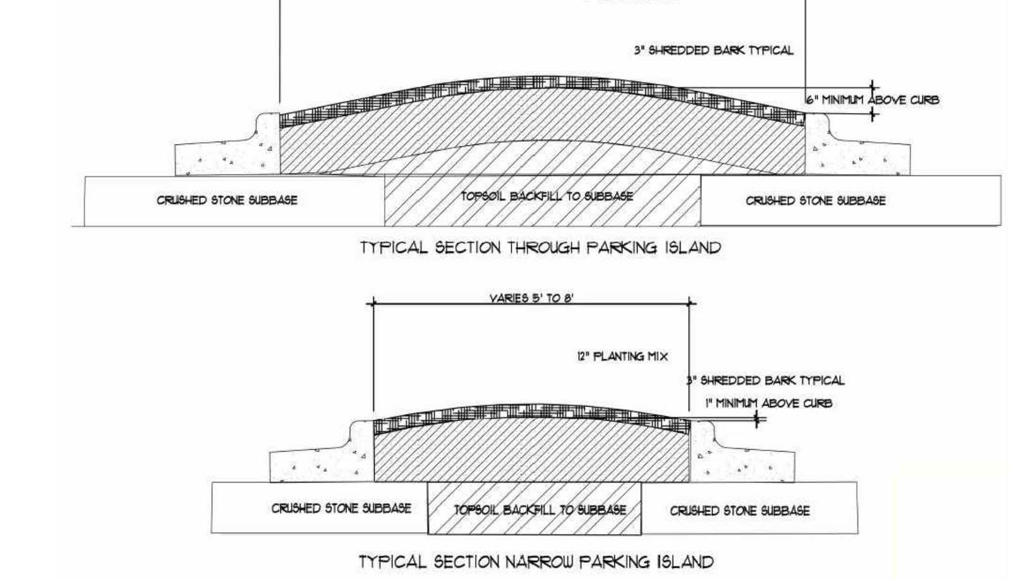
INSTALLATION:

1. REMOVE GRATE
2. DROP FLEXSTORM INLET FILTER ONTO LOAD BEARING LIP OF CASTING OR CONCRETE STRUCTURE
3. REPLACE GRATE

ALL PRODUCTS MANUFACTURED BY INLET & PIPE PROTECTION, INC
A DIVISION OF ADS, INC.
WWW.INLETFILTERS.COM
(866) 287-8655 PH
(630) 355-3477 FX
INFO@INLETFILTERS.COM

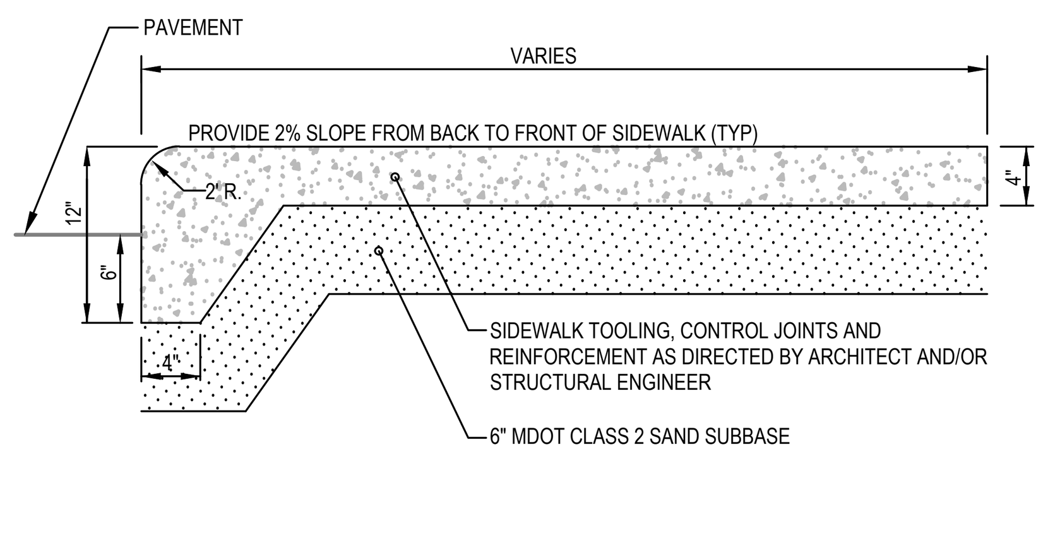
FLEXSTORM INLET FILTER DETAIL

N.T.S.



PARKING ISLAND DETAIL

N.T.S.

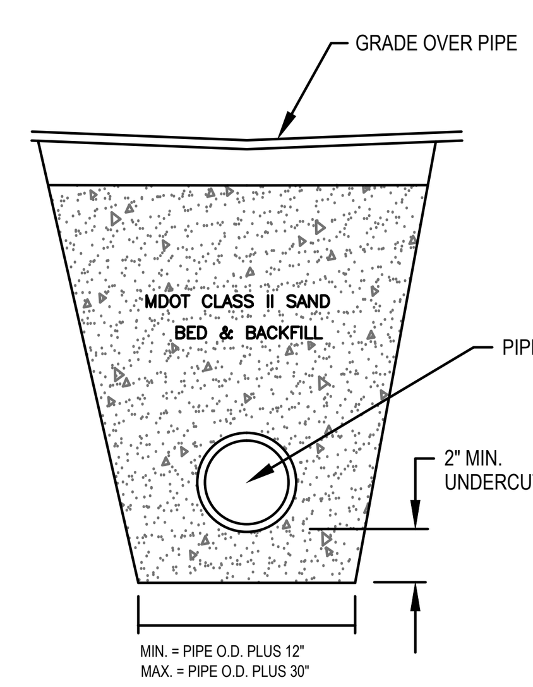


NOTES:

1. MINIMUM 3,000 PSI COMPRESSION STRENGTH.
2. BROOM FINISH.
3. EXPANSION AND CONTRACTION JOINT PER ACI STANDARDS.

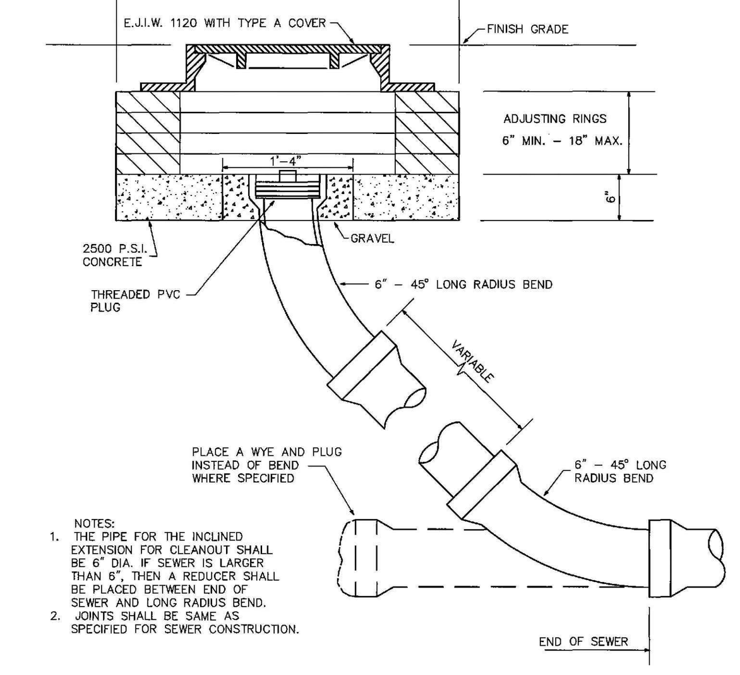
COMBINATION CURB AND WALK

N.T.S.



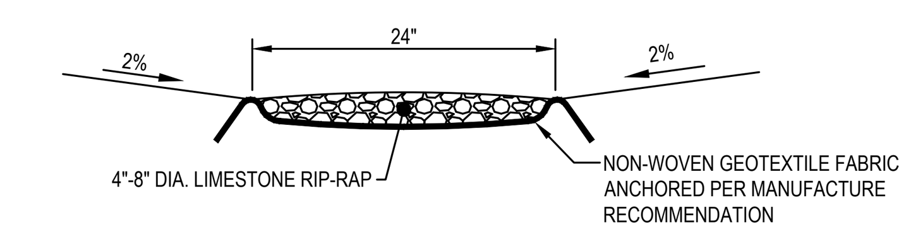
TYPICAL UTILITY TRENCH BED AND BACKFILL DETAILS

N.T.S.



SEWER CLEANOUT DETAIL

N.T.S.



RIP-RAP CHANNEL DETAIL

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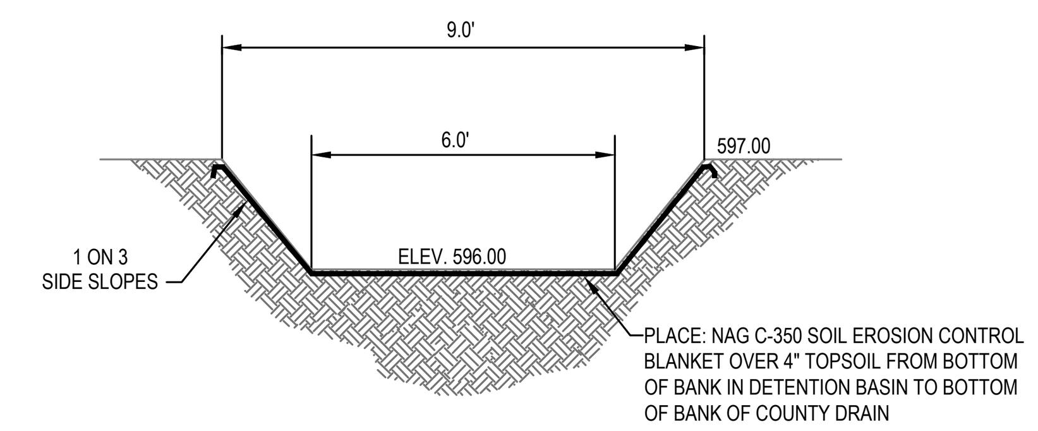
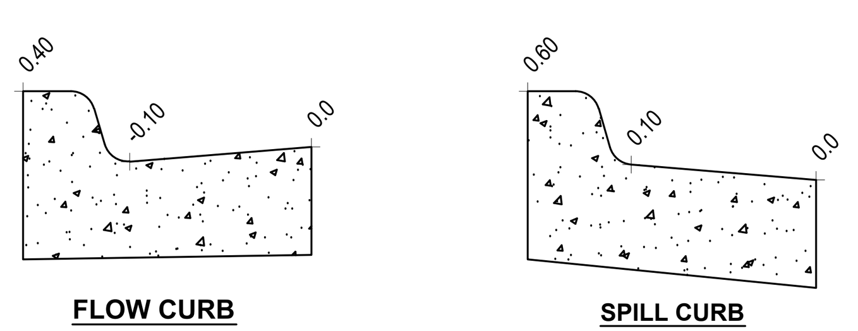


EMERGENCY SPILLWAY DETAIL

N.T.S.

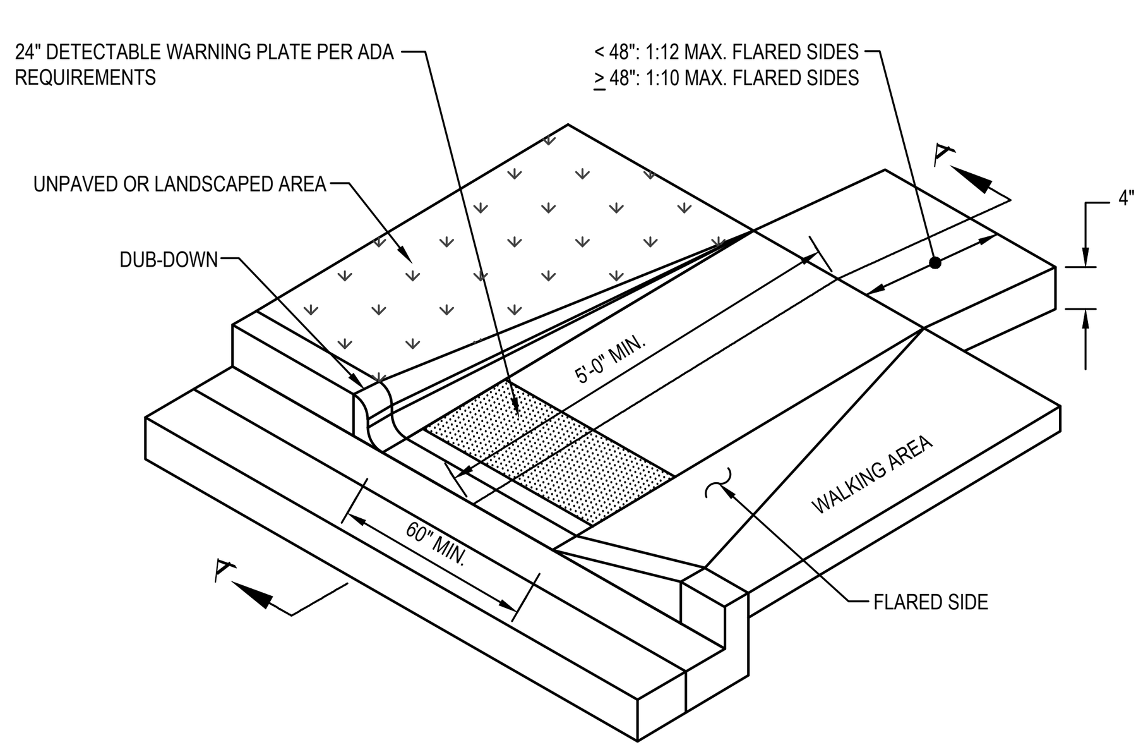


CURB ELEVATION DETAILS

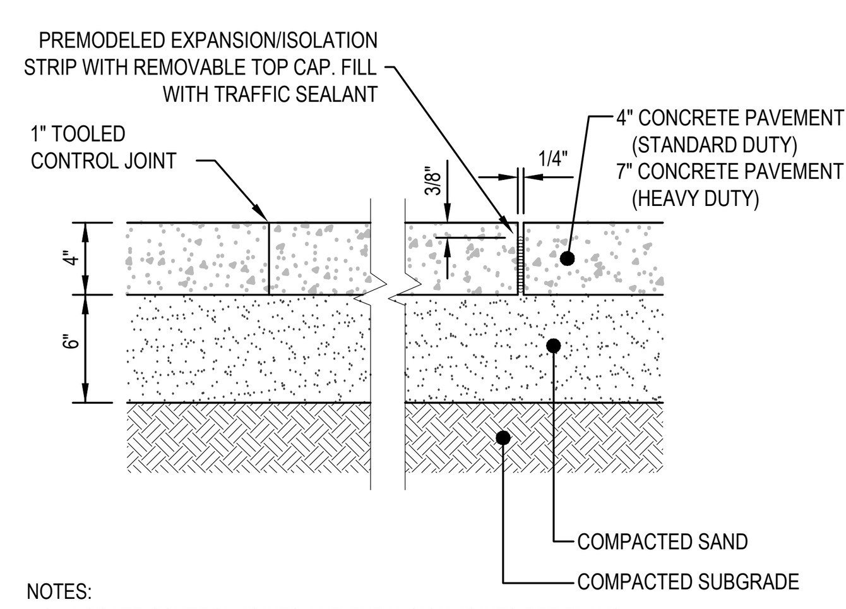
NO SCALE

GRADING NOTES:

1. ESTABLISH PERMANENT BENCH MARK ON-SITE PRIOR TO GRADING.
2. PROPOSED SPOT GRADES ARE TO EDGE OF METAL/TOP OF PAVEMENT UNLESS OTHERWISE NOTED. THE VERTICAL DIFFERENCE BETWEEN PAVEMENT GRADES AND TOP OF CURB GRADES VARY FOR PITCH IN AND PITCH OUT CURB (SEE DETAIL-THIS SHEET).
3. PROPOSED ADA ROUTE SHALL MEET THE STANDARDS SET FORTH IN THE ADA ACCESSIBILITY GUIDELINES FOR BUILDING AND FACILITIES - APPENDIX A TO PART 1191
4. SEE SHEETS C-300 FOR LOCATIONS



DUB-DOWN OR FLARED SIDE OPTION

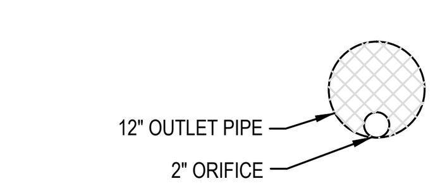


NOTES:

1. LOCATE CONTROL JOINTS AND EXPANSION JOINTS PER PLANS.
2. PANEL SIZE SHALL NOT EXCEED 8 FEET.
3. PANELS SHALL BE KEPT AS SQUARE AS POSSIBLE WITH THE LENGTH NEVER EXCEEDING 1.25X THE WIDTH.

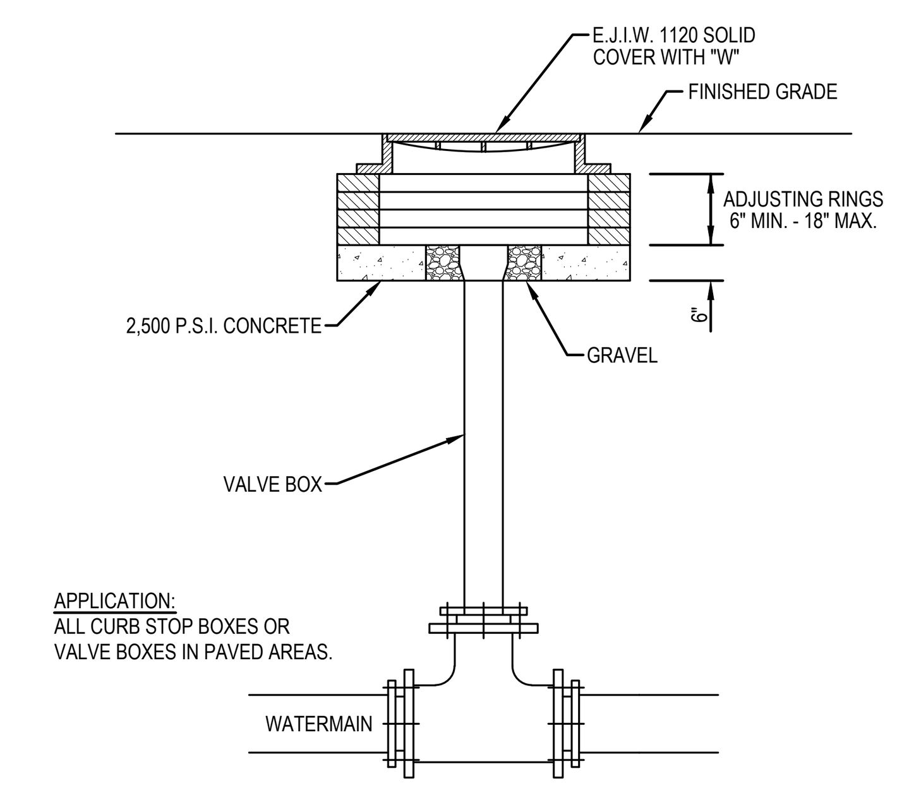
CONCRETE PAVEMENT DETAIL

N.T.S.



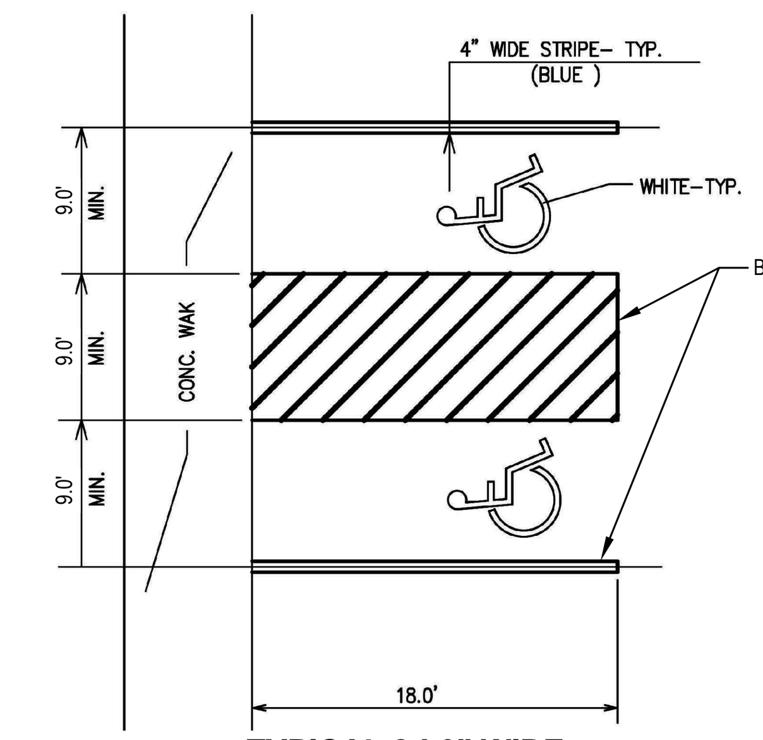
ORIFICE DETAIL

N.T.S.

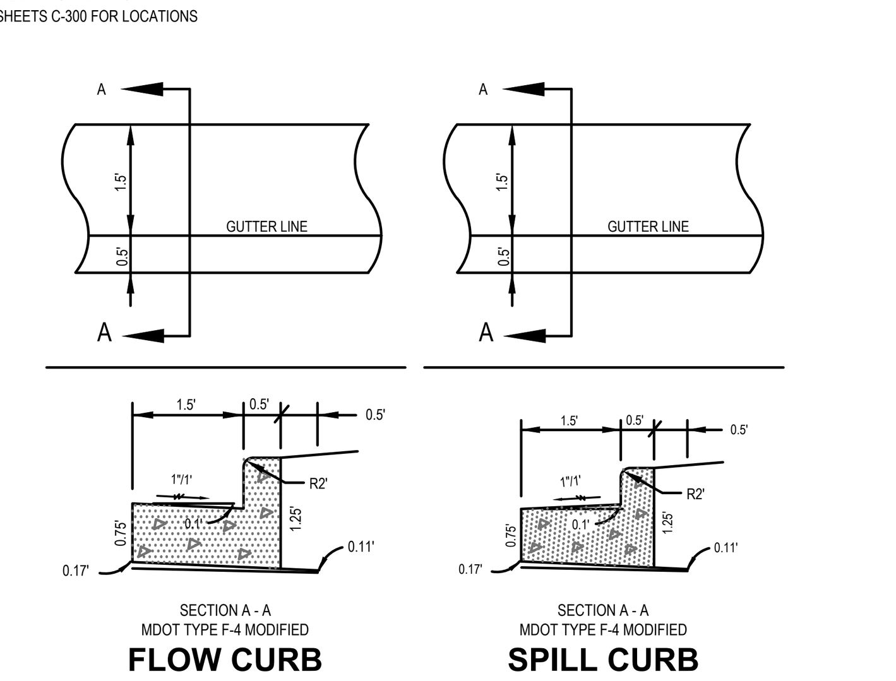


WATER VALVE BOX COVER DETAIL

N.T.S.

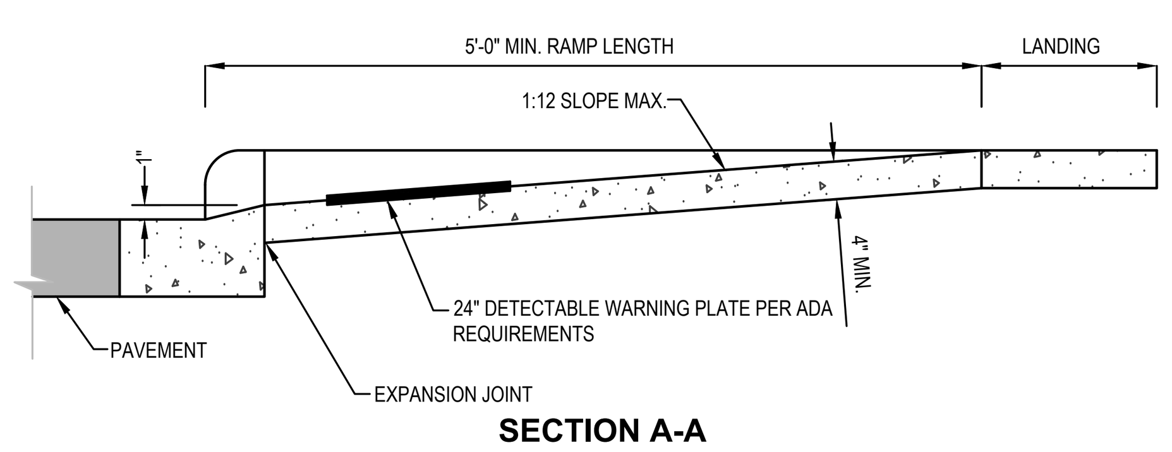


TYPICAL 8'-0" WIDE HANDICAP VAN PARKING SPACE



24" CONCRETE CURB AND GUTTER DETAIL

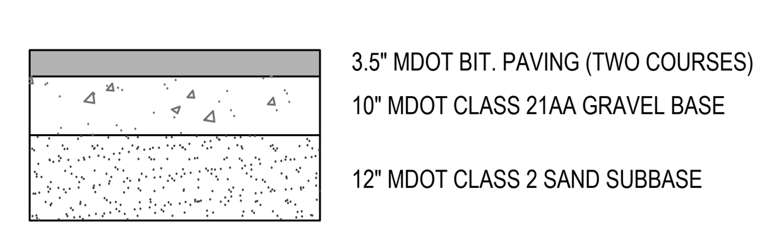
N.T.S.



SECTION A-A

DETECTABLE WARNING SIDEWALK RAMP

N.T.S.



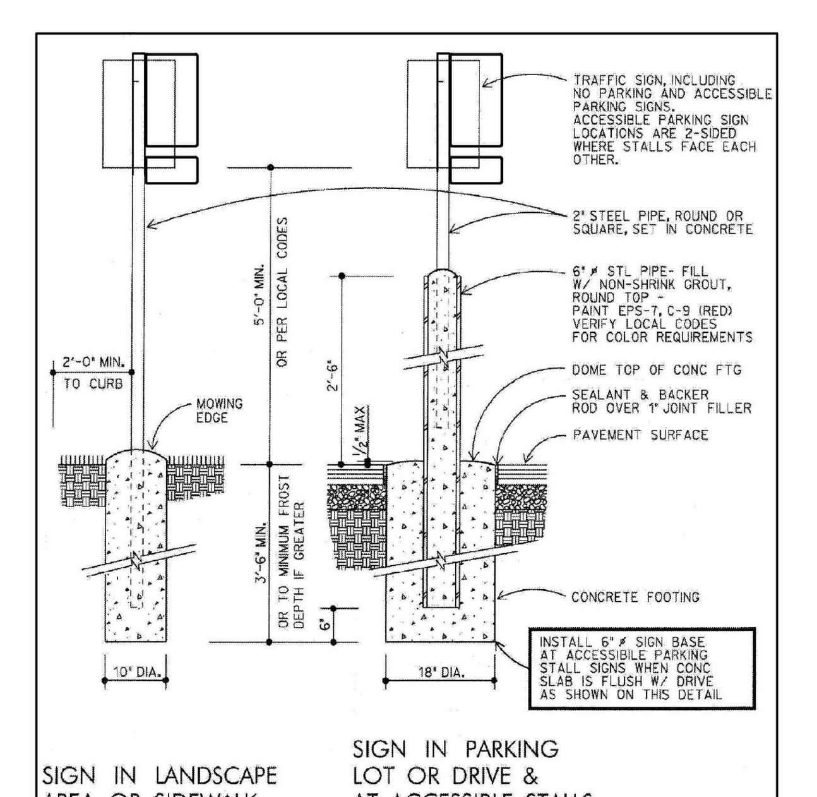
STANDARD DUTY PAVEMENT CROSS SECTION

N.T.S.

R7-8 & R7-8a / WITH 2" SQUARE STEEL POST - 2 EA.

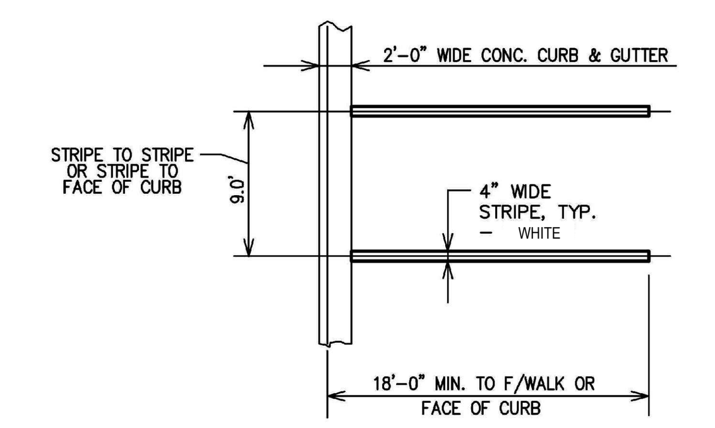
SIGN QUANITIES

N.T.S.



TYPICAL DETAIL OF SIGNAGE IN PARKING LOT

N.T.S.



TYPICAL 90° PERIMETER PARKING SPACE

NOTE:
APPLY TWO COATS OF VOC COMPLIANT, M.D.O.T. APPROVED, UNDILUTED SOLVENT BASED, OR LATEX TRAFFIC PAINT TO ALL PAVEMENT MARKINGS. USE MANUFACTURERS RECOMMENDED APPLICATION RATE, WITHOUT ADDITION OF THINNER, WITH A MAXIMUM OF 100 SFT PER GALLON, OR MINIMUM 15 MILS WET FILM THICKNESS, AND 7.5 MILS DRY FILM THICKNESS PER COAT, WITH MINIMUM 30 DAYS BETWEEN APPLICATIONS. SECOND COAT MUST NOT BE APPLIED EARLIER THAN 7 DAYS BEFORE OCCUPANCY.

PAVEMENT MARKING DETAILS

N.T.S.

NEDERVELD
www.nederveld.com
800.222.1868
GRAND RAPIDS
217 Grandville Ave., Suite 302
Grand Rapids, MI 49503
Phone: 616.575.5190
ANN ARBOR
CHICAGO
COLUMBUS
HOLLAND
INDIANAPOLIS
ST. LOUIS

PREPARED FOR:

MBA ARCHITECTS
MIKE BOGGIO

30100 Telegraph Rd., Suite 216
Bingham Farms, MI 48025
Phone: 248.258.5155

REVISIONS:

Title: Site Plan Submittal		V. Date: 03-20-15
Drawn: ER / BEM	Checked: RJB	S. Date: 03-20-15
Title: Site Plan Submittal		V. Date: 03-24-15
Drawn: ER / BEM	Checked: RJB	S. Date: 03-24-15
Title: Site Plan Submittal		V. Date: 04-24-15
Drawn: ER / BEM	Checked: RJB	S. Date: 04-24-15
Title: Site Plan Submittal		V. Date: 04-29-15
Drawn: ER / BEM	Checked: RJB	S. Date: 04-29-15

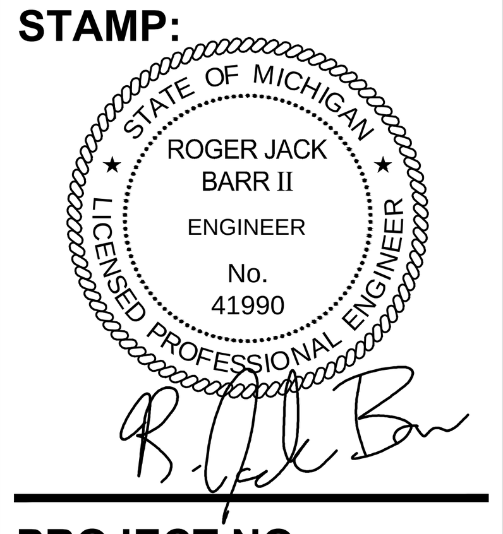
FLAGSTAR BANK

DETAILS & SPECIFICATIONS

17250 HAYES RD

PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

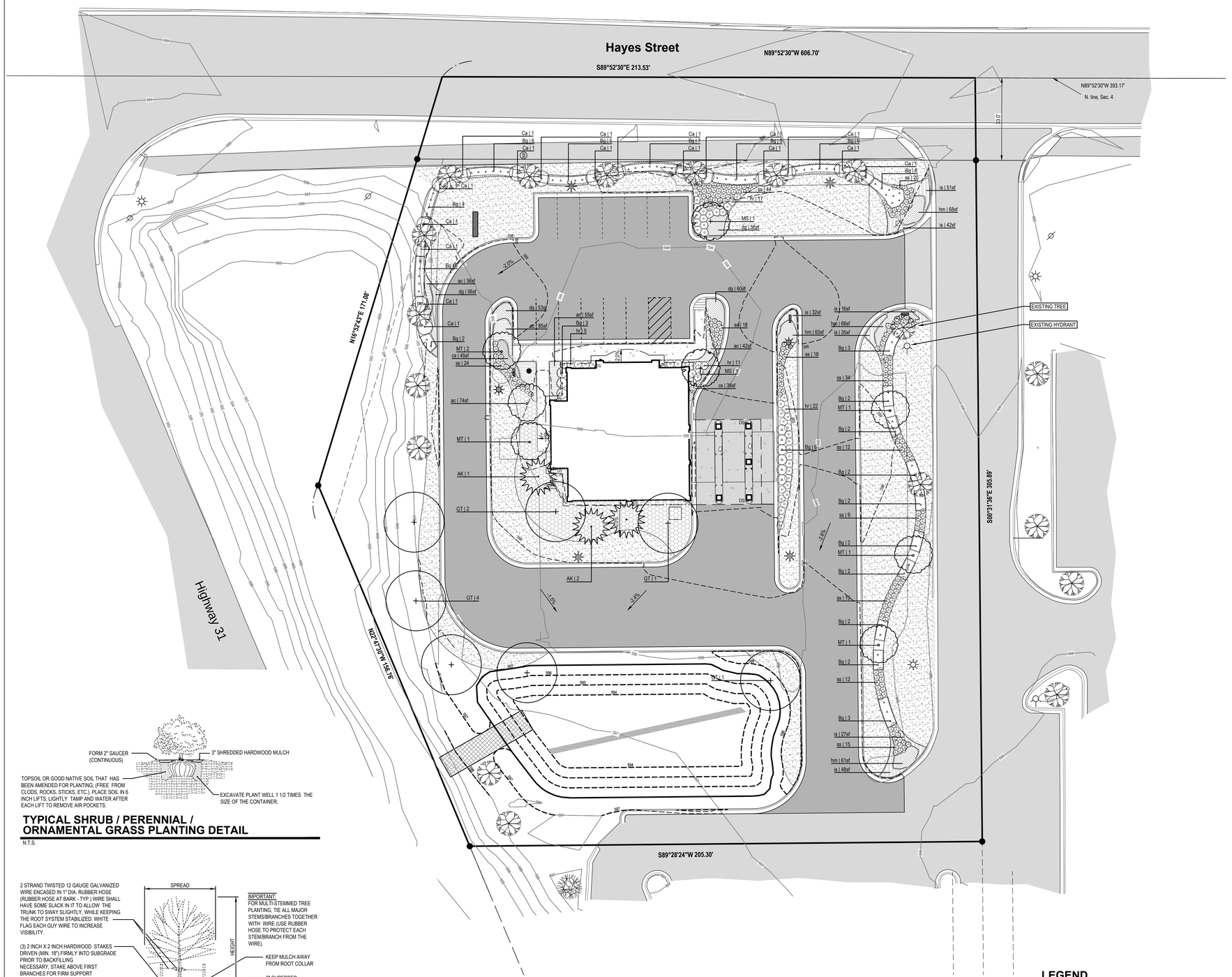
STAMP:



PROJECT NO: 15200045

SHEET NO: C-500

SHEET: 8 OF 9



LANDSCAPE LEGEND / SCHEDULE

TREES

SYMBOL	KEY	QUANTITY	SCIENTIFIC NAME	COMMON NAME	SIZE
	AK	3	Abies koreana	Korean Fir	10' hgt. avg.(1)
	GT	7	Gleditsia triacanthos f. inermis	Thornless Honey Locust	3" cal. min.
	MS	2	Magnolia stellata	Star Magnolia	3" cal. min.
	MT	6	Malus 'Thunderchild'	'Thunderchild' Flowering Crabapple	3" cal. min.

(1) Korean Fir shall be planted at varying heights, approximately 8'-12'.

SHRUBS

SYMBOL	KEY	QUANTITY	SCIENTIFIC NAME	COMMON NAME	SIZE
	Ca	16	Cornus alba 'Bailhalo'	Ivory Halo Dogwood	5 gal.
(1) (2)	Bg	79	Buxus 'Green Beauty'	'Green Beauty' Boxwood	5 gal.

1) Oval pruned boxwood approximately 4' x 4'.

2) Boxwood pruned into continuous rectangular hedge approximately 4' x 4'.

PERENNIALS, GRASSES, & GROUND COVERS

SYMBOL	KEY	QUANTITY	SCIENTIFIC NAME	COMMON NAME	SIZE
	ac	292 sf.	Astilbe chinensis 'Visions'	'Visions' Astilbe	1 gal. 12"-18" spc.
	N/A	As Needed(1)	N/A	Wood Mulch	3" depth
	cs	82 sf.	Coreopsis 'Snowberry'	'Snowberry' Tickseed	1 gal. 30"-36" spc.
	dg	223 sf.	Deutzia gracilis 'Nikko'	Dwarf Slender Deutzia	1 gal. 30"-36" spc.
	hm	261 sf.	Heuchera 'Midnight Bayou'	'Midnight Bayou' Coral Bells	1 gal. 18"-24" spc.
	hr	55	Hosta 'Risky Business'	'Risky Business' Hosta	2 gal.
	is	251 sf.	Iberis 'Snowflake'	'Snowflake' Candytuft	1 gal. 12"-18" spc.
	nm	As Needed(2)	N/A	Native Meadow Grass	Seed
	pp	11227 sf.	Poa pratensis	Kentucky Bluegrass Sod	Roll
	ss	223	Schizachyrium scoparium 'The Blues'	'The Blues' Little Bluestem	2 gal.

(1) All disturbed areas programmed as planting beds shall receive wood mulch to a depth of 3".

(2) All disturbed areas not otherwise programmed shall be planted with native meadow grass.

LANDSCAPE NOTES

PLANTING NOTES:

1) ALL PLANT MATERIAL SHALL BE LOCALLAY NURSERY GROWN NO.1 GRADE AND INSTALLED ACCORDING TO ACCEPTED PLANTING PROCEDURES. ALL PLANT MATERIALS SHALL MEET CURRENT AMERICAN ASSOCIATION OR NURSERYMEN STANDARDS. DO NOT PLANT MATERIALS UNTIL DIRECTED BY OWNER, LANDSCAPE ARCHITECT, AND/OR CONSTRUCTION MANAGER. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ANY PLANT MATERIAL, FOR ANY REASON BEFORE OR AFTER IT IS INSTALLED.
2) SIZES SPECIFIED ARE MINIMUM SIZES TO WHICH THE PLANTS ARE TO BE INSTALLED.
3) ANY PLANT SUBSTITUTIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT.
4) MAINTENANCE OF LANDSCAPING ITEMS, TREES, AND PLANTS SHALL BE PERFORMED BY THE PROPERTY OWNER OR A QUALIFIED PROFESSIONAL. ALL LANDSCAPING SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH APPLICABLE MUNICIPAL STANDARDS AND IN ACCORDANCE WITH CURRENT INDUSTRY STANDARDS IN A NEAT, HEALTHY AND WEED FREE CONDITION. ANY DEAD, DISEASED OR DAMAGED PLANT MATERIALS ARE TO BE REPLACED IMMEDIATELY AFTER NOTIFIED TO DO SO.
5) PLANT TREES AND SHRUBS IN ACCORDANCE WITH PLANTING DETAILS. DIG TREE PITS PER DETAILS. PLANT TREES AND SHRUBS AT THE SAME GRADE LEVEL AT WHICH THEY WERE GROWN AT THE NURSERY. IF HEAVY CLAY SOILS ARE EVIDENT, PLANT TREES AND SHRUBS HIGHER, APPROX. 1/4 OF THE ROOT BALL ABOVE GRADE, AND BACKFILL TO TOP OF ROOT BALL.
6) REMOVE ALL TWINE, WIRE, NURSERY TREE GUARDS, TAGS AND INORGANIC MATERIAL FROM ROOT BALLS. REMOVE THE TOP 1/3 OF BURLAP FROM EARTH BALLS AND REMOVE BURLAP FROM AROUND TRUNK.
7) FINELY SHREDDED HARDWARD BARK MULCH, NATURAL COLOR (NON-COLORED), IS REQUIRED FOR ALL PLANTINGS AND PLANTING BEDS. MULCH PER PLANTING DETAILS. MULCH IN PLANT BEDS SHALL BE 3" THICK AT TIME OF INSPECTION AND AFTER COMPACTED BY RAIN OR IRRIGATION. ALL PLANTING BEDS SHALL BE EDGED WITH 6" X 12 GAUGE STEEL LANDSCAPE EDGING.
8) LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION OF ALL UNDERGROUND AND OVERHEAD UTILITIES. IF A CONFLICT WITH UTILITIES EXIST, NOTIFY OWNER/CONSTRUCTION MANAGER PRIOR TO PLANTING.
9) PLANT MATERIAL SHALL BE GUARANTEED FOR ONE YEAR AFTER PLANTING AND ACCEPTANCE.

TOPSOIL AND SOD NOTES:

1) WHEREVER GROUND IN ITS NATURAL STATE HAS BEEN DISTURBED, APPROVED LANDSCAPING OR GRASS SHALL BE FULLY INSTALLED, AND ESTABLISHED WITHIN A REASONABLE PERIOD OF TIME, BUT NO LONGER THAN ONE GROWING SEASON (UNLESS OTHERWISE NOTED AND APPROVED).
2) DURING EXCAVATION, GRADING, AND INSTALLATION OF REQUIRED LANDSCAPING, ALL SOIL EROSION AND SEDIMENTATION CONTROL REGULATIONS SHALL BE STRICTLY FOLLOWED AND COMPLIED WITH.
3) ALL LAWN AREAS SHALL RECEIVE SOD. SOD SHALL BE GROWN ON TOPSOIL UNLESS APPROVED OTHERWISE. SOD SHALL BE 2 YEARS OLD AND STRONGLY ROOTED. PLACE SOD TIGHTLY WITH NO GAPS AND WITH GRAIN IN SAME DIRECTION. SEAMS OF SOD SHALL BE STAGGERED IN A RUNNING BOND PATTERN. SOD SHALL BE WATERED IMMEDIATELY TO AVOID DRYING OUT. DO NOT INSTALL SOD UNTIL ACCEPTANCE OF FINISH GRADE AND IRRIGATION SYSTEM IS OPERATING PROPERLY UNLESS DIRECTED IN WRITING TO DO OTHERWISE. FINISH ROLL SOD WITH A WATER FILLED LAWN ROLLER, ROLL PERPENDICULAR TO LENGTH OF SOD.
4) SOD SHALL BE INSTALLED ON A MIN. 3" OF LIGHTLY COMPACTED APPROVED TOPSOIL. TOPSOIL SHALL BE FERTILE, SCREENED, FRIABLE TOPSOIL FREE OF STONES 1/2" IN DIA. AND LARGER, ROOTS, STICKS, OR OTHER EXTRANEOUS MATERIAL INCLUDING NOXIOUS PLANTS. PH BETWEEN 6.0 AND 6.5, SALTS 500 PARTS PPM, ORGANIC CONTENT 3% MIN. DO NOT INSTALL TOPSOIL UNTIL APPROVED BY OWNER/C.M.. TOPSOIL SHALL BE FINE GRADED TO A SMOOTH FINISH, FREE OF LUMPS AND DEPRESSIONS.
5) ALL LANDSCAPE ISLANDS WITHIN PARKING LOTS SHALL BE BACK FILLED WITH TOPSOIL TO A DEPTH OF 18".

TOPSOIL AND SEED NOTES:

1) WHEREVER GROUND IN ITS NATURAL STATE HAS BEEN DISTURBED, APPROVED LANDSCAPING OR GRASS SHALL BE FULLY INSTALLED, AND ESTABLISHED WITHIN A REASONABLE PERIOD OF TIME, BUT NO LONGER THAN ONE GROWING SEASON (UNLESS OTHERWISE NOTED AND APPROVED).
2) DURING EXCAVATION, GRADING, AND INSTALLATION OF REQUIRED LANDSCAPING, ALL SOIL EROSION AND SEDIMENTATION CONTROL REGULATIONS SHALL BE STRICTLY FOLLOWED AND COMPLIED WITH.
3) ALL LAWN AREAS PROGRAMMED AS NATIVE MEADOW GRASS SHALL BE HYDROSEEDED. SEED SHALL BE INSTALLED ON TOPSOIL UNLESS APPROVED OTHERWISE. DO NOT SEED UNTIL ACCEPTANCE OF FINISH GRADE.
4) SEED SHALL BE INSTALLED ON A MIN. OF 4" OF LIGHTLY COMPACTED APPROVED TOPSOIL. TOPSOIL SHALL BE FERTILE, SCREENED, FRIABLE TOPSOIL FREE OF STONES 1/2" IN DIA. AND LARGER, ROOTS, STICKS, OR OTHER EXTRANEOUS MATERIAL INCLUDING NOXIOUS PLANTS. PH BETWEEN 6.0 AND 6.5, SALTS 500 PARTS PPM, ORGANIC CONTENT 3% MIN. DO NOT INSTALL TOPSOIL UNTIL APPROVED BY OWNER/C.M.. TOPSOIL SHALL BE FINE GRADED TO A SMOOTH FINISH, FREE OF LUMPS AND DEPRESSIONS.

IRRIGATION NOTES:

1) ALL PLANTING AREAS, LAWN AREAS AND LANDSCAPE ISLANDS SHOWN ARE TO HAVE A COMPLETE IRRIGATION SYSTEM. THE G.C. SHALL BE RESPONSIBLE FOR RETAINING A QUALIFIED FIRM FOR THE DESIGN OF THE IRRIGATION SYSTEM. THE DESIGN MUST SHOW HOW THE SYSTEM TIES INTO THE BUILDING AND MUST SHOW ALL OF THE NECESSARY EQUIPMENT FOR A COMPLETE SYSTEM. THE G.C. SHALL SUBMIT THE IRRIGATION SYSTEM DESIGN TO THE ARCHITECT/OWNER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK.

TYPICAL SHRUB / PERENNIAL / ORNAMENTAL GRASS PLANTING DETAIL

N.T.S.

TYPICAL TREE PLANTING DETAIL

N.T.S.

811 Know what's **below.** **CALL** before you dig.

UTILITY LOCATIONS ARE DERIVED FROM ACTUAL MEASUREMENTS OR AVAILABLE RECORDS. THEY SHOULD NOT BE INTERPRETED TO BE EXACT LOCATIONS NOR SHOULD IT BE ASSUMED THAT THEY ARE THE ONLY UTILITIES IN THIS AREA.

NOTE:
EXISTING UTILITIES AND SERVICE LINES IDENTIFIED AS "PLAN" WERE OBTAINED FROM AVAILABLE AS-BUILT RECORD DRAWINGS. THE CONTRACTOR SHALL VERIFY THE LOCATION, DEPTH AND STATUS OF ALL UTILITIES AND SERVICE LINES PRIOR TO NEW CONNECTIONS.

LEGEND

- EXISTING BITUMINOUS
- EXISTING CONCRETE
- PROPOSED BITUMINOUS (STANDARD DUTY)
- PROPOSED CONCRETE (STANDARD DUTY)
- PROPOSED CONCRETE (HEAVY DUTY)

N

0' 10' 20' 40'

SCALE: 1" = 20'

NEDERVELD
www.nederveld.com
800.222.1868
GRAND RAPIDS
217 Grandville Ave., Suite 302
Grand Rapids, MI 49503
Phone: 616.575.5190
ANN ARBOR
CHICAGO
COLUMBUS
HOLLAND
INDIANAPOLIS
ST. LOUIS

PREPARED FOR:
MBA ARCHITECTS
MIKE BOGGIO

30100 Telegraph Rd., Suite 216
Bingham Farms, MI 48025
Phone: 248.258.5155

REVISIONS:

Title: Site Plan Submittal	V. Date: 03-20-15
Drawn: ER / BEM Checked: RJB	S. Date: 03-20-15
Title: Site Plan Submittal	V. Date: 03-24-15
Drawn: ER / BEM Checked: RJB	S. Date: 03-24-15
Title: Site Plan Submittal	V. Date: 04-24-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-24-15
Title: Site Plan Submittal	V. Date: 04-29-15
Drawn: ER / BEM Checked: RJB	S. Date: 04-29-15

FLAGSTAR BANK

Landscape Plan

17250 HAYES RD
PART OF THE NORTHWEST 1/4 OF SECTION 04, T7N, R16W, TOWNSHIP OF GRAND HAVEN, OTTAWA COUNTY, MICHIGAN

STAMP:

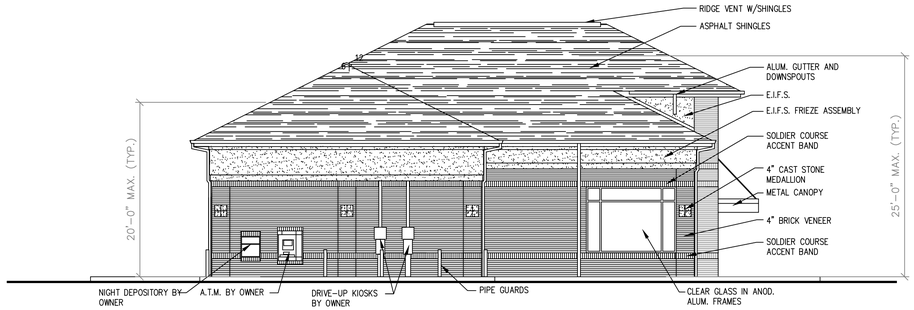
STATE OF MICHIGAN
JAMES C. WALTER, JR.
LANDSCAPE ARCHITECT
No. 1588
REGISTERED LANDSCAPE ARCHITECT

PROJECT NO:
15200045

SHEET NO:
L-101

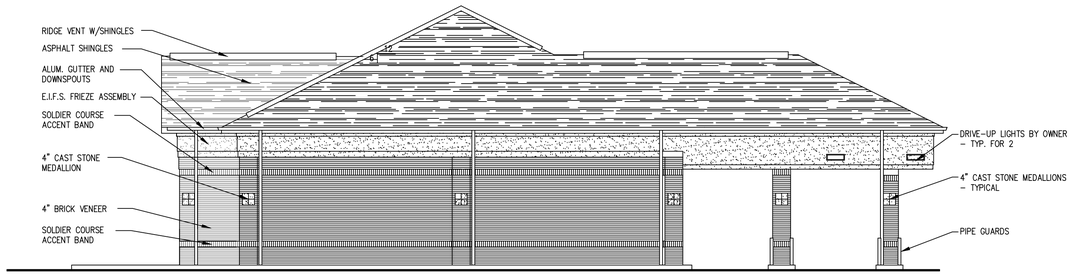
SHEET: 9 OF 9

15200045-CP1.dwg BM 4/27/2015 15:46



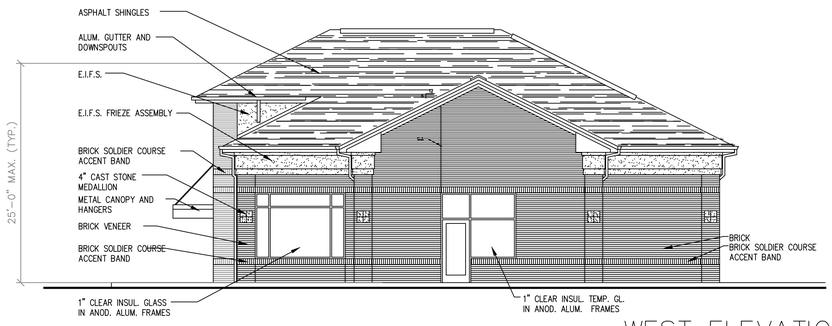
EAST ELEVATION

1/8" = 1'-0"



SOUTH ELEVATION

1/8" = 1'-0"



WEST ELEVATION

1/8" = 1'-0"

NORTH ELEVATION

1/8" = 1'-0"

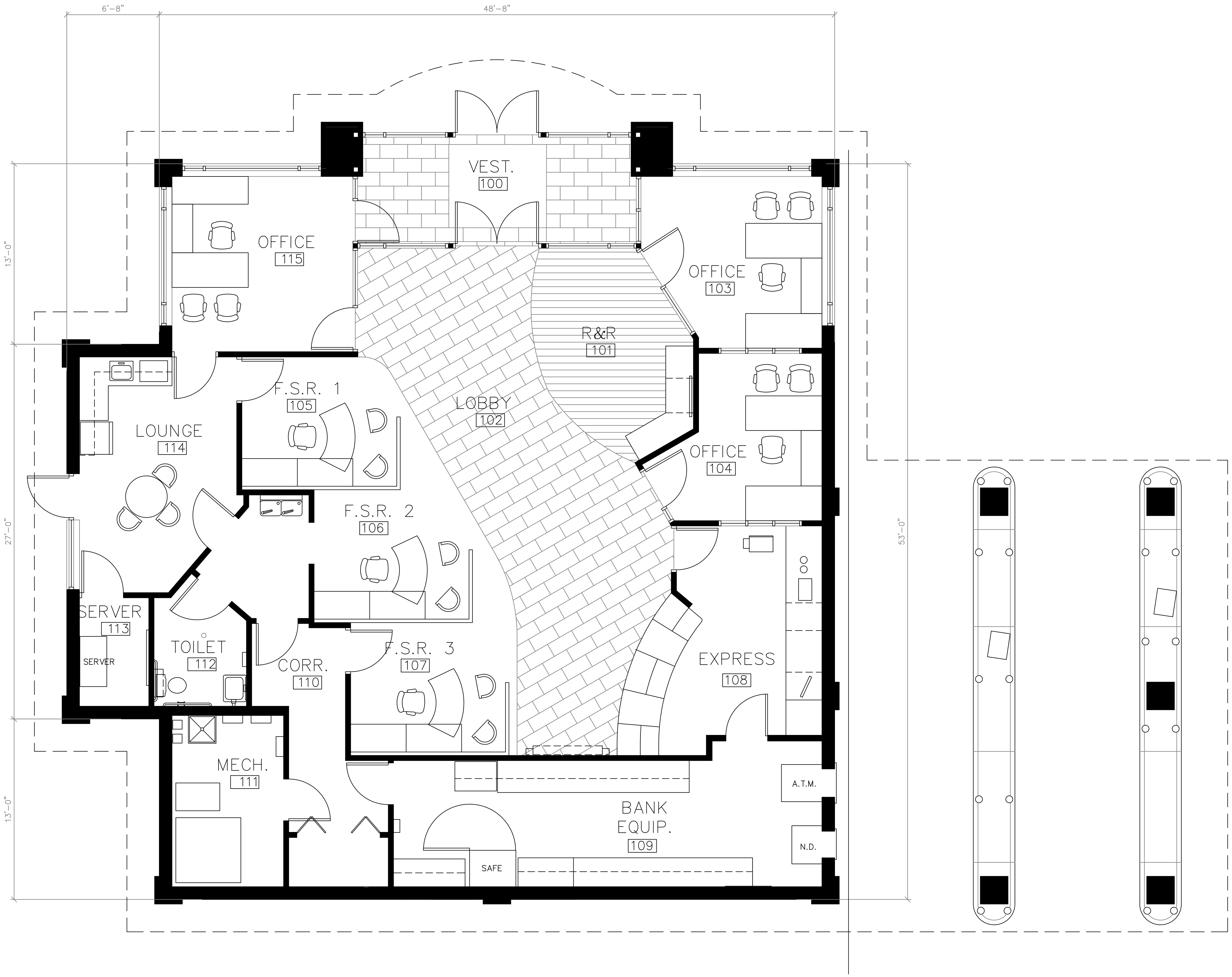
Michael A. Boggio Assoc. Architects
30100 Telegraph Rd., Ste. 216 Bingham Farms MI 48025 (248)-258-5155

PROPOSED
FLAGSTAR BANK
BRANCH #017
HAYES ST. AT U.S. 31
GRAND HAVEN TWP., MICHIGAN

Sheet Title:
EXTERIOR
ELEVATIONS

Issued For:
03-23-15

Sheet No.
A-2



FLOOR PLAN
2,840 SQ. FT. 1/4" = 1'-0"

Michael A. Boggio Assoc. Architects
30100 Telegraph Rd., Ste. 216 Bingham Farms MI 48025 (248)-258-5155

PROPOSED
FLAGSTAR BANK
BRANCH #017
HAYES ST. AT U.S. 31
GRAND HAVEN TWP., MICHIGAN

Sheet Title:
FLOOR PLAN

Issued For:
03-23-15

Sheet No.
A-1

Flagstar | #17 Grand Haven TWP, MI

NOTE: Renderings below utilize sample dimensions derived from client surveys.

WEST ELEVATION

1/8" = 1'-0"

NORTH ELEVATION

1/8" = 1'-0"

A **B** **QTY 2: Illuminated Stacked Wall Signs**

43.05 sq. ft.

FAIRMONT SIGN COMPANY

3750 East Outer Drive
Detroit, MI 48234
t: 313.368.4000 f: 313.368.9335
www.fairmontsign.com

Client:

Flagstar Bank

Hayes Street & US 31
Grand Haven TWP, MI

Date: 4/7/15

File: Accounts/Flagstar/Elev/ 17 Grand Haven

Designer: RNB

Scale: NA

Job# 00000 **Sheet#** 1 of 2

Revision # 0 **Date:** 00-00

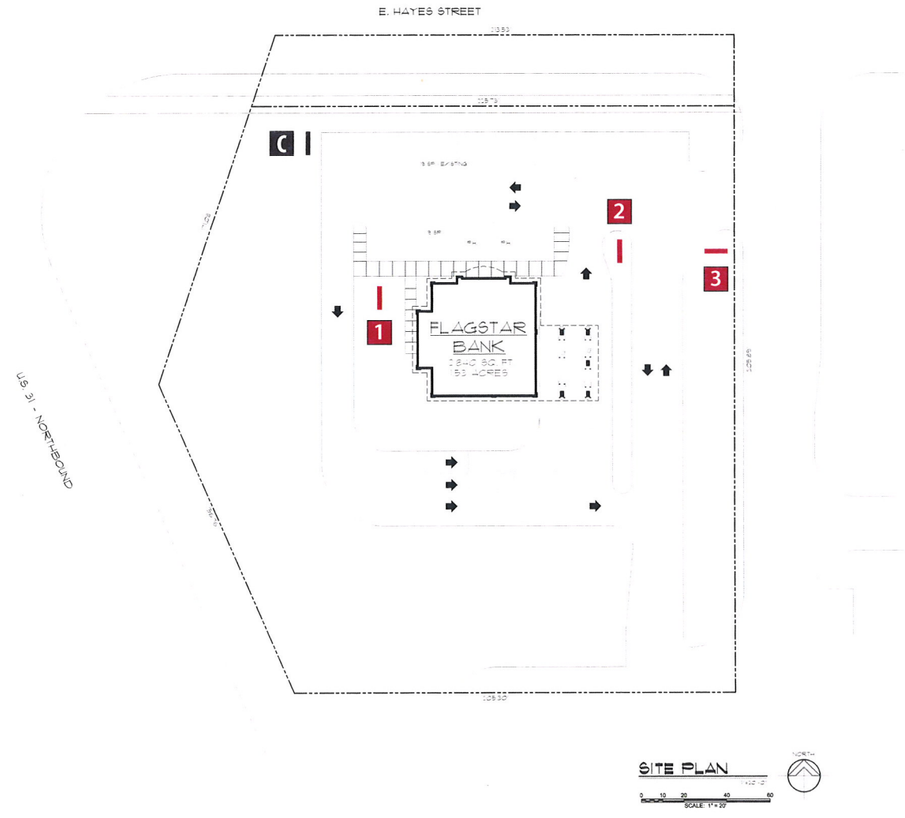
Revision Description:

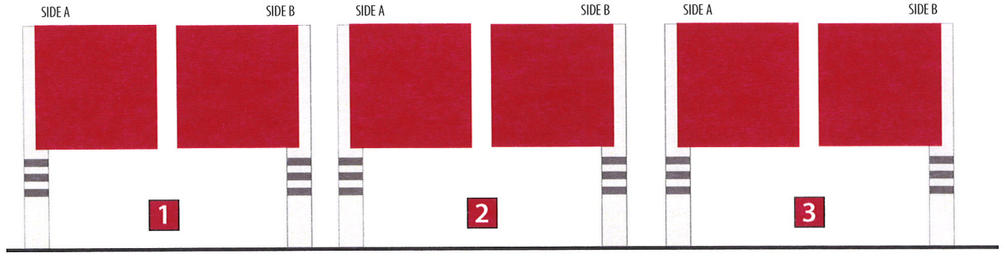
Customer Approval:

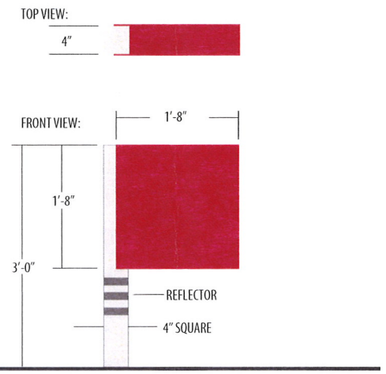
ALL DIMENSIONS TO BE FIELD VERIFIED PRIOR TO INSTALLATION

Flagstar | #17 Grand Haven TWP, MI

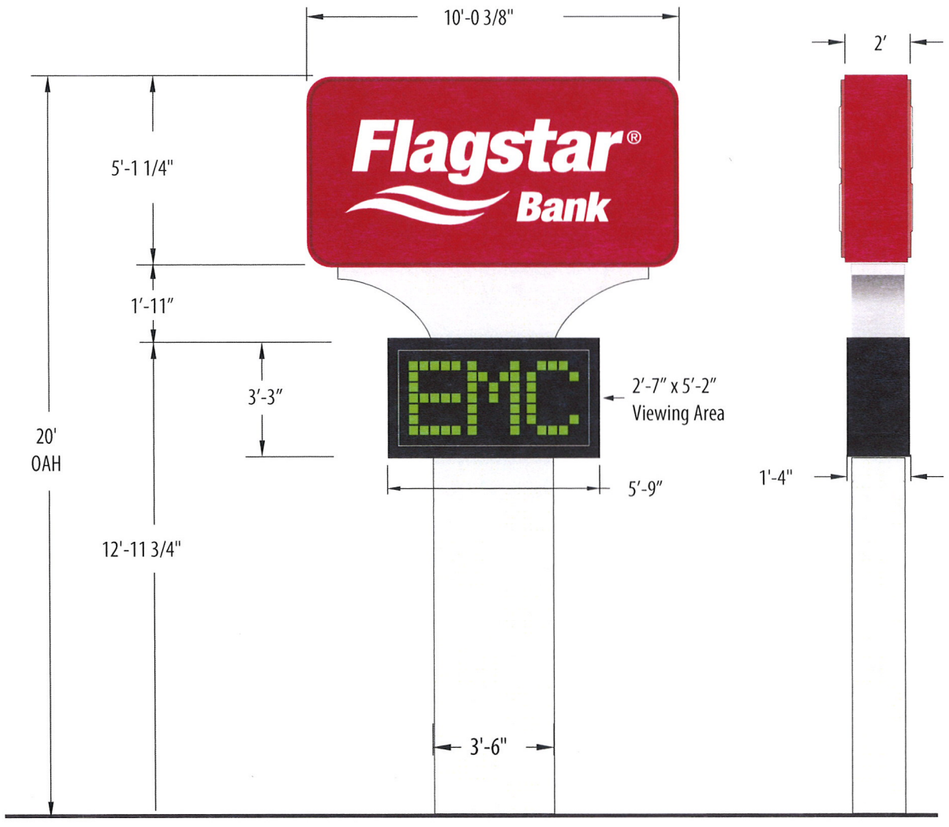
NOTE: Renderings below utilize sample dimensions derived from client surveys.







QTY 3: Non-illuminated D/F Directional Signs – Copy TBD



C **QTY 1: Internally Illuminated D/F Pylon Sign**

51.20 sq. ft.

16mm full color EMC. Direct cable connection. 48 x 96 pixels.

FAIRMONT SIGN COMPANY

3750 East Outer Drive
Detroit, MI 48234
t: 313.368.4000 f: 313.368.9335
www.fairmontsign.com

Client:

Flagstar Bank

Hayes Street & US 31
Grand Haven TWP, MI

Date: 4/7/15

File: Accounts/Flagstar/Elev/ 17 Grand Haven

Designer: RNB

Scale: NA

Job# 00000 **Sheet#** 2 of 2

Revision # 0 **Date:** 00-00

Revision Description:

Customer Approval:

ALL DIMENSIONS TO BE FIELD VERIFIED PRIOR TO INSTALLATION

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MEMO

VIA EMAIL

To:	**Mr. Michael A. Boggio Jr, AIA** **MBA Architects**
From:	**Michael J. Labadie, PE** **Steven J. Russo, E.I.T.** **Fleis & VandenBrink**
Date:	**April 9, 2015**
Re:	**Proposed Flagstar Bank** **Grand Haven Township, Michigan** **Traffic Impact Assessment**

Introduction

This memorandum presents the results of a Traffic Impact Assessment (TIA) for the proposed Flagstar Bank in Grand Haven Township, Michigan. The project site is located on the southeast corner of the US-31 & Hayes Street intersection and was previously occupied by a family restaurant. The proposed redevelopment plans include demolition of the family restaurant and construction of a new 2,840 square feet (SF) Flagstar Bank. Site access will remain unchanged and is provided via one driveway to Hayes Street and two driveways to 172nd Street. Hayes Street and 172nd Street are under the jurisdiction of the Ottawa County Road Commission (OCRC).

Grand Haven Township has required a TIA to evaluate traffic operations with the proposed project. This TIA has been completed to identify the impacts (if any) of this project on the intersections of Hayes Street and US-31 and 172nd Street, and the site access points. The scope of this study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practice, and methodologies published by the Institute of Transportation Engineers (ITE). The study analyses were completed using Synchro and SimTraffic, Version 8 traffic analysis software.

Data Collection

Existing weekday traffic volume data were collected by F&V subconsultant Traffic Data Collection, Inc. (TDC) on February 10th, 2015. Vehicular turning movement counts were collected at the study intersections during the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak periods. F&V also collected an inventory of existing lane use and traffic controls and obtained existing traffic signal timing information from the Michigan Department of Transportation (MDOT). The applicable data referenced in this memorandum are attached.

Existing Conditions

The existing AM and PM peak hour traffic volumes were identified based on the data collected. Existing peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections based on the existing lane use and traffic control, the existing peak hour traffic volumes shown on the attached Figure 1, and the methodologies presented in the *Highway Capacity Manual, 2010* (HCM). Typically, LOS D is considered acceptable, with LOS A representing minimal delay, and LOS F indicating failing conditions. Additionally, SimTraffic network simulations were reviewed to evaluate network operations and vehicle queues. The results of the existing conditions analysis are attached and summarized in Table 1.

27725 Stansbury Boulevard, Suite 150
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

In order to accurately replicate field conditions of the US-31 Michigan Boulevard configuration, US-31 was modeled as two parallel, one-way links connected by Hayes Street. This results in the intersection of US-31 & Hayes Street being represented by two individual signalized intersections (one for each direction of travel along US-31) which must then be clustered, or grouped, together as they functionally operate using the same controller. The clustering of intersections is not currently supported by the HCM 2010, therefore for analysis purposes the HCM 2000 was utilized for the intersection of US-31 & Hayes Street.

Table 1

Existing Intersection Operations

			AM Peak		PM Peak	
Intersection	Control	Approach	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. US-31 & Hayes Street	Signalized	EB	31.5	C	29.3	C
		WB	23.9	C	25.3	C
		NB	10.4	B	12.1	B
		SB	14.6	B	10.7	B
		East Overall	**13.0**	**B**	**10.3**	**B**
		West Overall	**11.5**	**B**	**14.0**	**B**
2. Hayes Street & 172nd Street	STOP (All-Way)	EB	10.9	B	9.6	A
		WB	10.4	B	11.3	B
		NB	9.7	A	9.5	A
		SB	9.8	A	10.2	B
		Overall	**10.4**	**B**	**10.4**	**B**
3. Hayes Street & Site Drive	STOP (Minor)	EB	Free		Free	
		WB LT	7.9	A	7.4	A
		NB	11.4	B	10.1	B
4. 172nd Street & N. Site Drive	STOP (Minor)	EB	9.0	A	9.7	A
		WB	9.4	A	8.8	A
		NB LT	0.0*	A	7.5	A
		SB LT	7.4	A	0.0*	A
5. 172nd Street & S. Site Drive	STOP (Minor)	EB	0.0*	A	9.3	A
		WB	0.0*	A	9.0	A
		NB LT	0.0*	A	0.0*	A
		SB LT	7.5	A	7.4	A

* - No demand present for movement.

The results of the existing conditions analysis indicate that all study intersection approaches and movements currently operate acceptably at a LOS B or better during both peak periods. Additionally, review of network simulations indicates acceptable traffic operations and vehicle queues which are acceptably processed.

As this development is planned to be complete and occupied within the next year, future background conditions ***without the proposed development*** are assumed to be equal to existing conditions.

Site Trip Generation and Assignment

The number of AM and PM peak hour vehicle trips that would be generated by the proposed Flagstar Bank was forecast based on data published by the Institute of Transportation Engineers (ITE) in *Trip Generation, 9th Edition* and the *Trip Generation Handbook, 2nd Edition*. The site trip generation forecast is shown in Table 2.

Table 2
Site Trip Generation

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Drive-In Bank	912	2,840	SF	421	19	15	34	35	34	69
Pass-By[1]		*47%*		*198*				*16*	*16*	*32*
New Trips				**223**	**19**	**15**	**34**	**19**	**18**	**37**

As is typical of Banks, a portion of the site-generated trips are already present on the adjacent road network and are interrupted to visit the site. These trips are known as "pass-by" trips and account for a percentage of the total site-generated traffic. Pass-by trips result in turning movements at the site driveways, but do not increase traffic volumes on the adjacent road network. Where pass-by data is not available for the AM peak hour, no pass-by trips were assumed to provide a conservative approach.

The vehicle trips that would be generated by the proposed development were assigned to the study road network based on existing peak hour traffic patterns, local population density within the development area, the proposed site access plan, and the methodologies published by ITE. This methodology indicates that pass-by trips enter and exit the development in their original direction of travel, while new trips will return to their direction of origin. The assumed distribution of site traffic is summarized in Table 3 and the peak hour site-generated traffic volumes are shown on the attached Figure 2.

Table 3
Site Trip Distribution

New Trips To / From	via	AM / PM	*Pass-By From*	*To*	AM	PM
North	US-31	45%	East	West	-	45%
North	172nd Street	10%	West	East	-	20%
South	US-31	30%	North	South	-	20%
South	172nd Street	5%	South	North	-	15%
East	Hayes Street	5%			0%	100%
West	Hayes Street	5%				
		100%				

Future Conditions

The site-generated trip assignments were added to the existing traffic volumes to determine the total future peak hour traffic volumes with the proposed development and are shown on the attached Figure 3. Future peak hour vehicle delays and LOS were calculated at the study intersections based on these volumes, the existing intersection lane use and traffic control, and the methodologies presented in the HCM. Additionally, SimTraffic simulations were utilized to evaluate network operations and vehicle queues. The results of the future conditions analysis are attached and summarized in Table 4.

Table 4

Future Intersection Operations

Intersection	Control	Approach	AM Peak Delay (s/veh)	AM Peak LOS	PM Peak Delay (s/veh)	PM Peak LOS
1. US-31 & Hayes Street	Signalized	EB	31.8	C	29.2	C
		WB	24.3	C	25.8	C
		NB	10.3	B	12.1	B
		SB	14.8	B	10.9	B
		East Overall	**13.2**	**B**	**10.2**	**B**
		West Overall	**11.7**	**B**	**14.2**	**B**
2. Hayes Street & 172nd Street	STOP (All-Way)	EB	10.9	B	9.6	A
		WB	10.5	B	11.4	B
		NB	9.8	A	9.5	A
		SB	9.9	A	10.2	B
		Overall	**10.5**	**B**	**10.4**	**B**
3. Hayes Street & Site Drive	STOP (Minor)	EB	Free		Free	
		WB LT	8.0	A	7.5	A
		NB	11.6	B	10.4	B
4. 172nd Street & N. Site Drive	STOP (Minor)	EB	9.0	A	9.3	A
		WB	9.4	A	8.8	A
		NB LT	0.0*	A	7.5	A
		SB LT	7.4	A	0.0*	A
5. 172nd Street & S. Site Drive	STOP (Minor)	EB	0.0*	A	9.6	A
		WB	0.0*	A	9.0	A
		NB LT	7.4	A	0.0*	A
		SB LT	7.5	A	7.4	A

* - No demand present for movement.

The results of the future conditions analysis indicate that the proposed development project would not have a significant impact on the study intersections or site driveways. Future vehicle delays and LOS as shown in Table 4 would be similar to existing conditions and any increases would not be discernable. Additionally, review of network simulations indicates acceptable future traffic operations and significant vehicle queues are not observed.

Conclusions

The conclusions of this Traffic Impact Assessment are as follows:

1. Currently, all study intersection approaches and movements operate acceptably at a LOS D or better during both peak periods.
2. Future traffic operations with the proposed Flagstar Bank will be similar to existing conditions and minor changes to vehicle delay and LOS will not be discernable.

Any questions related to this memorandum, study, analyses, and results should be addressed to Fleis & VandenBrink.

Attachments: Traffic Volume Data
Figures 1-3
Synchro / SimTraffic Results

SJR:mjl

Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

TDC Traffic Data Collection

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_2Z4 & 3DQ

File Name : TMC_1 US-31 & Hayes
Site Code : TMC_1
Start Date : 2/10/2015
Page No : 1

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

	US Hwy. 31 Southbound					Hayes Street Westbound					US Hwy. 31 Northbound					Hayes Street Eastbound					
Start Time	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	9	290	0	0	299	17	7	0	0	24	23	208	0	0	231	3	7	0	0	10	564
07:15 AM	5	383	0	0	388	37	5	0	0	42	19	239	0	0	258	11	10	0	0	21	709
07:30 AM	7	365	0	0	372	44	10	0	0	54	34	257	0	0	291	9	26	0	0	35	752
07:45 AM	7	245	0	0	252	15	3	0	0	18	60	249	0	0	309	6	22	0	0	28	607
Total	28	1283	0	0	1311	113	25	0	0	138	136	953	0	0	1089	29	65	0	0	94	2632
08:00 AM	9	206	0	0	215	16	6	0	0	22	33	173	0	0	206	5	12	0	0	17	460
08:15 AM	4	196	0	0	200	15	16	0	0	31	28	185	0	0	213	2	17	0	0	19	463
08:30 AM	10	175	0	0	185	17	11	0	0	28	15	190	0	0	205	3	13	0	0	16	434
08:45 AM	6	152	0	0	158	18	11	1	0	30	16	185	0	0	201	4	7	0	0	11	400
Total	29	729	0	0	758	66	44	1	0	111	92	733	0	0	825	14	49	0	0	63	1757
**** BREAK ****																					
04:00 PM	16	255	0	0	271	47	22	0	0	69	15	237	0	0	252	3	7	0	0	10	602
04:15 PM	11	199	0	0	210	30	23	0	0	53	17	257	0	0	274	0	2	0	0	2	539
04:30 PM	16	208	0	0	224	30	14	0	0	44	14	250	0	0	264	1	3	0	0	4	536
04:45 PM	10	241	0	0	251	16	16	0	0	32	18	263	0	0	281	1	2	0	0	3	567
Total	53	903	0	0	956	123	75	0	0	198	64	1007	0	0	1071	5	14	0	0	19	2244
05:00 PM	21	270	0	0	291	42	22	0	0	64	13	291	0	0	304	7	6	0	0	13	672
05:15 PM	15	308	0	0	323	34	18	1	0	53	15	323	0	0	338	10	10	0	0	20	734
05:30 PM	12	242	0	0	254	10	15	0	0	25	19	352	0	0	371	10	13	0	0	23	673
05:45 PM	16	204	0	0	220	12	12	0	0	24	10	309	0	0	319	6	8	0	0	14	577
Total	64	1024	0	0	1088	98	67	1	0	166	57	1275	0	0	1332	33	37	0	0	70	2656
Grand Total	174	3939	0	0	4113	400	211	2	0	613	349	3968	0	0	4317	81	165	0	0	246	9289
Apprch %	4.2	95.8	0	0		65.3	34.4	0.3	0		8.1	91.9	0	0		32.9	67.1	0	0		
Total %	1.9	42.4	0	0	44.3	4.3	2.3	0	0	6.6	3.8	42.7	0	0	46.5	0.9	1.8	0	0	2.6	
Pass Cars	167	3674	0	0	3841	357	210	1	0	568	302	3807	0	0	4109	77	160	0	0	237	8755
% Pass Cars	96	93.3	0	0	93.4	89.2	99.5	50	0	92.7	86.5	95.9	0	0	95.2	95.1	97	0	0	96.3	94.3
Single Units	6	85	0	0	91	9	1	1	0	11	18	65	0	0	83	4	5	0	0	9	194
% Single Units	3.4	2.2	0	0	2.2	2.2	0.5	50	0	1.8	5.2	1.6	0	0	1.9	4.9	3	0	0	3.7	2.1
Heavy Trucks	1	180	0	0	181	34	0	0	0	34	29	96	0	0	125	0	0	0	0	0	340
% Heavy Trucks	0.6	4.6	0	0	4.4	8.5	0	0	0	5.5	8.3	2.4	0	0	2.9	0	0	0	0	0	3.7
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments: Traffic study conducted during atypical weekday (Tuesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours & while school was in session. Signalized intersection with push button ped. signals for south leg only. US Hwy 31 is a divided highway with left turns prohibited for all approch legs. VCU scout camera located at NW & SE quadrants.

Traffic Data Collection, TDC

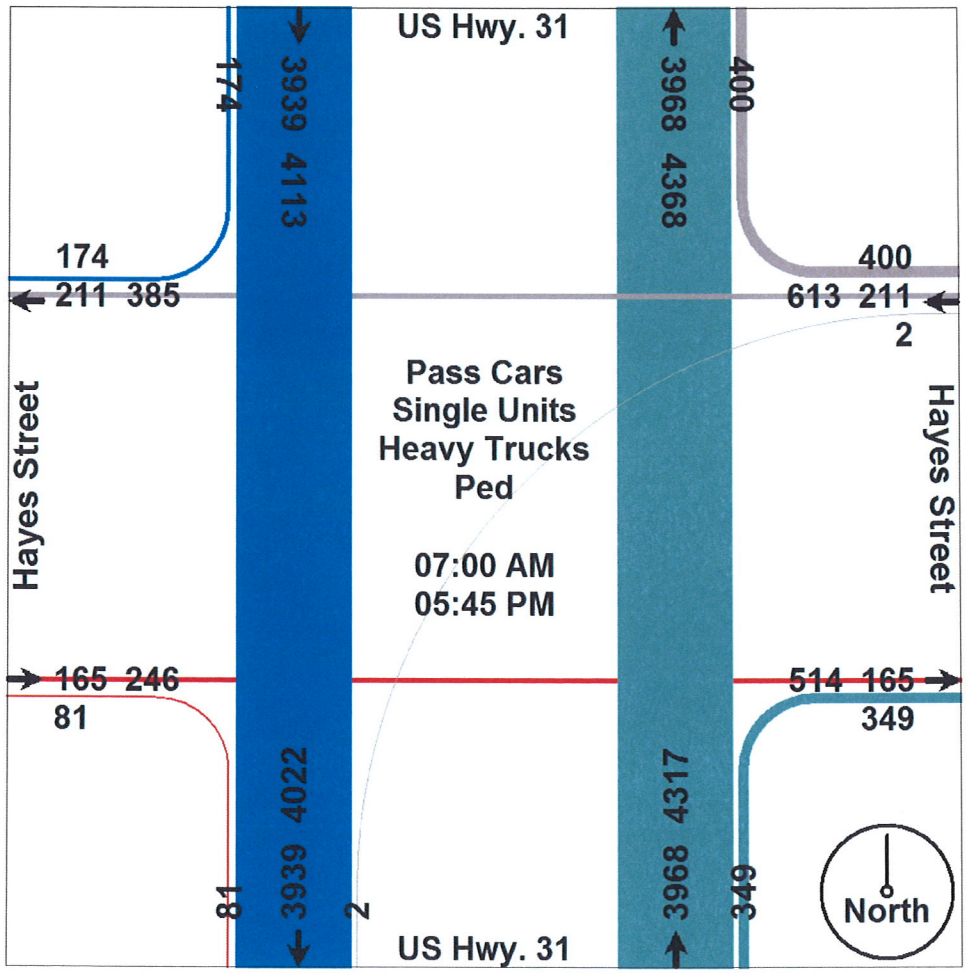
7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_2Z4 & 3DQ

File Name : TMC_1 US-31 & Hayes
Site Code : TMC_1
Start Date : 2/10/2015
Page No : 2



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

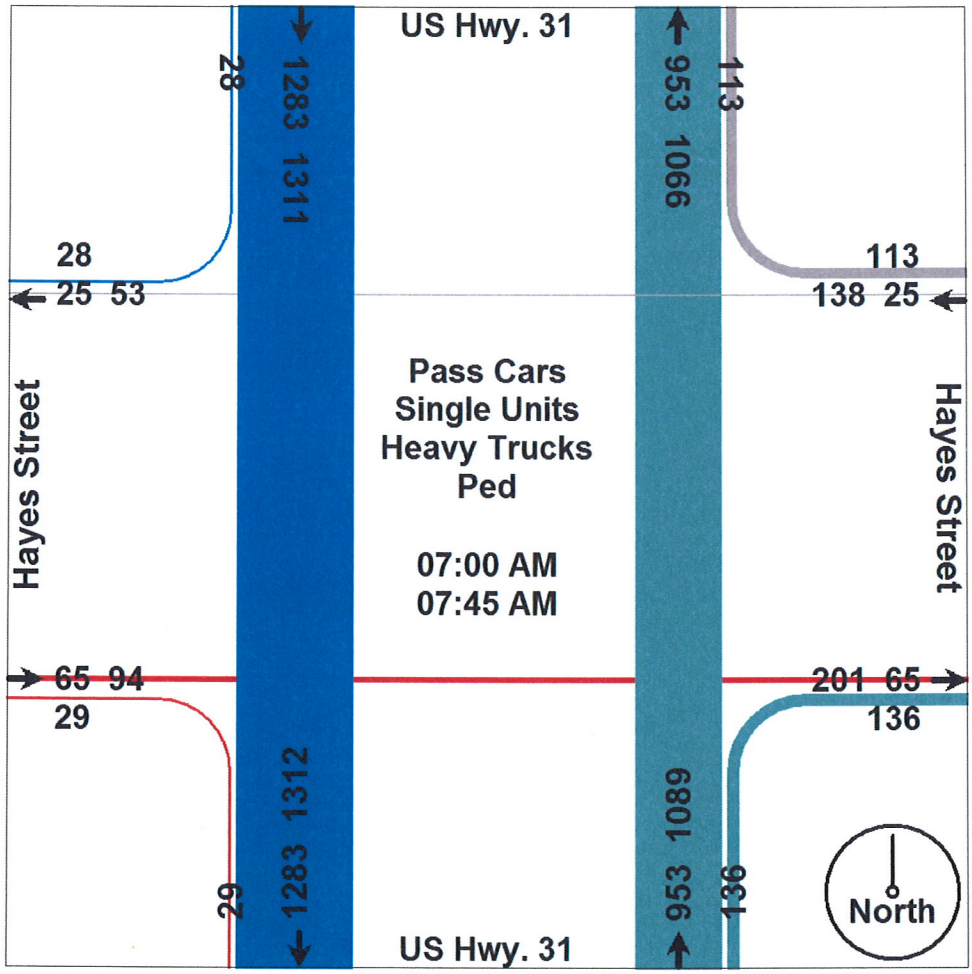
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_2Z4 & 3DQ

File Name : TMC_1 US-31 & Hayes
Site Code : TMC_1
Start Date : 2/10/2015
Page No : 3

	US Hwy. 31 Southbound				Hayes Street Westbound				US Hwy. 31 Northbound				Hayes Street Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**9**	290	0	299	17	7	0	24	23	208	0	231	3	7	0	10	564
07:15 AM	5	**383**	0	**388**	37	5	0	42	19	239	0	258	**11**	10	0	21	709
07:30 AM	7	365	0	372	**44**	**10**	0	**54**	34	**257**	0	291	9	**26**	0	**35**	**752**
07:45 AM	7	245	0	252	15	3	0	18	**60**	249	0	**309**	6	22	0	28	607
Total Volume	28	1283	0	1311	113	25	0	138	136	953	0	1089	29	65	0	94	2632
% App. Total	2.1	97.9	0		81.9	18.1	0		12.5	87.5	0		30.9	69.1	0		
PHF	.778	.837	.000	.845	.642	.625	.000	.639	.567	.927	.000	.881	.659	.625	.000	.671	.875
Pass Cars	27	1217	0	1244	99	25	0	124	122	888	0	1010	27	65	0	92	2470
% Pass Cars	96.4	94.9	0	94.9	87.6	100	0	89.9	89.7	93.2	0	92.7	93.1	100	0	97.9	93.8
Single Units	1	28	0	29	2	0	0	2	7	33	0	40	2	0	0	2	73
% Single Units	3.6	2.2	0	2.2	1.8	0	0	1.4	5.1	3.5	0	3.7	6.9	0	0	2.1	2.8
Heavy Trucks	0	38	0	38	12	0	0	12	7	32	0	39	0	0	0	0	89
% Heavy Trucks	0	3.0	0	2.9	10.6	0	0	8.7	5.1	3.4	0	3.6	0	0	0	0	3.4
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

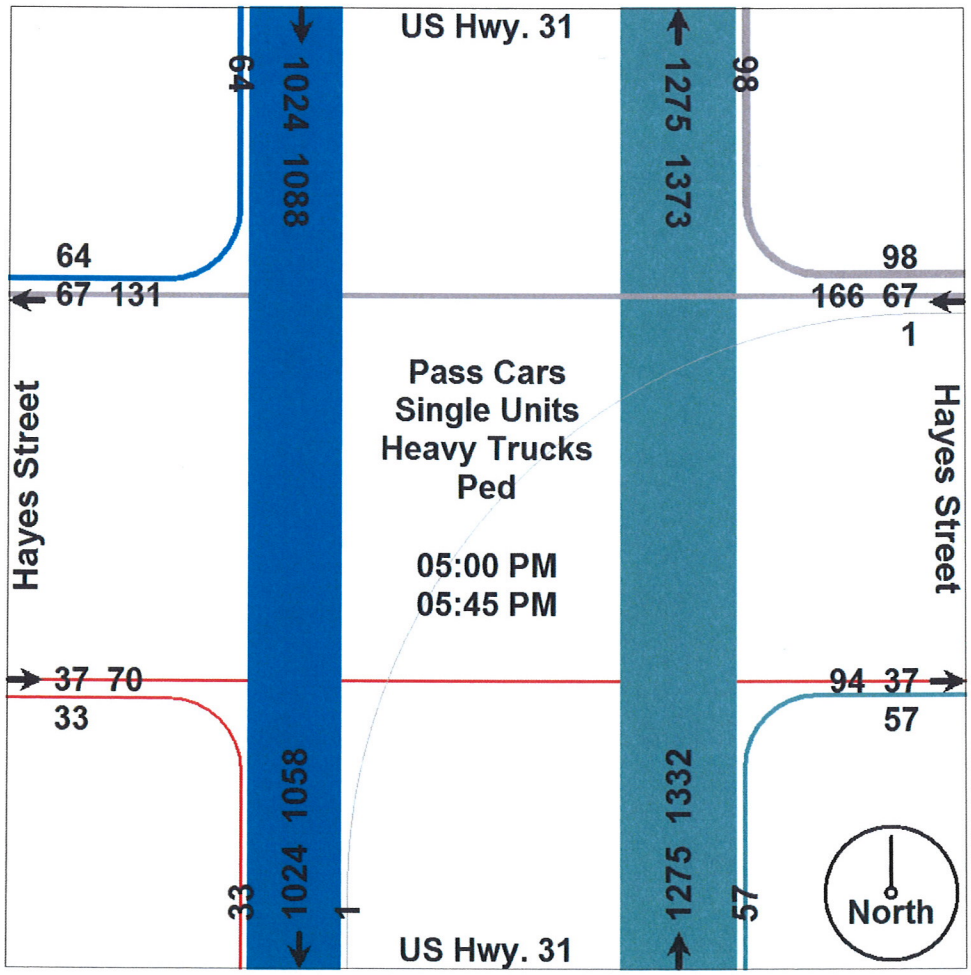
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_2Z4 & 3DQ

File Name : TMC_1 US-31 & Hayes
Site Code : TMC_1
Start Date : 2/10/2015
Page No : 4

	US Hwy. 31 Southbound				Hayes Street Westbound				US Hwy. 31 Northbound				Hayes Street Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**21**	270	0	291	**42**	**22**	0	**64**	13	291	0	304	7	6	0	13	672
05:15 PM	15	**308**	0	**323**	34	18	**1**	53	15	323	0	338	**10**	10	0	20	**734**
05:30 PM	12	242	0	254	10	15	0	25	**19**	**352**	0	**371**	10	**13**	0	**23**	673
05:45 PM	16	204	0	220	12	12	0	24	10	309	0	319	6	8	0	14	577
Total Volume	64	1024	0	1088	98	67	1	166	57	1275	0	1332	33	37	0	70	2656
% App. Total	5.9	94.1	0		59	40.4	0.6		4.3	95.7	0		47.1	52.9	0		
PHF	.762	.831	.000	.842	.583	.761	.250	.648	.750	.906	.000	.898	.825	.712	.000	.761	.905
Pass Cars	63	977	0	1040	94	67	0	161	51	1256	0	1307	33	37	0	70	2578
% Pass Cars	98.4	95.4	0	95.6	95.9	100	0	97.0	89.5	98.5	0	98.1	100	100	0	100	97.1
Single Units	0	11	0	11	0	0	1	1	1	8	0	9	0	0	0	0	21
% Single Units	0	1.1	0	1.0	0	0	100	0.6	1.8	0.6	0	0.7	0	0	0	0	0.8
Heavy Trucks	1	36	0	37	4	0	0	4	5	11	0	16	0	0	0	0	57
% Heavy Trucks	1.6	3.5	0	3.4	4.1	0	0	2.4	8.8	0.9	0	1.2	0	0	0	0	2.1
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_24L

File Name : TMC_2 Hayes & West Site Dw
Site Code : TMC_2
Start Date : 2/10/2015
Page No : 1

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

	Southbound					Hayes Street Westbound					Westerly Site Driveway Northbound					Hayes Street Eastbound					
Start Time	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	25	0	0	25	0	0	0	0	0	1	27	0	0	28	53
07:15 AM	0	0	0	0	0	0	45	0	0	45	0	0	0	0	0	1	30	0	0	31	76
07:30 AM	0	0	0	0	0	0	53	0	0	53	0	0	0	0	0	0	59	0	0	59	112
07:45 AM	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	81	0	0	81	98
Total	0	0	0	0	0	0	140	0	0	140	0	0	0	0	0	2	197	0	0	199	339
08:00 AM	0	0	0	0	0	0	23	0	0	23	0	0	1	0	1	0	44	0	0	44	68
08:15 AM	0	0	0	0	0	0	28	1	0	29	0	0	0	0	0	1	48	0	0	49	78
08:30 AM	0	0	0	0	0	0	27	0	0	27	0	0	1	0	1	0	27	0	0	27	55
08:45 AM	0	0	0	0	0	0	29	0	0	29	0	0	0	0	0	1	23	0	0	24	53
Total	0	0	0	0	0	0	107	1	0	108	0	0	2	0	2	2	142	0	0	144	254
**** BREAK ****																					
04:00 PM	0	0	0	0	0	0	73	0	0	73	0	0	0	0	0	1	24	0	0	25	98
04:15 PM	0	0	0	0	0	0	53	0	0	53	0	0	1	1	2	2	22	0	0	24	79
04:30 PM	0	0	0	0	0	0	43	1	0	44	0	0	0	0	0	0	30	0	0	30	74
04:45 PM	0	0	0	0	0	0	36	0	0	36	0	0	1	0	1	0	24	0	0	24	61
Total	0	0	0	0	0	0	205	1	0	206	0	0	2	1	3	3	100	0	0	103	312
05:00 PM	0	0	0	0	0	0	60	2	0	62	1	0	1	0	2	2	17	0	0	19	83
05:15 PM	0	0	0	0	0	0	45	0	0	45	0	0	2	0	2	0	23	0	0	23	70
05:30 PM	0	0	0	0	0	0	29	1	0	30	1	0	1	0	2	0	32	0	0	32	64
05:45 PM	0	0	0	0	0	0	29	0	0	29	0	0	0	0	0	1	17	0	0	18	47
Total	0	0	0	0	0	0	163	3	0	166	2	0	4	0	6	3	89	0	0	92	264
Grand Total	0	0	0	0	0	0	615	5	0	620	2	0	8	1	11	10	528	0	0	538	1169
Apprch %	0	0	0	0		0	99.2	0.8	0		18.2	0	72.7	9.1		1.9	98.1	0	0		
Total %	0	0	0	0	0	0	52.6	0.4	0	53	0.2	0	0.7	0.1	0.9	0.9	45.2	0	0	46	
Pass Cars	0	0	0	0	0	0	566	5	0	571	2	0	8	0	10	9	484	0	0	493	1074
% Pass Cars	0	0	0	0	0	0	92	100	0	92.1	100	0	100	0	90.9	90	91.7	0	0	91.6	91.9
Single Units	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	15	0	0	15	28
% Single Units	0	0	0	0	0	0	2.1	0	0	2.1	0	0	0	0	0	0	2.8	0	0	2.8	2.4
Heavy Trucks	0	0	0	0	0	0	36	0	0	36	0	0	0	0	0	1	29	0	0	30	66
% Heavy Trucks	0	0	0	0	0	0	5.9	0	0	5.8	0	0	0	0	0	10	5.5	0	0	5.6	5.6
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	100	9.1	0	0	0	0	0	0.1

Comments: Traffic study conducted during atypical weekday (Tuesday from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours & while school was in session. Non-signalized intersection. Video SCU scout camera located within SW quadrant.

Traffic Data Collection, TDC

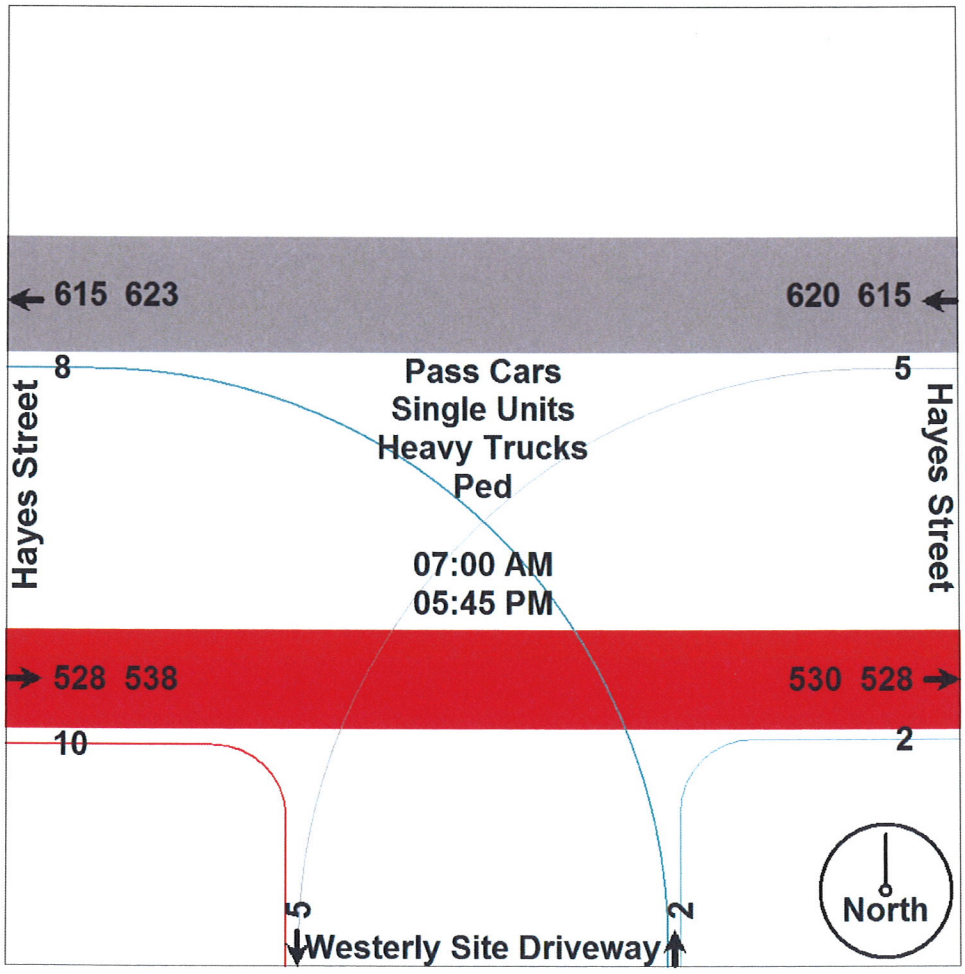
7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_24L

File Name : TMC_2 Hayes & West Site Dw
Site Code : TMC_2
Start Date : 2/10/2015
Page No : 2



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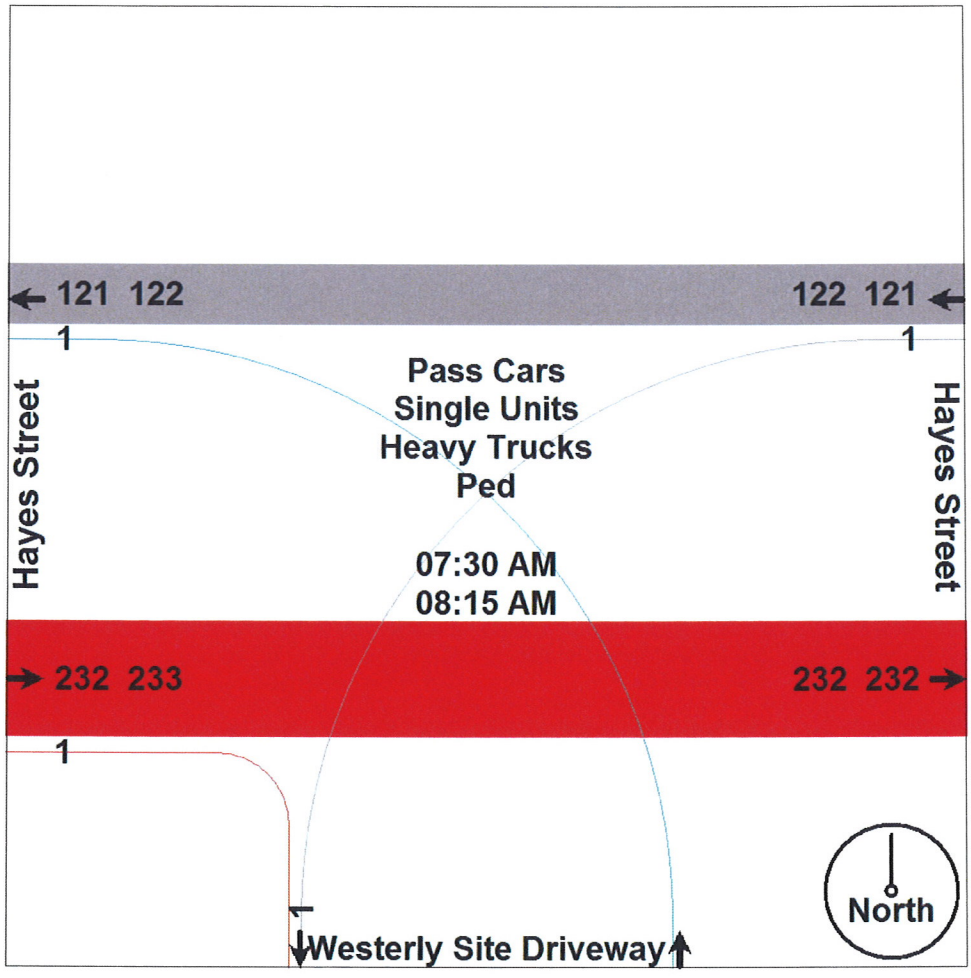
File Name : TMC_2 Hayes & West Site Dw
Site Code : TMC_2
Start Date : 2/10/2015
Page No : 3

	Southbound				Hayes Street Westbound				Westerly Site Driveway Northbound				Hayes Street Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	**53**	0	**53**	0	0	0	0	0	59	0	59	**112**
07:45 AM	0	0	0	0	0	17	0	17	0	0	0	0	0	**81**	0	**81**	98
08:00 AM	0	0	0	0	0	23	0	23	0	0	**1**	**1**	0	44	0	44	68
08:15 AM	0	0	0	0	0	28	**1**	29	0	0	0	0	**1**	48	0	49	78
Total Volume	0	0	0	0	0	121	1	122	0	0	1	1	1	232	0	233	356
% App. Total	0	0	0		0	99.2	0.8		0	0	100		0.4	99.6	0		
PHF	.000	.000	.000	.000	.000	.571	.250	.575	.000	.000	.250	.250	.250	.716	.000	.719	.795
Pass Cars	0	0	0	0	0	110	1	111	0	0	1	1	0	221	0	221	333
% Pass Cars	0	0	0	0	0	90.9	100	91.0	0	0	100	100	0	95.3	0	94.8	93.5
Single Units	0	0	0	0	0	3	0	3	0	0	0	0	0	5	0	5	8
% Single Units	0	0	0	0	0	2.5	0	2.5	0	0	0	0	0	2.2	0	2.1	2.2
Heavy Trucks	0	0	0	0	0	8	0	8	0	0	0	0	1	6	0	7	15
% Heavy Trucks	0	0	0	0	0	6.6	0	6.6	0	0	0	0	100	2.6	0	3.0	4.2
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

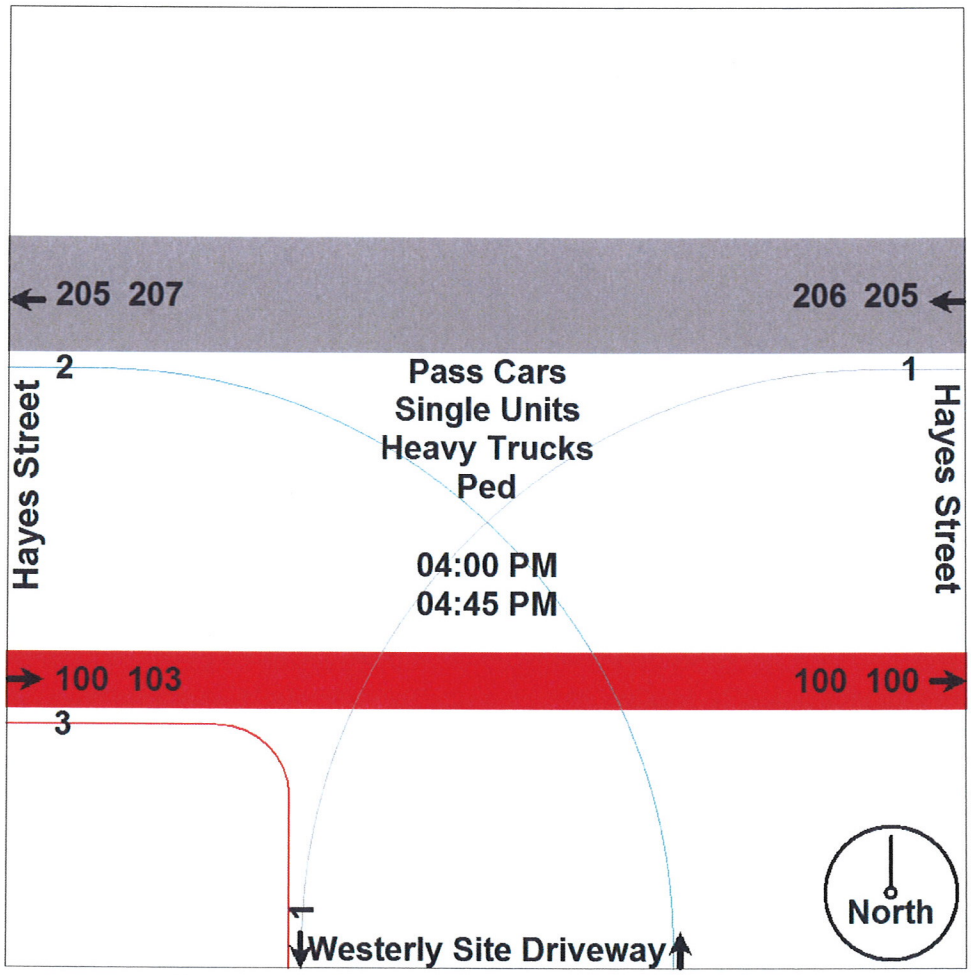
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_24L

File Name : TMC_2 Hayes & West Site Dw
Site Code : TMC_2
Start Date : 2/10/2015
Page No : 4

	Southbound				Hayes Street Westbound				Westerly Site Driveway Northbound				Hayes Street Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	**73**	0	**73**	0	0	0	0	1	24	0	25	**98**
04:15 PM	0	0	0	0	0	53	0	53	0	0	**1**	**1**	**2**	22	0	24	78
04:30 PM	0	0	0	0	0	43	**1**	44	0	0	0	0	0	**30**	0	**30**	74
04:45 PM	0	0	0	0	0	36	0	36	0	0	1	1	0	24	0	24	61
Total Volume	0	0	0	0	0	205	1	206	0	0	2	2	3	100	0	103	311
% App. Total	0	0	0		0	99.5	0.5		0	0	100		2.9	97.1	0		
PHF	.000	.000	.000	.000	.000	.702	.250	.705	.000	.000	.500	.500	.375	.833	.000	.858	.793
Pass Cars	0	0	0	0	0	196	1	197	0	0	2	2	3	88	0	91	290
% Pass Cars	0	0	0	0	0	95.6	100	95.6	0	0	100	100	100	88.0	0	88.3	93.2
Single Units	0	0	0	0	0	2	0	2	0	0	0	0	0	3	0	3	5
% Single Units	0	0	0	0	0	1.0	0	1.0	0	0	0	0	0	3.0	0	2.9	1.6
Heavy Trucks	0	0	0	0	0	7	0	7	0	0	0	0	0	9	0	9	16
% Heavy Trucks	0	0	0	0	0	3.4	0	3.4	0	0	0	0	0	9.0	0	8.7	5.1
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

TDC Traffic Data Collection

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_1US

File Name : TMC_3 Hayes & 172nd
Site Code : TMC_3
Start Date : 2/10/2015
Page No : 1

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

	172nd Ave. Southbound					Hayes Street Westbound					172nd Ave. Northbound					Hayes Street Eastbound					
Start Time	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	8	4	7	0	19	3	13	1	0	17	3	4	8	0	15	6	18	5	0	29	80
07:15 AM	3	6	6	0	15	5	26	2	0	33	3	8	16	0	27	3	14	12	0	29	104
07:30 AM	5	9	8	0	22	10	32	1	0	43	0	3	12	0	15	10	33	16	0	59	139
07:45 AM	5	16	16	0	37	11	9	0	0	20	0	4	3	0	7	14	49	17	0	80	144
Total	21	35	37	0	93	29	80	4	0	113	6	19	39	0	64	33	114	50	0	197	467
08:00 AM	4	13	5	0	22	7	16	0	0	23	2	2	4	0	8	8	23	12	0	43	96
08:15 AM	9	8	10	0	27	8	16	3	0	27	1	6	4	0	11	8	27	13	0	48	113
08:30 AM	8	9	6	0	23	4	14	1	0	19	0	5	7	0	12	1	17	10	0	28	82
08:45 AM	6	10	16	0	32	16	16	0	0	32	0	8	4	0	12	2	14	7	0	23	99
Total	27	40	37	0	104	35	62	4	0	101	3	21	19	0	43	19	81	42	0	142	390
**** BREAK ****																					
04:00 PM	26	21	9	0	56	22	46	2	0	70	1	14	8	0	23	3	11	11	0	25	174
04:15 PM	15	24	8	0	47	11	20	1	0	32	1	9	13	1	24	3	11	6	0	20	123
04:30 PM	16	17	7	0	40	11	13	2	0	26	2	6	13	0	21	5	7	19	0	31	118
04:45 PM	19	10	8	0	37	12	16	1	0	29	1	14	3	0	18	4	11	10	0	25	109
Total	76	72	32	0	180	56	95	6	0	157	5	43	37	1	86	15	40	46	0	101	524
05:00 PM	15	20	8	0	43	21	38	1	0	60	1	17	9	0	27	5	4	9	0	18	148
05:15 PM	17	30	9	0	56	7	23	1	0	31	1	11	6	0	18	2	11	10	0	23	128
05:30 PM	11	16	2	1	30	7	13	2	0	22	0	15	6	0	21	4	12	18	0	34	107
05:45 PM	10	15	4	0	29	4	13	0	0	17	1	7	5	0	13	4	4	8	0	16	75
Total	53	81	23	1	158	39	87	4	0	130	3	50	26	0	79	15	31	45	0	91	458
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Grand Total	177	228	129	1	535	159	324	18	0	501	17	133	121	1	272	82	266	184	0	532	1840
Apprch %	33.1	42.6	24.1	0.2		31.7	64.7	3.6	0		6.2	48.9	44.5	0.4		15.4	50	34.6	0		
Total %	9.6	12.4	7	0.1	29.1	8.6	17.6	1	0	27.2	0.9	7.2	6.6	0.1	14.8	4.5	14.5	10	0	28.9	
Pass Cars	173	224	114	0	511	149	284	13	0	446	11	130	116	0	257	78	220	174	0	472	1686
% Pass Cars	97.7	98.2	88.4	0	95.5	93.7	87.7	72.2	0	89	64.7	97.7	95.9	0	94.5	95.1	82.7	94.6	0	88.7	91.6
Single Units	2	4	3	0	9	4	9	3	0	16	2	3	2	0	7	3	24	2	0	29	61
% Single Units	1.1	1.8	2.3	0	1.7	2.5	2.8	16.7	0	3.2	11.8	2.3	1.7	0	2.6	3.7	9	1.1	0	5.5	3.3
Heavy Trucks	2	0	12	0	14	6	31	2	0	39	4	0	3	0	7	1	22	8	0	31	91
% Heavy Trucks	1.1	0	9.3	0	2.6	3.8	9.6	11.1	0	7.8	23.5	0	2.5	0	2.6	1.2	8.3	4.3	0	5.8	4.9
Ped	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
% Ped	0	0	0	100	0.2	0	0	0	0	0	0	0	0	100	0.4	0	0	0	0	0	0.1

Comments: Traffic study conducted during atypical weekday (Tuesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours & while school was in session. All way stop controlled intersection. Video SCU camera located within NE quadrant.

Traffic Data Collection, TDC

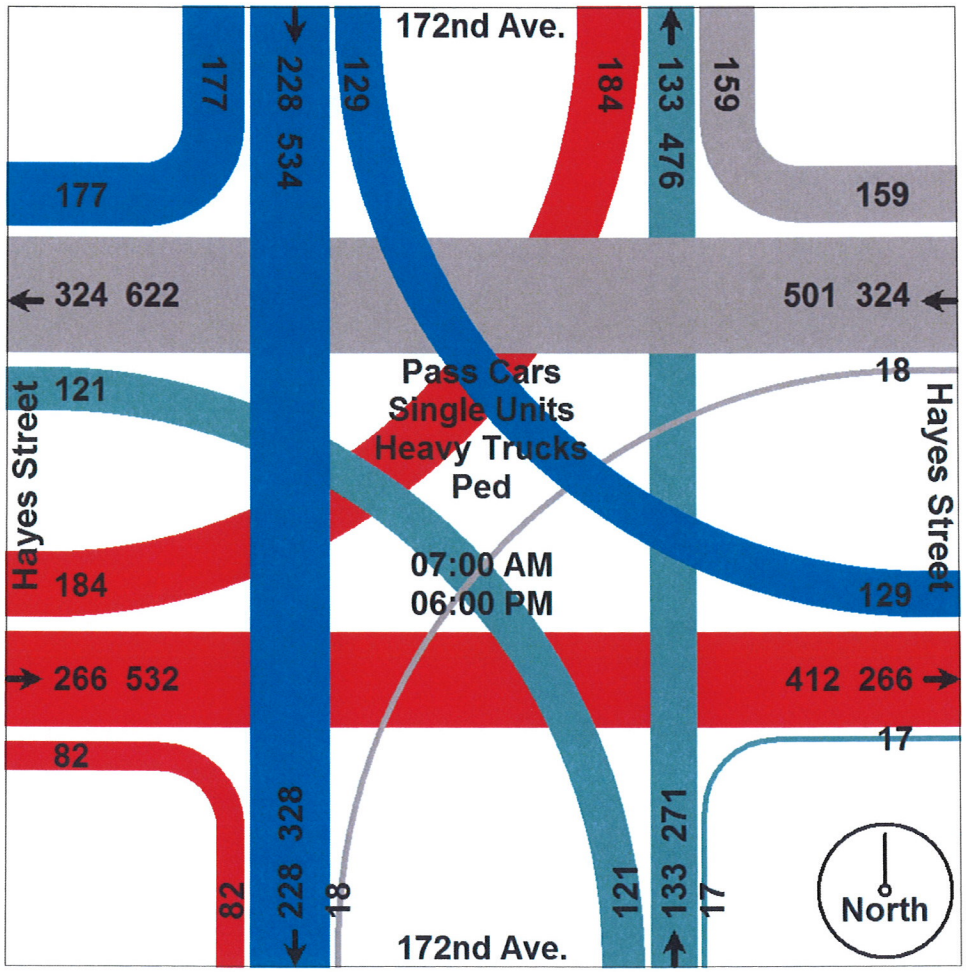
7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_1US

File Name : TMC_3 Hayes & 172nd
Site Code : TMC_3
Start Date : 2/10/2015
Page No : 2



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

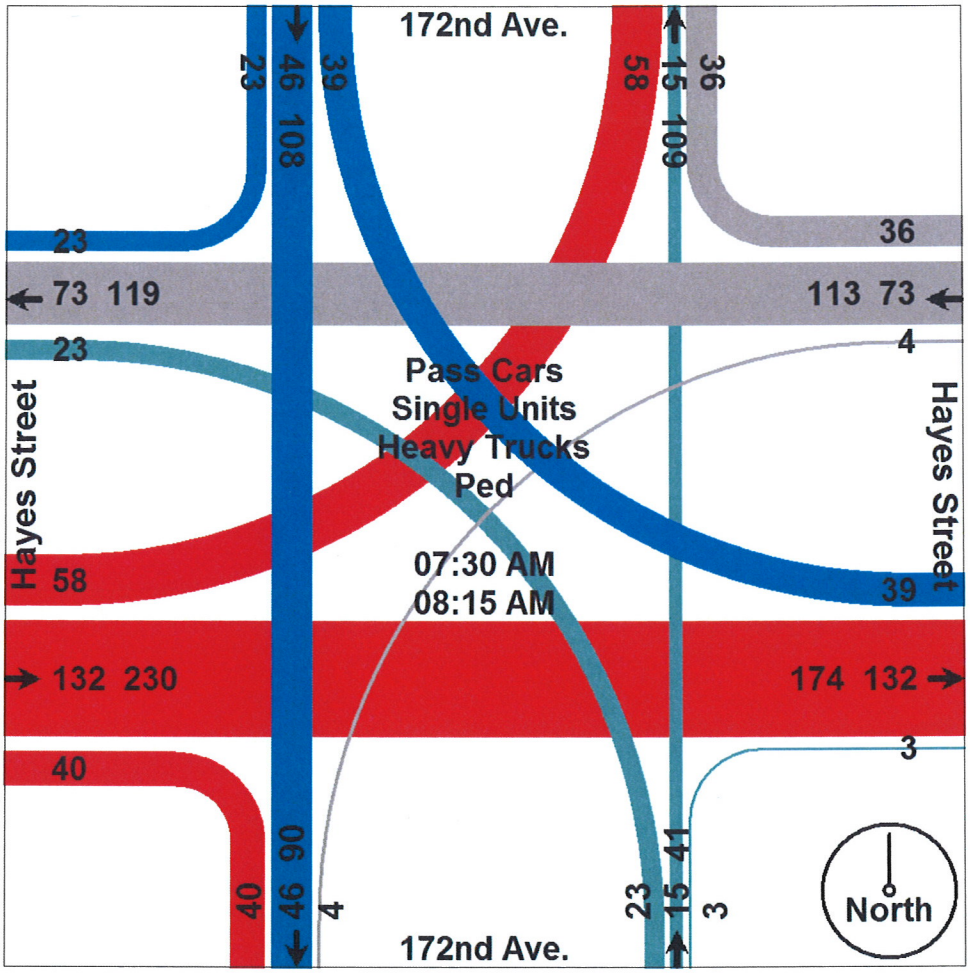
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_1US

File Name : TMC_3 Hayes & 172nd
Site Code : TMC_3
Start Date : 2/10/2015
Page No : 3

	172nd Ave. Southbound				Hayes Street Westbound				172nd Ave. Northbound				Hayes Street Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	5	9	8	22	10	32	1	43	0	3	12	15	10	33	16	59	139
07:45 AM	5	16	16	37	11	9	0	20	0	4	3	7	14	49	17	80	144
08:00 AM	4	13	5	22	7	16	0	23	2	2	4	8	8	23	12	43	96
08:15 AM	9	8	10	27	8	16	3	27	1	6	4	11	8	27	13	48	113
Total Volume	23	46	39	108	36	73	4	113	3	15	23	41	40	132	58	230	492
% App. Total	21.3	42.6	36.1		31.9	64.6	3.5		7.3	36.6	56.1		17.4	57.4	25.2		
PHF	.639	.719	.609	.730	.818	.570	.333	.657	.375	.625	.479	.683	.714	.673	.853	.719	.854
Pass Cars	20	45	35	100	33	64	3	100	1	15	23	39	39	117	54	210	449
% Pass Cars	87.0	97.8	89.7	92.6	91.7	87.7	75.0	88.5	33.3	100	100	95.1	97.5	88.6	93.1	91.3	91.3
Single Units	1	1	1	3	2	3	1	6	1	0	0	1	1	9	2	12	22
% Single Units	4.3	2.2	2.6	2.8	5.6	4.1	25.0	5.3	33.3	0	0	2.4	2.5	6.8	3.4	5.2	4.5
Heavy Trucks	2	0	3	5	1	6	0	7	1	0	0	1	0	6	2	8	21
% Heavy Trucks	8.7	0	7.7	4.6	2.8	8.2	0	6.2	33.3	0	0	2.4	0	4.5	3.4	3.5	4.3
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

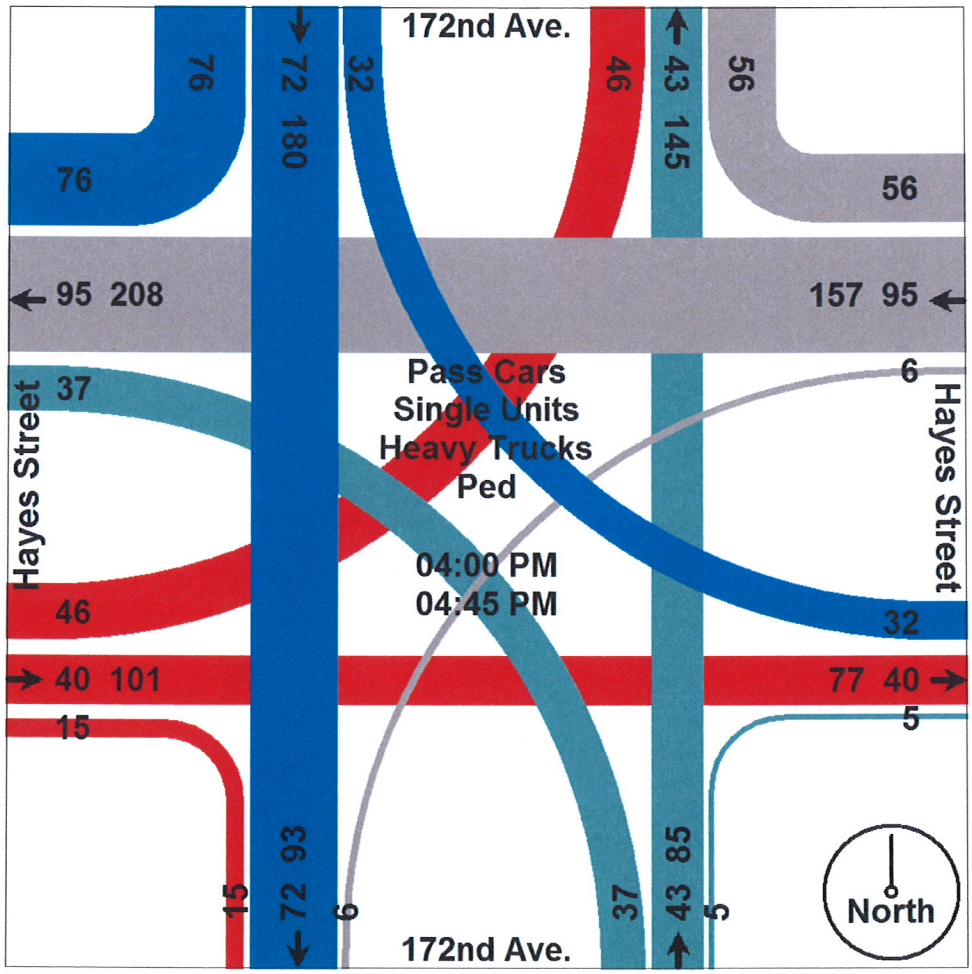
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_1US

File Name : TMC_3 Hayes & 172nd
Site Code : TMC_3
Start Date : 2/10/2015
Page No : 4

	172nd Ave. Southbound				Hayes Street Westbound				172nd Ave. Northbound				Hayes Street Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	**26**	21	**9**	**56**	**22**	**46**	**2**	**70**	1	**14**	8	**23**	3	**11**	11	25	**174**
04:15 PM	15	**24**	8	47	11	20	1	32	1	9	**13**	23	3	11	6	20	122
04:30 PM	16	17	7	40	11	13	2	26	**2**	6	13	21	**5**	7	**19**	**31**	118
04:45 PM	19	10	8	37	12	16	1	29	1	14	3	18	4	11	10	25	109
Total Volume	76	72	32	180	56	95	6	157	5	43	37	85	15	40	46	101	523
% App. Total	42.2	40	17.8		35.7	60.5	3.8		5.9	50.6	43.5		14.9	39.6	45.5		
PHF	.731	.750	.889	.804	.636	.516	.750	.561	.625	.768	.712	.924	.750	.909	.605	.815	.751
Pass Cars	76	71	28	175	54	87	5	146	3	41	36	80	13	30	44	87	488
% Pass Cars	100	98.6	87.5	97.2	96.4	91.6	83.3	93.0	60.0	95.3	97.3	94.1	86.7	75.0	95.7	86.1	93.3
Single Units	0	1	0	1	0	2	1	3	1	2	0	3	1	7	0	8	15
% Single Units	0	1.4	0	0.6	0	2.1	16.7	1.9	20.0	4.7	0	3.5	6.7	17.5	0	7.9	2.9
Heavy Trucks	0	0	4	4	2	6	0	8	1	0	1	2	1	3	2	6	20
% Heavy Trucks	0	0	12.5	2.2	3.6	6.3	0	5.1	20.0	0	2.7	2.4	6.7	7.5	4.3	5.9	3.8
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_4BT

File Name : TMC_4 172nd & North Site Dw
Site Code : TMC_4
Start Date : 2/10/2015
Page No : 1

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

	172nd Ave. Southbound					Existing Business Dw. Westbound					172nd Ave. Northbound					North Site Driveway Eastbound					
Start Time	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	13	0	0	13	1	0	0	0	1	0	15	0	0	15	0	0	0	0	0	29
07:15 AM	0	11	0	0	11	1	0	0	0	1	0	25	0	0	25	0	0	0	0	0	37
07:30 AM	0	19	2	0	21	0	0	1	0	1	0	15	0	0	15	1	0	0	0	1	38
07:45 AM	0	29	3	0	32	3	0	0	0	3	0	4	0	0	4	0	0	0	0	0	39
Total	0	72	5	0	77	5	0	1	0	6	0	59	0	0	59	1	0	0	0	1	143
08:00 AM	0	21	0	0	21	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	29
08:15 AM	0	18	0	0	18	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	29
08:30 AM	0	11	0	0	11	0	0	0	0	0	0	11	0	0	11	0	0	1	0	1	23
08:45 AM	0	12	1	0	13	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	25
Total	0	62	1	0	63	1	0	0	0	1	0	41	0	0	41	0	0	1	0	1	106
**** BREAK ****																					
04:00 PM	3	23	0	0	26	0	0	0	0	0	1	23	0	0	24	1	0	1	0	2	52
04:15 PM	1	27	1	0	29	0	0	0	1	1	0	23	0	0	23	0	0	0	0	0	53
04:30 PM	2	22	0	0	24	2	0	0	0	2	0	19	2	0	21	0	0	0	0	0	47
04:45 PM	1	15	0	0	16	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	34
Total	7	87	1	0	95	2	0	0	1	3	1	83	2	0	86	1	0	1	0	2	186
05:00 PM	2	24	0	0	26	0	0	0	0	0	0	25	0	0	25	0	0	1	0	1	52
05:15 PM	2	31	0	0	33	1	0	0	0	1	0	17	0	0	17	1	0	1	0	2	53
05:30 PM	1	21	0	0	22	0	0	0	0	0	0	18	0	0	18	0	0	3	0	3	43
05:45 PM	1	18	0	0	19	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	31
Total	6	94	0	0	100	1	0	0	0	1	0	72	0	0	72	1	0	5	0	6	179
Grand Total	13	315	7	0	335	9	0	1	1	11	1	255	2	0	258	3	0	7	0	10	614
Apprch %	3.9	94	2.1	0		81.8	0	9.1	9.1		0.4	98.8	0.8	0		30	0	70	0		
Total %	2.1	51.3	1.1	0	54.6	1.5	0	0.2	0.2	1.8	0.2	41.5	0.3	0	42	0.5	0	1.1	0	1.6	
Pass Cars	13	302	7	0	322	8	0	0	0	8	0	243	2	0	245	3	0	6	0	9	584
% Pass Cars	100	95.9	100	0	96.1	88.9	0	0	0	72.7	0	95.3	100	0	95	100	0	85.7	0	90	95.1
Single Units	0	10	0	0	10	1	0	0	0	1	0	8	0	0	8	0	0	0	0	0	19
% Single Units	0	3.2	0	0	3	11.1	0	0	0	9.1	0	3.1	0	0	3.1	0	0	0	0	0	3.1
Heavy Trucks	0	3	0	0	3	0	0	1	0	1	1	4	0	0	5	0	0	1	0	1	10
% Heavy Trucks	0	1	0	0	0.9	0	0	100	0	9.1	100	1.6	0	0	1.9	0	0	14.3	0	10	1.6
Ped	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
% Ped	0	0	0	0	0	0	0	0	100	9.1	0	0	0	0	0	0	0	0	0	0	0.2

Comments: Traffic study conducted during atypical weekday (Tuesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours & while school was in session. Non-signalized intersection. Video SCU camera located in NE quadrant.

Traffic Data Collection, TDC

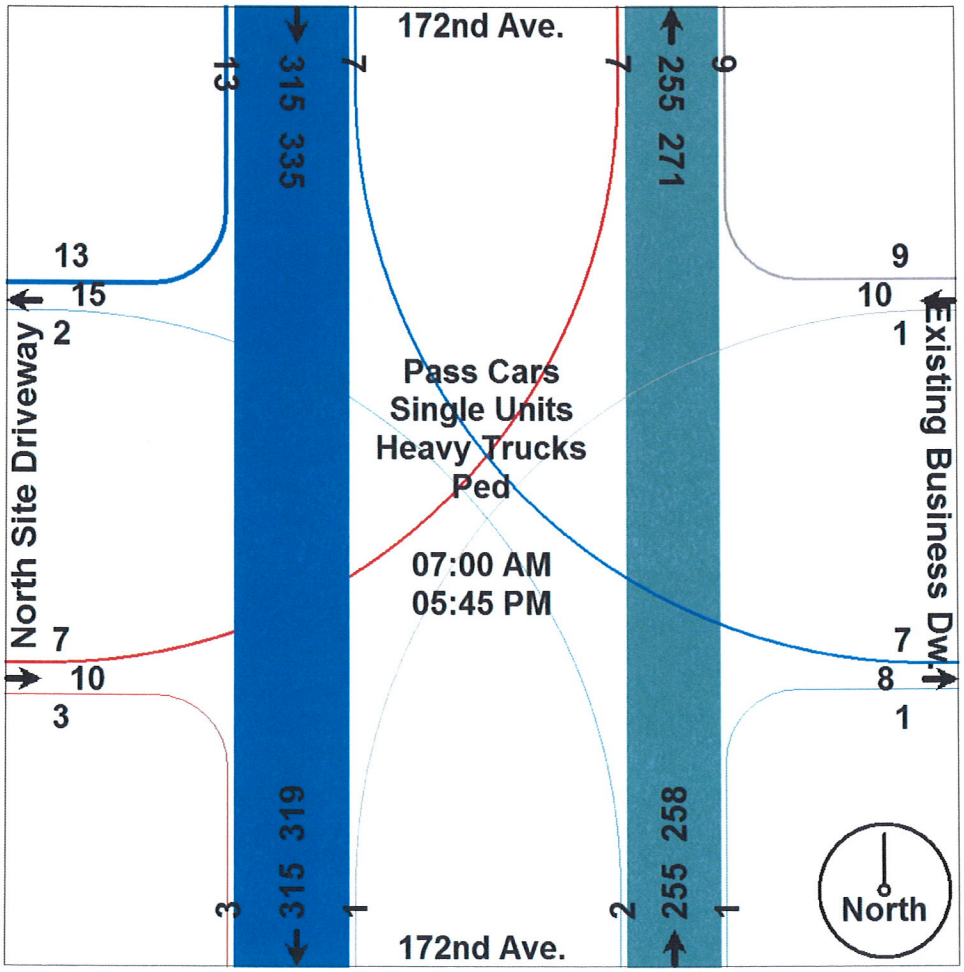
7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_4BT

File Name : TMC_4 172nd & North Site Dw
Site Code : TMC_4
Start Date : 2/10/2015
Page No : 2



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

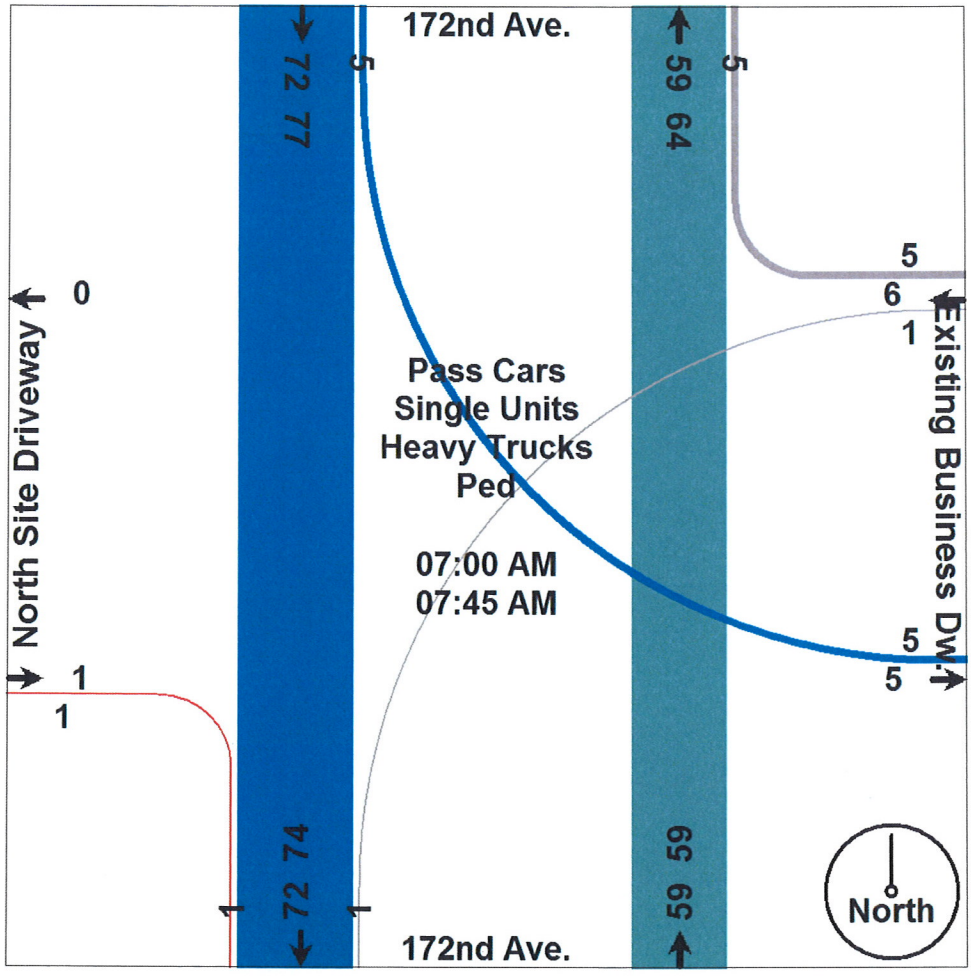
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_4BT

File Name : TMC_4 172nd & North Site Dw
Site Code : TMC_4
Start Date : 2/10/2015
Page No : 3

	172nd Ave. Southbound				Existing Business Dw. Westbound				172nd Ave. Northbound				North Site Driveway Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	13	0	13	1	0	0	1	0	15	0	15	0	0	0	0	29
07:15 AM	0	11	0	11	1	0	0	1	0	25	0	25	0	0	0	0	37
07:30 AM	0	19	2	21	0	0	1	1	0	15	0	15	1	0	0	1	38
07:45 AM	0	29	3	32	3	0	0	3	0	4	0	4	0	0	0	0	39
Total Volume	0	72	5	77	5	0	1	6	0	59	0	59	1	0	0	1	143
% App. Total	0	93.5	6.5		83.3	0	16.7		0	100	0		100	0	0		
PHF	.000	.621	.417	.602	.417	.000	.250	.500	.000	.590	.000	.590	.250	.000	.000	.250	.917
Pass Cars	0	70	5	75	4	0	0	4	0	58	0	58	1	0	0	1	138
% Pass Cars	0	97.2	100	97.4	80.0	0	0	66.7	0	98.3	0	98.3	100	0	0	100	96.5
Single Units	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	2
% Single Units	0	1.4	0	1.3	20.0	0	0	16.7	0	0	0	0	0	0	0	0	1.4
Heavy Trucks	0	1	0	1	0	0	1	1	0	1	0	1	0	0	0	0	3
% Heavy Trucks	0	1.4	0	1.3	0	0	100	16.7	0	1.7	0	1.7	0	0	0	0	2.1
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

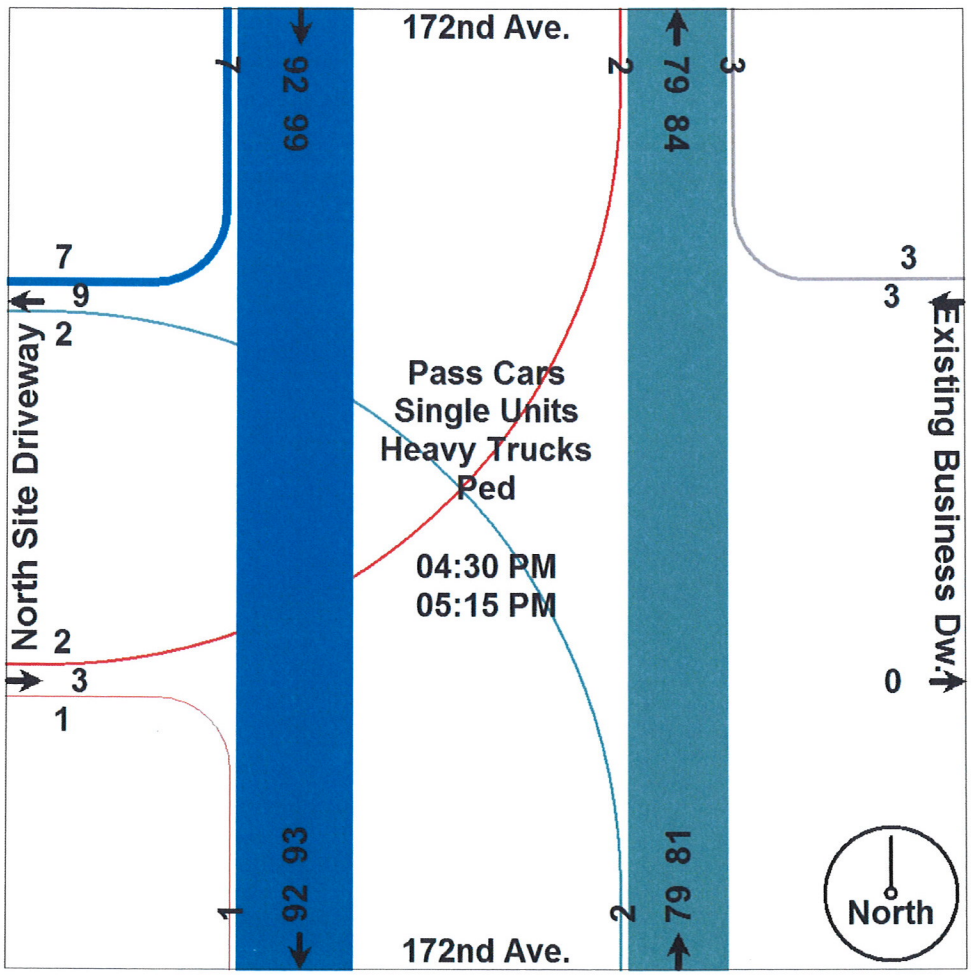
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_4BT

File Name : TMC_4 172nd & North Site Dw
Site Code : TMC_4
Start Date : 2/10/2015
Page No : 4

	172nd Ave. Southbound				Existing Business Dw. Westbound				172nd Ave. Northbound				North Site Driveway Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	2	22	0	24	2	0	0	2	0	19	2	21	0	0	0	0	47
04:45 PM	1	15	0	16	0	0	0	0	0	18	0	18	0	0	0	0	34
05:00 PM	2	24	0	26	0	0	0	0	0	25	0	25	0	0	1	1	52
05:15 PM	2	31	0	33	1	0	0	1	0	17	0	17	1	0	1	2	53
Total Volume	7	92	0	99	3	0	0	3	0	79	2	81	1	0	2	3	186
% App. Total	7.1	92.9	0		100	0	0		0	97.5	2.5		33.3	0	66.7		
PHF	.875	.742	.000	.750	.375	.000	.000	.375	.000	.790	.250	.810	.250	.000	.500	.375	.877
Pass Cars	7	87	0	94	3	0	0	3	0	76	2	78	1	0	2	3	178
% Pass Cars	100	94.6	0	94.9	100	0	0	100	0	96.2	100	96.3	100	0	100	100	95.7
Single Units	0	5	0	5	0	0	0	0	0	3	0	3	0	0	0	0	8
% Single Units	0	5.4	0	5.1	0	0	0	0	0	3.8	0	3.7	0	0	0	0	4.3
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

7504 Sawgrass Drive, Washington, MI 48094 Ph. (586) 786-5407

TDC Traffic Data Collection

Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_34G

File Name : TMC_5 172nd & South Site Dw
Site Code : TMC_5
Start Date : 2/10/2015
Page No : 1

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

	172nd Ave. Southbound					Existing Business Dw. Westbound					172nd Ave. Northbound					South Site Driveway Eastbound					
Start Time	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	12	0	0	12	0	0	0	0	0	0	15	0	0	15	0	0	1	0	1	28
07:15 AM	0	11	0	0	11	0	0	0	0	0	1	24	0	0	25	0	0	0	0	0	36
07:30 AM	0	20	1	0	21	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	37
07:45 AM	0	24	2	0	26	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	30
Total	0	67	3	0	70	0	0	0	0	0	1	59	0	0	60	0	0	1	0	1	131
08:00 AM	0	22	2	0	24	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	31
08:15 AM	0	15	2	0	17	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	28
08:30 AM	0	11	2	0	13	3	0	0	0	3	0	8	0	0	8	0	0	0	0	0	24
08:45 AM	0	12	0	0	12	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	24
Total	0	60	6	0	66	3	0	0	0	3	0	38	0	0	38	0	0	0	0	0	107
**** BREAK ****																					
04:00 PM	0	24	0	0	24	0	0	1	0	1	0	22	0	0	22	0	0	1	0	1	48
04:15 PM	0	26	0	0	26	0	0	0	1	1	0	23	0	0	23	0	0	0	0	0	50
04:30 PM	0	22	1	0	23	3	0	1	0	4	0	18	0	0	18	2	0	0	0	2	47
04:45 PM	0	13	0	0	13	1	0	0	0	1	0	17	0	0	17	0	0	0	0	0	31
Total	0	85	1	0	86	4	0	2	1	7	0	80	0	0	80	2	0	1	0	3	176
05:00 PM	0	26	0	0	26	1	0	0	0	1	0	23	0	0	23	0	0	1	0	1	51
05:15 PM	0	33	0	0	33	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	50
05:30 PM	0	19	0	0	19	1	0	0	0	1	0	17	0	0	17	0	0	0	0	0	37
05:45 PM	0	19	0	0	19	1	0	0	0	1	0	12	0	0	12	0	0	0	0	0	32
Total	0	97	0	0	97	3	0	0	0	3	0	69	0	0	69	0	0	1	0	1	170
Grand Total	0	309	10	0	319	10	0	2	1	13	1	246	0	0	247	2	0	3	0	5	584
Apprch %	0	96.9	3.1	0		76.9	0	15.4	7.7		0.4	99.6	0	0		40	0	60	0		
Total %	0	52.9	1.7	0	54.6	1.7	0	0.3	0.2	2.2	0.2	42.1	0	0	42.3	0.3	0	0.5	0	0.9	
Pass Cars	0	298	7	0	305	9	0	2	0	11	1	234	0	0	235	2	0	3	0	5	556
% Pass Cars	0	96.4	70	0	95.6	90	0	100	0	84.6	100	95.1	0	0	95.1	100	0	100	0	100	95.2
Single Units	0	7	2	0	9	1	0	0	0	1	0	6	0	0	6	0	0	0	0	0	16
% Single Units	0	2.3	20	0	2.8	10	0	0	0	7.7	0	2.4	0	0	2.4	0	0	0	0	0	2.7
Heavy Trucks	0	4	1	0	5	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	11
% Heavy Trucks	0	1.3	10	0	1.6	0	0	0	0	0	0	2.4	0	0	2.4	0	0	0	0	0	1.9
Ped	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
% Ped	0	0	0	0	0	0	0	0	100	7.7	0	0	0	0	0	0	0	0	0	0	0.2

Comments: Traffic study conducted during atypical weekday (Tuesday) from 7:00-9:00 AM morning & 4:00-6:00 PM afternoon peak hours & while school was in session. Non-signalized intersection. Video VCU scout camera located at SW quadrant

Traffic Data Collection, TDC

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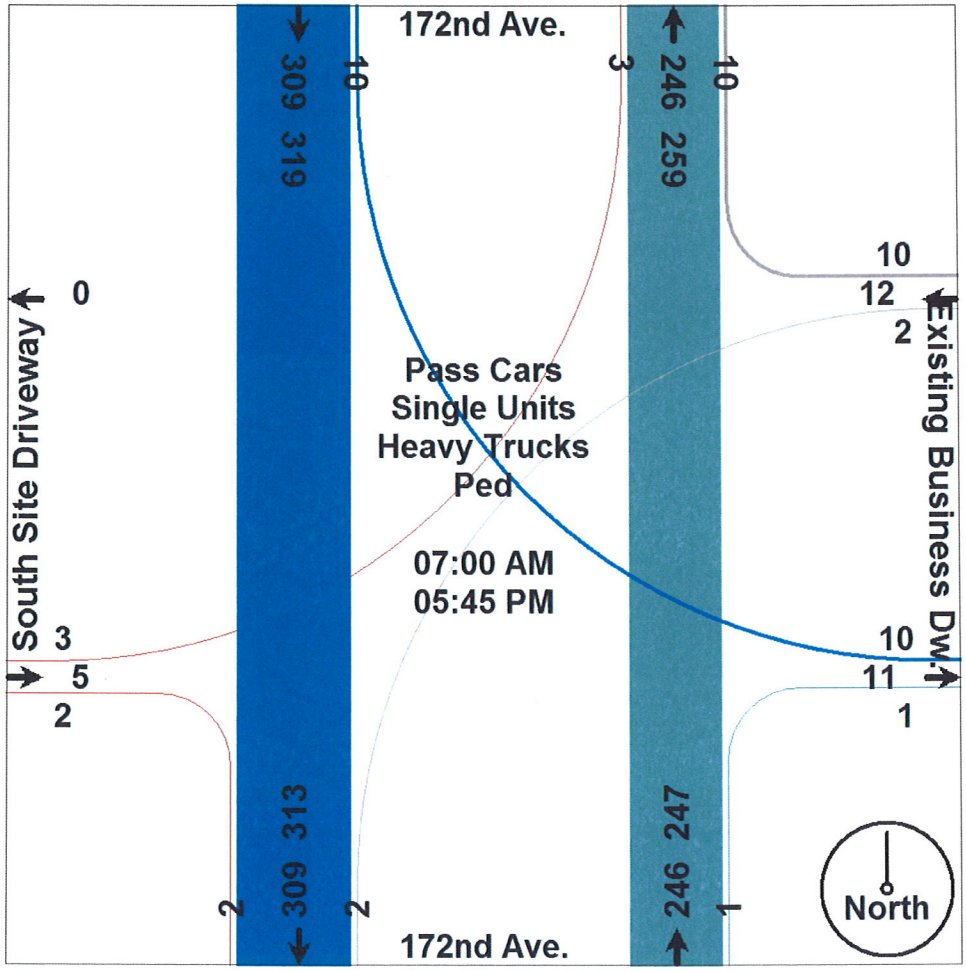
Traffic Study Performed For:

Fleis Vandenbrink

Project: Grand Haven Flagstar Study
Location: US-31 & Hayes Street
Weather: Sunny, Clear, Tmep., 20's
Count By: Miovision Video SCU_34G

File Name : TMC_5 172nd & South Site Dw
Site Code : TMC_5
Start Date : 2/10/2015
Page No : 2



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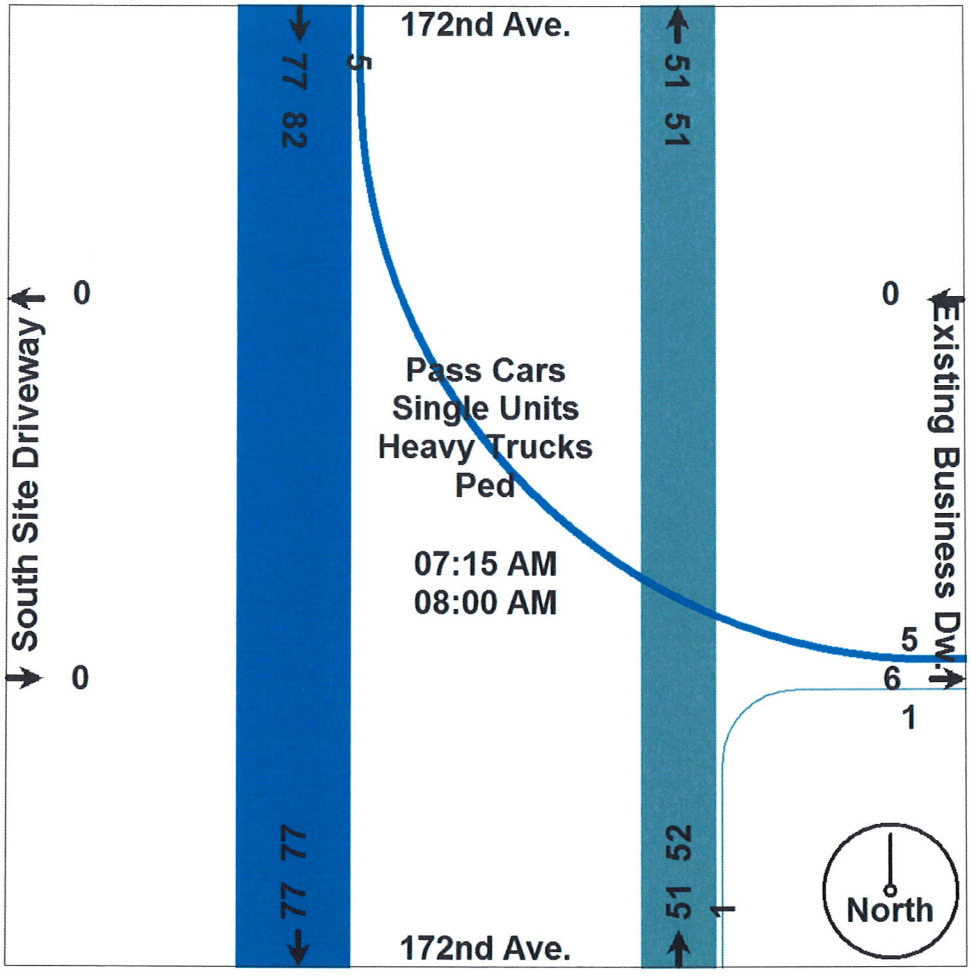
File Name : TMC_5 172nd & South Site Dw
Site Code : TMC_5
Start Date : 2/10/2015
Page No : 3

	172nd Ave. Southbound				Existing Business Dw. Westbound				172nd Ave. Northbound				South Site Driveway Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	11	0	11	0	0	0	0	1	24	0	25	0	0	0	0	36
07:30 AM	0	20	1	21	0	0	0	0	0	16	0	16	0	0	0	0	37
07:45 AM	0	24	2	26	0	0	0	0	0	4	0	4	0	0	0	0	30
08:00 AM	0	22	2	24	0	0	0	0	0	7	0	7	0	0	0	0	31
Total Volume	0	77	5	82	0	0	0	0	1	51	0	52	0	0	0	0	134
% App. Total	0	93.9	6.1		0	0	0		1.9	98.1	0		0	0	0		
PHF	.000	.802	.625	.788	.000	.000	.000	.000	.250	.531	.000	.520	.000	.000	.000	.000	.905
Pass Cars	0	75	3	78	0	0	0	0	1	50	0	51	0	0	0	0	129
% Pass Cars	0	97.4	60.0	95.1	0	0	0	0	100	98.0	0	98.1	0	0	0	0	96.3
Single Units	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Single Units	0	0	20.0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0.7
Heavy Trucks	0	2	1	3	0	0	0	0	0	1	0	1	0	0	0	0	4
% Heavy Trucks	0	2.6	20.0	3.7	0	0	0	0	0	2.0	0	1.9	0	0	0	0	3.0
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, TDC

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Traffic Study Performed For:

Fleis Vandenbrink

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Location: US-31 & Hayes Street
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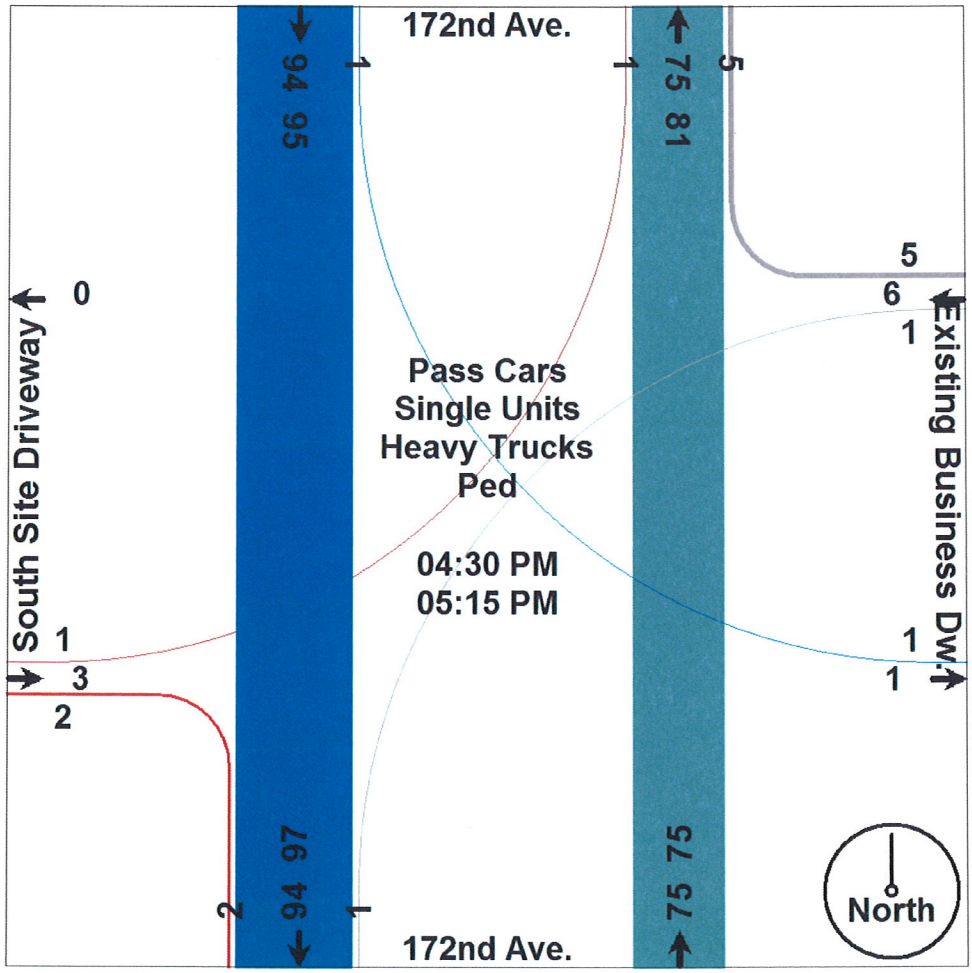
Count By: Miovision Video SCU_34G

File Name : TMC_5 172nd & South Site Dw
Site Code : TMC_5
Start Date : 2/10/2015
Page No : 4

	172nd Ave. Southbound				Existing Business Dw. Westbound				172nd Ave. Northbound				South Site Driveway Eastbound				
Start Time	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	22	1	23	3	0	1	4	0	18	0	18	2	0	0	2	47
04:45 PM	0	13	0	13	1	0	0	1	0	17	0	17	0	0	0	0	31
05:00 PM	0	26	0	26	1	0	0	1	0	23	0	23	0	0	1	1	51
05:15 PM	0	33	0	33	0	0	0	0	0	17	0	17	0	0	0	0	50
Total Volume	0	94	1	95	5	0	1	6	0	75	0	75	2	0	1	3	179
% App. Total	0	98.9	1.1		83.3	0	16.7		0	100	0		66.7	0	33.3		
PHF	.000	.712	.250	.720	.417	.000	.250	.375	.000	.815	.000	.815	.250	.000	.250	.375	.877
Pass Cars	0	89	1	90	5	0	1	6	0	73	0	73	2	0	1	3	172
% Pass Cars	0	94.7	100	94.7	100	0	100	100	0	97.3	0	97.3	100	0	100	100	96.1
Single Units	0	5	0	5	0	0	0	0	0	2	0	2	0	0	0	0	7
% Single Units	0	5.3	0	5.3	0	0	0	0	0	2.7	0	2.7	0	0	0	0	3.9
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



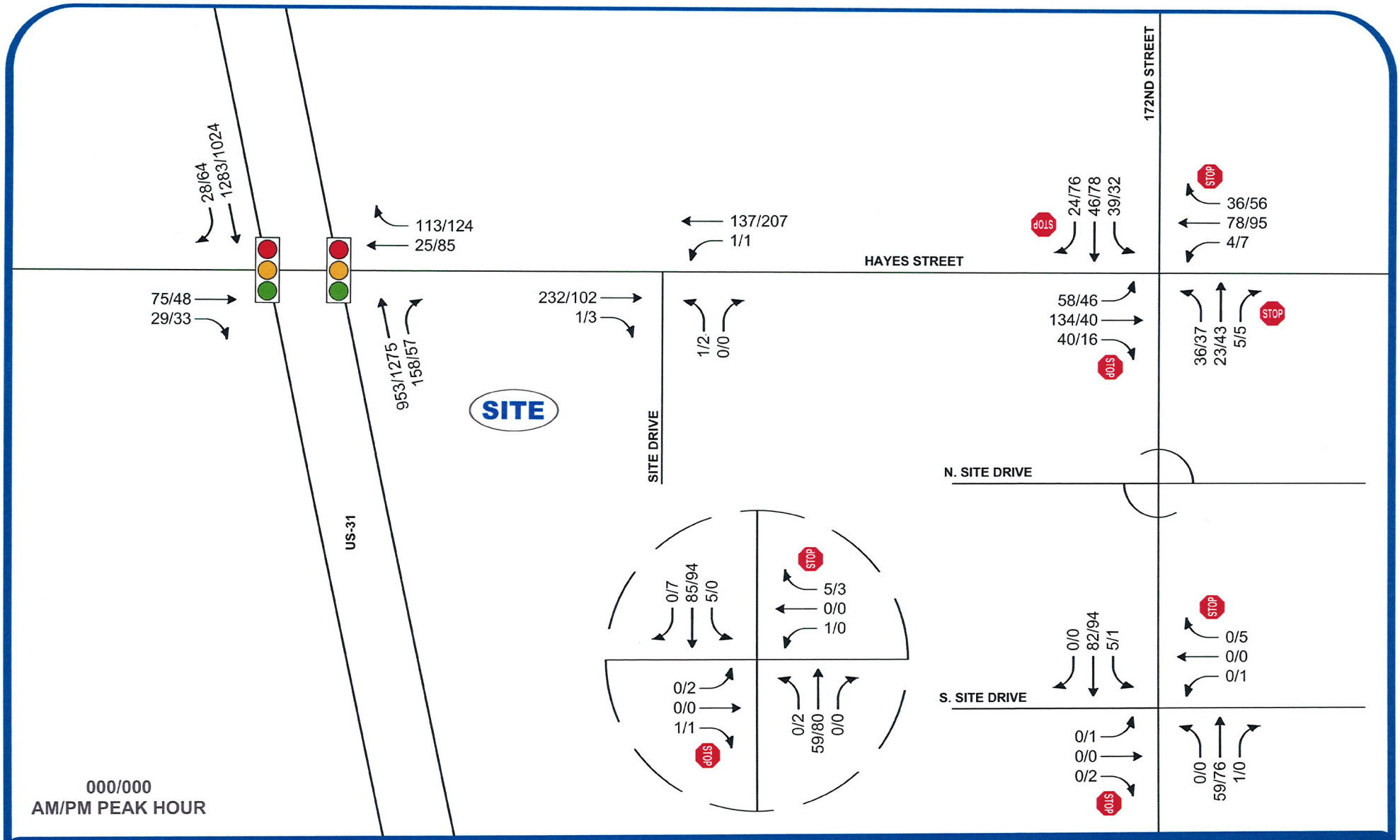


FIGURE 1
EXISTING TRAFFIC VOLUMES

GRAND HAVEN FLAGSTAR BANK TIA - GRAND HAVEN, MI

LEGEND

- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION
- TRAFFIC VOLUMES (AM/PM)
- ROADS

NORTH

SCALE: NOT TO SCALE

2015

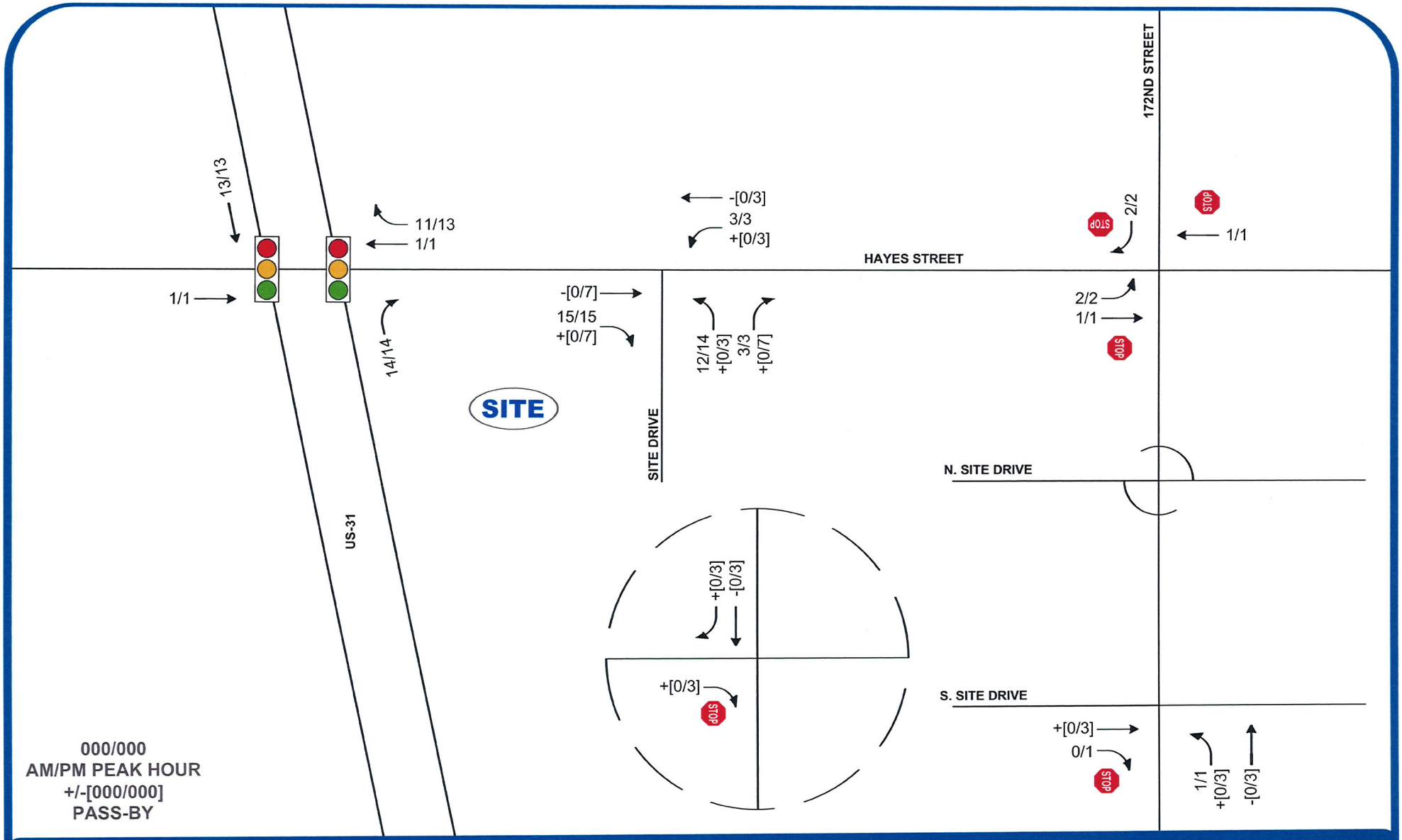


FIGURE 2
SITE-GENERATED TRAFFIC VOLUMES

GRAND HAVEN FLAGSTAR BANK TIA - GRAND HAVEN, MI

LEGEND

- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION
- TRAFFIC VOLUMES (AM/PM)
- ROADS

NORTH

SCALE: NOT TO SCALE

2015

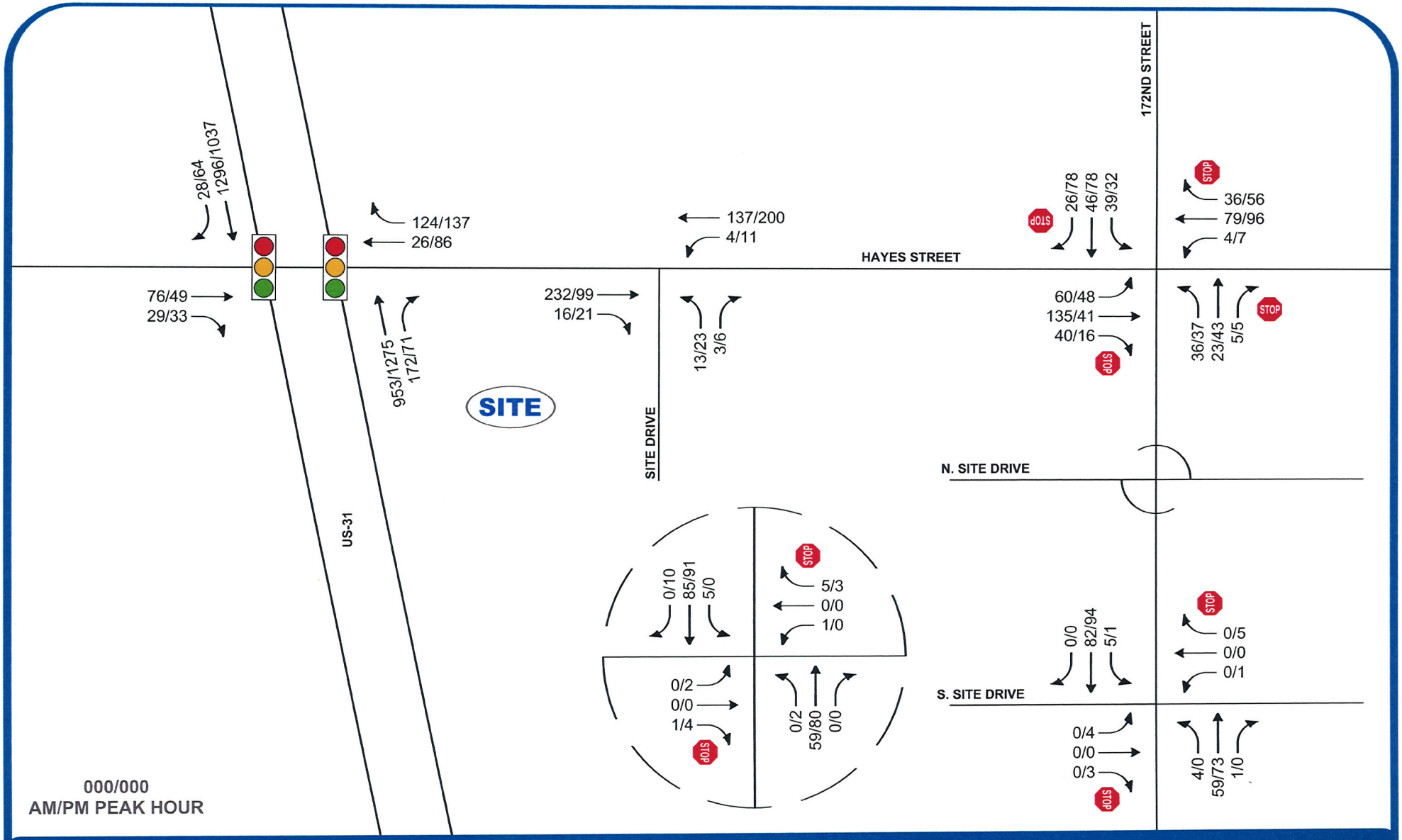


FIGURE 3
FUTURE TRAFFIC VOLUMES

GRAND HAVEN FLAGSTAR BANK TIA - GRAND HAVEN, MI

LEGEND

- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION
- TRAFFIC VOLUMES (AM/PM)
- ROADS

NORTH

SCALE: NOT TO SCALE

2015

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Exhibit 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. To remain consistent with the AWSC intersection analysis procedure described later in this chapter, a total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in Exhibit 16-2. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the *v/c* ratio for the lane group in question.

LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Exhibit 16-2. Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤10.0
B	> 10.0 and ≤20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	>80.0

LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high *v/c* ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high *v/c* ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high *v/c* ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↑						↑↑	↱
Volume (vph)	0	75	29	0	25	0	0	0	0	0	1283	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0	9.0		6.0						6.4	6.4
Lane Util. Factor		1.00	1.00		1.00						0.95	1.00
Frt		1.00	0.85		1.00						1.00	0.85
Flt Protected		1.00	1.00		1.00						1.00	1.00
Satd. Flow (prot)		1863	1583		1727						3438	1538
Flt Permitted		1.00	1.00		1.00						1.00	1.00
Satd. Flow (perm)		1863	1583		1727						3438	1538
Peak-hour factor, PHF	0.67	0.67	0.67	0.64	0.64	0.64	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	0	112	43	0	39	0	0	0	0	0	1509	33
RTOR Reduction (vph)	0	0	34	0	0	0	0	0	0	0	0	14
Lane Group Flow (vph)	0	112	9	0	39	0	0	0	0	0	1509	19
Heavy Vehicles (%)	2%	2%	2%	10%	10%	10%	2%	2%	2%	5%	5%	5%
Turn Type		NA	Perm		NA						NA	Perm
Protected Phases		4			8						6	
Permitted Phases			4									6
Actuated Green, G (s)		14.9	14.9		17.9						39.7	39.7
Effective Green, g (s)		14.9	14.9		17.9						39.7	39.7
Actuated g/C Ratio		0.21	0.21		0.26						0.57	0.57
Clearance Time (s)		9.0	9.0		6.0						6.4	6.4
Vehicle Extension (s)		3.0	3.0		3.0						0.2	0.2
Lane Grp Cap (vph)		396	336		441						1949	872
v/s Ratio Prot		c0.06			0.02						c0.44	
v/s Ratio Perm			0.01									0.01
v/c Ratio		0.28	0.03		0.09						0.77	0.02
Uniform Delay, d1		23.1	21.8		19.8						11.7	6.6
Progression Factor		0.00	0.00		0.00						1.00	1.00
Incremental Delay, d2		0.3	0.0		0.1						3.1	0.0
Delay (s)		0.3	0.0		0.1						14.8	6.7
Level of Service		A	A		A						B	A
Approach Delay (s)		0.3			0.1			0.0			14.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	75	0	0	25	113	0	953	158	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			9.0	9.0		6.4	6.4			
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (prot)		1863			1727	1468		3374	1509			
Flt Permitted		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (perm)		1863			1727	1468		3374	1509			
Peak-hour factor, PHF	0.67	0.67	0.67	0.64	0.64	0.64	0.88	0.88	0.88	0.92	0.92	0.92
Adj. Flow (vph)	0	112	0	0	39	177	0	1083	180	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	63	0	0	78	0	0	0
Lane Group Flow (vph)	0	112	0	0	39	114	0	1083	102	0	0	0
Heavy Vehicles (%)	2%	2%	2%	10%	10%	10%	7%	7%	7%	2%	2%	2%
Turn Type		NA			NA	Perm		NA	Perm			
Protected Phases		8			4			2				
Permitted Phases						4			2			
Actuated Green, G (s)		17.9			14.9	14.9		39.7	39.7			
Effective Green, g (s)		17.9			14.9	14.9		39.7	39.7			
Actuated g/C Ratio		0.26			0.21	0.21		0.57	0.57			
Clearance Time (s)		6.0			9.0	9.0		6.4	6.4			
Vehicle Extension (s)		3.0			3.0	3.0		0.2	0.2			
Lane Grp Cap (vph)		476			367	312		1913	855			
v/s Ratio Prot		0.06			0.02			c0.32				
v/s Ratio Perm						c0.08			0.07			
v/c Ratio		0.24			0.11	0.37		0.57	0.12			
Uniform Delay, d1		20.6			22.2	23.5		9.7	7.0			
Progression Factor		0.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		0.3			0.1	0.7		1.2	0.3			
Delay (s)		0.3			22.3	24.2		10.9	7.3			
Level of Service		A			C	C		B	A			
Approach Delay (s)		0.3			23.9			10.4			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		
Volume (vph)	104	0	0	53	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	14.0			4.0		
Lane Util. Factor	1.00			1.00		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1863			1776		
Flt Permitted	1.00			1.00		
Satd. Flow (perm)	1863			1776		
Peak-hour factor, PHF	0.67	0.67	0.75	0.75	0.92	0.92
Adj. Flow (vph)	155	0	0	71	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	155	0	0	71	0	0
Heavy Vehicles (%)	2%	2%	7%	7%	2%	2%
Turn Type	NA			NA		
Protected Phases	12			Free		
Permitted Phases						
Actuated Green, G (s)	9.9			70.0		
Effective Green, g (s)	9.9			70.0		
Actuated g/C Ratio	0.14			1.00		
Clearance Time (s)	14.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	263			1776		
v/s Ratio Prot	c0.08			0.04		
v/s Ratio Perm						
v/c Ratio	0.59			0.04		
Uniform Delay, d1	28.1			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	3.4			0.0		
Delay (s)	31.5			0.0		
Level of Service	C			A		
Approach Delay (s)	31.5			0.0	0.0	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Vol, veh/h	0	58	134	40	0	4	78	36	0	36	23	5	0	39	46	24
Peak Hour Factor	0.92	0.72	0.72	0.72	0.92	0.66	0.66	0.66	0.92	0.68	0.68	0.68	0.92	0.73	0.73	0.73
Heavy Vehicles, %	2	9	9	9	2	11	11	11	2	5	5	5	2	7	7	7
Mvmt Flow	0	81	186	56	0	6	118	55	0	53	34	7	0	53	63	33
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	10.9	10.4	9.7	9.8
HCM LOS	B	B	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	82%	0%	77%	0%	68%	0%	66%
Vol Right, %	0%	18%	0%	23%	0%	32%	0%	34%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	28	58	174	4	114	39	70
LT Vol	36	0	58	0	4	0	39	0
Through Vol	0	23	0	134	0	78	0	46
RT Vol	0	5	0	40	0	36	0	24
Lane Flow Rate	53	41	81	242	6	173	53	96
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.099	0.069	0.135	0.361	0.011	0.265	0.099	0.157
Departure Headway (Hd)	6.699	6.066	6.152	5.485	6.37	5.642	6.644	5.896
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	538	594	586	660	565	641	542	612
Service Time	4.404	3.771	3.852	3.185	4.07	3.342	4.347	3.599
HCM Lane V/C Ratio	0.099	0.069	0.138	0.367	0.011	0.27	0.098	0.157
HCM Control Delay	10.1	9.2	9.8	11.3	9.1	10.4	10.1	9.7
HCM Lane LOS	B	A	A	B	A	B	B	A
HCM 95th-tile Q	0.3	0.2	0.5	1.6	0	1.1	0.3	0.6

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	232	1	1	137	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	1	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	72	72	60	60	60	60
Heavy Vehicles, %	5	0	0	9	0	0
Mvmt Flow	322	1	2	228	2	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	324	0	441	323
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	118	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1247	-	563	723
Stage 1	-	-	-	-	738	-
Stage 2	-	-	-	-	900	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1247	-	562	723
Mov Cap-2 Maneuver	-	-	-	-	562	-
Stage 1	-	-	-	-	738	-
Stage 2	-	-	-	-	898	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	562	-	-	1247	-
HCM Lane V/C Ratio	0.003	-	-	0.001	-
HCM Control Delay (s)	11.4	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	1	1	0	5	0	59	0	5	85	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	0	0	0	33	33	33	2	2	2	3	3	3
Mvmt Flow	0	0	2	2	0	8	0	98	0	8	142	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	261	256	142	257	256	98	142	0	0	98	0	0
Stage 1	158	158	-	98	98	-	-	-	-	-	-	-
Stage 2	103	98	-	159	158	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.43	6.83	6.53	4.12	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.43	5.83	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.43	5.83	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.797	4.297	3.597	2.218	-	-	2.227	-	-
Pot Cap-1 Maneuver	696	651	911	637	598	880	1441	-	-	1489	-	-
Stage 1	849	771	-	838	757	-	-	-	-	-	-	-
Stage 2	908	818	-	775	712	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	686	647	911	633	594	880	1441	-	-	1489	-	-
Mov Cap-2 Maneuver	686	647	-	633	594	-	-	-	-	-	-	-
Stage 1	849	766	-	838	757	-	-	-	-	-	-	-
Stage 2	899	818	-	769	708	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9	9.4	0	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1441	-	-	911	826	1489	-	-
HCM Lane V/C Ratio	-	-	-	0.002	0.012	0.006	-	-
HCM Control Delay (s)	0	-	-	9	9.4	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	0	0	0	59	1	5	82	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	5	5	5
Mvmt Flow	0	0	0	0	0	0	0	98	2	6	104	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	215	216	104	215	215	99	104	0	0	100	0	0
Stage 1	116	116	-	99	99	-	-	-	-	-	-	-
Stage 2	99	100	-	116	116	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.245	-	-
Pot Cap-1 Maneuver	742	682	951	742	683	957	1488	-	-	1474	-	-
Stage 1	889	800	-	907	813	-	-	-	-	-	-	-
Stage 2	907	812	-	889	800	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	740	679	951	740	680	957	1488	-	-	1474	-	-
Mov Cap-2 Maneuver	740	679	-	740	680	-	-	-	-	-	-	-
Stage 1	889	797	-	907	813	-	-	-	-	-	-	-
Stage 2	907	812	-	885	797	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1488	-	-	-	-	1474	-	-
HCM Lane V/C Ratio	-	-	-	-	-	0.004	-	-
HCM Control Delay (s)	0	-	-	0	0	7.5	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	-	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↑						↑↑	↱
Volume (vph)	0	48	33	0	85	0	0	0	0	0	1024	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0	9.0		6.0						6.4	6.4
Lane Util. Factor		1.00	1.00		1.00						0.95	1.00
Frt		1.00	0.85		1.00						1.00	0.85
Flt Protected		1.00	1.00		1.00						1.00	1.00
Satd. Flow (prot)		1900	1615		1845						3471	1553
Flt Permitted		1.00	1.00		1.00						1.00	1.00
Satd. Flow (perm)		1900	1615		1845						3471	1553
Peak-hour factor, PHF	0.76	0.76	0.76	0.65	0.65	0.65	0.92	0.92	0.92	0.84	0.84	0.84
Adj. Flow (vph)	0	63	43	0	131	0	0	0	0	0	1219	76
RTOR Reduction (vph)	0	0	34	0	0	0	0	0	0	0	0	32
Lane Group Flow (vph)	0	63	9	0	131	0	0	0	0	0	1219	44
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Turn Type		NA	Perm		NA						NA	Perm
Protected Phases		4			8						6	
Permitted Phases			4									6
Actuated Green, G (s)		14.1	14.1		17.1						40.5	40.5
Effective Green, g (s)		14.1	14.1		17.1						40.5	40.5
Actuated g/C Ratio		0.20	0.20		0.24						0.58	0.58
Clearance Time (s)		9.0	9.0		6.0						6.4	6.4
Vehicle Extension (s)		3.0	3.0		3.0						0.2	0.2
Lane Grp Cap (vph)		382	325		450						2008	898
v/s Ratio Prot		0.03			c0.07						c0.35	
v/s Ratio Perm			0.01									0.03
v/c Ratio		0.16	0.03		0.29						0.61	0.05
Uniform Delay, d1		23.1	22.4		21.5						9.6	6.4
Progression Factor		0.00	0.00		0.00						1.00	1.00
Incremental Delay, d2		0.2	0.0		0.3						1.4	0.1
Delay (s)		0.2	0.0		0.4						11.0	6.5
Level of Service		A	A		A						B	A
Approach Delay (s)		0.1			0.4			0.0			10.7	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑	↱		↑↑	↱			
Volume (vph)	0	48	0	0	85	124	0	1275	57	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			9.0	9.0		6.4	6.4			
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (prot)		1900			1845	1568		3539	1583			
Flt Permitted		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (perm)		1900			1845	1568		3539	1583			
Peak-hour factor, PHF	0.76	0.76	0.76	0.65	0.65	0.65	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	63	0	0	131	191	0	1417	63	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	27	0	0	0
Lane Group Flow (vph)	0	63	0	0	131	149	0	1417	36	0	0	0
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type		NA			NA	Perm		NA	Perm			
Protected Phases		8			4			2				
Permitted Phases						4			2			
Actuated Green, G (s)		17.1			14.1	14.1		40.5	40.5			
Effective Green, g (s)		17.1			14.1	14.1		40.5	40.5			
Actuated g/C Ratio		0.24			0.20	0.20		0.58	0.58			
Clearance Time (s)		6.0			9.0	9.0		6.4	6.4			
Vehicle Extension (s)		3.0			3.0	3.0		0.2	0.2			
Lane Grp Cap (vph)		464			371	315		2047	915			
v/s Ratio Prot		0.03			0.07			c0.40				
v/s Ratio Perm						c0.09			0.02			
v/c Ratio		0.14			0.35	0.47		0.69	0.04			
Uniform Delay, d1		20.7			24.0	24.7		10.4	6.4			
Progression Factor		0.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		0.1			0.6	1.1		2.0	0.1			
Delay (s)		0.1			24.6	25.8		12.3	6.4			
Level of Service		A			C	C		B	A			
Approach Delay (s)		0.1			25.3			12.1			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		
Volume (vph)	81	0	0	149	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	14.0			4.0		
Lane Util. Factor	1.00			1.00		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1900			1845		
Flt Permitted	1.00			1.00		
Satd. Flow (perm)	1900			1845		
Peak-hour factor, PHF	0.76	0.76	0.74	0.74	0.92	0.92
Adj. Flow (vph)	107	0	0	201	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	107	0	0	201	0	0
Heavy Vehicles (%)	0%	0%	3%	3%	2%	2%
Turn Type	NA			NA		
Protected Phases	12			Free		
Permitted Phases						
Actuated Green, G (s)	9.1			70.0		
Effective Green, g (s)	9.1			70.0		
Actuated g/C Ratio	0.13			1.00		
Clearance Time (s)	14.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	247			1845		
v/s Ratio Prot	c0.06			0.11		
v/s Ratio Perm						
v/c Ratio	0.43			0.11		
Uniform Delay, d1	28.1			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	1.2			0.1		
Delay (s)	29.3			0.1		
Level of Service	C			A		
Approach Delay (s)	29.3			0.1	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Vol, veh/h	0	46	40	16	0	7	95	56	0	37	43	5	0	32	78	76
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	14	14	14	2	7	7	7	2	6	6	6	2	3	3	3
Mvmt Flow	0	56	49	20	0	12	158	93	0	40	47	5	0	40	97	95
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	9.6	11.3	9.5	10.2
HCM LOS	A	B	A	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	90%	0%	71%	0%	63%	0%	51%
Vol Right, %	0%	10%	0%	29%	0%	37%	0%	49%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	37	48	46	56	7	151	32	154
LT Vol	37	0	46	0	7	0	32	0
Through Vol	0	43	0	40	0	95	0	78
RT Vol	0	5	0	16	0	56	0	76
Lane Flow Rate	40	52	56	68	12	252	40	192
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.073	0.086	0.102	0.11	0.02	0.376	0.069	0.286
Departure Headway (Hd)	6.542	5.963	6.521	5.814	6.142	5.376	6.308	5.455
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	550	604	553	620	577	662	571	662
Service Time	4.25	3.67	4.225	3.518	3.938	3.172	4.008	3.155
HCM Lane V/C Ratio	0.073	0.086	0.101	0.11	0.021	0.381	0.07	0.29
HCM Control Delay	9.8	9.2	10	9.2	9.1	11.4	9.5	10.3
HCM Lane LOS	A	A	A	A	A	B	A	B
HCM 95th-tile Q	0.2	0.3	0.3	0.4	0.1	1.7	0.2	1.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	102	3	1	207	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	1	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	71	71	60	60
Heavy Vehicles, %	12	0	0	4	0	0
Mvmt Flow	119	3	1	292	3	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	122	0	269	120
Stage 1	-	-	-	-	120	-
Stage 2	-	-	-	-	149	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1478	-	714	937
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	869	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1478	-	713	937
Mov Cap-2 Maneuver	-	-	-	-	713	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	868	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	713	-	-	1478	-
HCM Lane V/C Ratio	0.005	-	-	0.001	-
HCM Control Delay (s)	10.1	-	-	7.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	0	1	0	0	3	2	80	0	0	94	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	81	81	81	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	3	0	2	0	0	5	2	99	0	0	125	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	236	234	130	235	239	99	135	0	0	99	0	0
Stage 1	130	130	-	104	104	-	-	-	-	-	-	-
Stage 2	106	104	-	131	135	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	723	670	925	724	666	962	1462	-	-	1507	-	-
Stage 1	878	792	-	907	813	-	-	-	-	-	-	-
Stage 2	905	813	-	877	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	719	669	925	722	665	962	1462	-	-	1507	-	-
Mov Cap-2 Maneuver	719	669	-	722	665	-	-	-	-	-	-	-
Stage 1	877	792	-	906	812	-	-	-	-	-	-	-
Stage 2	899	812	-	875	789	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	8.8	0.2	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1462	-	-	777	962	1507	-	-
HCM Lane V/C Ratio	0.002	-	-	0.006	0.005	-	-	-
HCM Control Delay (s)	7.5	0	-	9.7	8.8	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	0	2	1	0	5	0	76	0	1	94	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	82	82	82	72	72	72
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	5	0
Mvmt Flow	2	0	3	2	0	8	0	93	0	1	131	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	230	226	131	228	226	93	131	0	0	93	0	0
Stage 1	133	133	-	93	93	-	-	-	-	-	-	-
Stage 2	97	93	-	135	133	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	729	677	924	731	677	970	1467	-	-	1514	-	-
Stage 1	875	790	-	919	822	-	-	-	-	-	-	-
Stage 2	914	822	-	873	790	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	722	676	924	728	676	970	1467	-	-	1514	-	-
Mov Cap-2 Maneuver	722	676	-	728	676	-	-	-	-	-	-	-
Stage 1	875	789	-	919	822	-	-	-	-	-	-	-
Stage 2	906	822	-	869	789	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	9	0	0.1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1467	-	-	845	919	1514	-	-
HCM Lane V/C Ratio	-	-	-	0.006	0.011	0.001	-	-
HCM Control Delay (s)	0	-	-	9.3	9	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↑						↑↑	↱
Volume (vph)	0	76	29	0	26	0	0	0	0	0	1296	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0	9.0		6.0						6.4	6.4
Lane Util. Factor		1.00	1.00		1.00						0.95	1.00
Frt		1.00	0.85		1.00						1.00	0.85
Flt Protected		1.00	1.00		1.00						1.00	1.00
Satd. Flow (prot)		1863	1583		1727						3438	1538
Flt Permitted		1.00	1.00		1.00						1.00	1.00
Satd. Flow (perm)		1863	1583		1727						3438	1538
Peak-hour factor, PHF	0.67	0.67	0.67	0.64	0.64	0.64	0.92	0.92	0.92	0.85	0.85	0.85
Adj. Flow (vph)	0	113	43	0	41	0	0	0	0	0	1525	33
RTOR Reduction (vph)	0	0	34	0	0	0	0	0	0	0	0	14
Lane Group Flow (vph)	0	113	9	0	41	0	0	0	0	0	1525	19
Heavy Vehicles (%)	2%	2%	2%	10%	10%	10%	2%	2%	2%	5%	5%	5%
Turn Type		NA	Perm		NA						NA	Perm
Protected Phases		4			8						6	
Permitted Phases			4									6
Actuated Green, G (s)		14.9	14.9		17.9						39.7	39.7
Effective Green, g (s)		14.9	14.9		17.9						39.7	39.7
Actuated g/C Ratio		0.21	0.21		0.26						0.57	0.57
Clearance Time (s)		9.0	9.0		6.0						6.4	6.4
Vehicle Extension (s)		3.0	3.0		3.0						0.2	0.2
Lane Grp Cap (vph)		396	336		441						1949	872
v/s Ratio Prot		c0.06			0.02						c0.44	
v/s Ratio Perm			0.01									0.01
v/c Ratio		0.29	0.03		0.09						0.78	0.02
Uniform Delay, d1		23.1	21.8		19.9						11.8	6.6
Progression Factor		0.00	0.00		0.00						1.00	1.00
Incremental Delay, d2		0.3	0.0		0.1						3.2	0.0
Delay (s)		0.3	0.0		0.1						15.0	6.7
Level of Service		A	A		A						B	A
Approach Delay (s)		0.3			0.1			0.0			14.8	
Approach LOS		A			A			A			B	

Intersection Summary

HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑	↱		↑↑	↱			
Volume (vph)	0	76	0	0	26	124	0	953	172	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			9.0	9.0		6.4	6.4			
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (prot)		1863			1727	1468		3374	1509			
Flt Permitted		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (perm)		1863			1727	1468		3374	1509			
Peak-hour factor, PHF	0.67	0.67	0.67	0.64	0.64	0.64	0.88	0.88	0.88	0.92	0.92	0.92
Adj. Flow (vph)	0	113	0	0	41	194	0	1083	195	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	63	0	0	84	0	0	0
Lane Group Flow (vph)	0	113	0	0	41	131	0	1083	111	0	0	0
Heavy Vehicles (%)	2%	2%	2%	10%	10%	10%	7%	7%	7%	2%	2%	2%
Turn Type		NA			NA	Perm		NA	Perm			
Protected Phases		8			4			2				
Permitted Phases						4			2			
Actuated Green, G (s)		17.9			14.9	14.9		39.7	39.7			
Effective Green, g (s)		17.9			14.9	14.9		39.7	39.7			
Actuated g/C Ratio		0.26			0.21	0.21		0.57	0.57			
Clearance Time (s)		6.0			9.0	9.0		6.4	6.4			
Vehicle Extension (s)		3.0			3.0	3.0		0.2	0.2			
Lane Grp Cap (vph)		476			367	312		1913	855			
v/s Ratio Prot		0.06			0.02			c0.32				
v/s Ratio Perm						c0.09			0.07			
v/c Ratio		0.24			0.11	0.42		0.57	0.13			
Uniform Delay, d1		20.6			22.2	23.8		9.7	7.1			
Progression Factor		0.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		0.3			0.1	0.9		1.2	0.3			
Delay (s)		0.3			22.3	24.7		10.9	7.4			
Level of Service		A			C	C		B	A			
Approach Delay (s)		0.3			24.3			10.3			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		
Volume (vph)	105	0	0	54	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	14.0			4.0		
Lane Util. Factor	1.00			1.00		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1863			1776		
Flt Permitted	1.00			1.00		
Satd. Flow (perm)	1863			1776		
Peak-hour factor, PHF	0.67	0.67	0.75	0.75	0.92	0.92
Adj. Flow (vph)	157	0	0	72	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	157	0	0	72	0	0
Heavy Vehicles (%)	2%	2%	7%	7%	2%	2%
Turn Type	NA			NA		
Protected Phases	12			Free		
Permitted Phases						
Actuated Green, G (s)	9.9			70.0		
Effective Green, g (s)	9.9			70.0		
Actuated g/C Ratio	0.14			1.00		
Clearance Time (s)	14.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	263			1776		
v/s Ratio Prot	c0.08			0.04		
v/s Ratio Perm						
v/c Ratio	0.60			0.04		
Uniform Delay, d1	28.2			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	3.6			0.0		
Delay (s)	31.8			0.0		
Level of Service	C			A		
Approach Delay (s)	31.8			0.0	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Vol, veh/h	0	60	135	40	0	4	79	36	0	36	23	5	0	39	46	26
Peak Hour Factor	0.92	0.72	0.72	0.72	0.92	0.66	0.66	0.66	0.92	0.68	0.68	0.68	0.92	0.73	0.73	0.73
Heavy Vehicles, %	2	9	9	9	2	11	11	11	2	5	5	5	2	7	7	7
Mvmt Flow	0	83	188	56	0	6	120	55	0	53	34	7	0	53	63	36
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	10.9	10.5	9.8	9.9
HCM LOS	B	B	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	82%	0%	77%	0%	69%	0%	64%
Vol Right, %	0%	18%	0%	23%	0%	31%	0%	36%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	28	60	175	4	115	39	72
LT Vol	36	0	60	0	4	0	39	0
Through Vol	0	23	0	135	0	79	0	46
RT Vol	0	5	0	40	0	36	0	26
Lane Flow Rate	53	41	83	243	6	174	53	99
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.099	0.07	0.14	0.364	0.011	0.273	0.099	0.162
Departure Headway (Hd)	6.722	6.089	6.17	5.504	6.371	5.645	6.662	5.9
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	535	590	585	659	564	638	540	611
Service Time	4.436	3.803	3.87	3.204	4.089	3.362	4.374	3.613
HCM Lane V/C Ratio	0.099	0.069	0.142	0.369	0.011	0.273	0.098	0.162
HCM Control Delay	10.2	9.3	9.9	11.3	9.2	10.5	10.1	9.8
HCM Lane LOS	B	A	A	B	A	B	B	A
HCM 95th-tile Q	0.3	0.2	0.5	1.7	0	1.1	0.3	0.6

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	232	16	4	137	13	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	1	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	72	72	60	60	60	60
Heavy Vehicles, %	5	0	0	9	0	0
Mvmt Flow	322	22	7	228	22	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	344	0	461	333
Stage 1	-	-	-	-	333	-
Stage 2	-	-	-	-	128	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1226	-	548	713
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	890	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1226	-	544	713
Mov Cap-2 Maneuver	-	-	-	-	544	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	884	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	569	-	-	1226	-
HCM Lane V/C Ratio	0.047	-	-	0.005	-
HCM Control Delay (s)	11.6	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	1	1	0	5	0	59	0	5	85	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	0	0	0	33	33	33	2	2	2	3	3	3
Mvmt Flow	0	0	2	2	0	8	0	98	0	8	142	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	261	256	142	257	256	98	142	0	0	98	0	0
Stage 1	158	158	-	98	98	-	-	-	-	-	-	-
Stage 2	103	98	-	159	158	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.43	6.83	6.53	4.12	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.43	5.83	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.43	5.83	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.797	4.297	3.597	2.218	-	-	2.227	-	-
Pot Cap-1 Maneuver	696	651	911	637	598	880	1441	-	-	1489	-	-
Stage 1	849	771	-	838	757	-	-	-	-	-	-	-
Stage 2	908	818	-	775	712	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	686	647	911	633	594	880	1441	-	-	1489	-	-
Mov Cap-2 Maneuver	686	647	-	633	594	-	-	-	-	-	-	-
Stage 1	849	766	-	838	757	-	-	-	-	-	-	-
Stage 2	899	818	-	769	708	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9	9.4	0	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1441	-	-	911	826	1489	-	-
HCM Lane V/C Ratio	-	-	-	0.002	0.012	0.006	-	-
HCM Control Delay (s)	0	-	-	9	9.4	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	0	0	1	59	1	5	82	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	5	5	5
Mvmt Flow	0	0	0	0	0	0	2	98	2	6	104	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	219	219	104	219	219	99	104	0	0	100	0	0
Stage 1	116	116	-	103	103	-	-	-	-	-	-	-
Stage 2	103	103	-	116	116	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.245	-	-
Pot Cap-1 Maneuver	737	679	951	737	679	957	1488	-	-	1474	-	-
Stage 1	889	800	-	903	810	-	-	-	-	-	-	-
Stage 2	903	810	-	889	800	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	734	676	951	734	676	957	1488	-	-	1474	-	-
Mov Cap-2 Maneuver	734	676	-	734	676	-	-	-	-	-	-	-
Stage 1	888	797	-	902	809	-	-	-	-	-	-	-
Stage 2	902	809	-	885	797	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0.1	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1488	-	-	-	-	1474	-	-
HCM Lane V/C Ratio	0.001	-	-	-	-	0.004	-	-
HCM Control Delay (s)	7.4	0	-	0	0	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	-	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↑						↑↑	↱
Volume (vph)	0	49	33	0	86	0	0	0	0	0	1037	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0	9.0		6.0						6.4	6.4
Lane Util. Factor		1.00	1.00		1.00						0.95	1.00
Frt		1.00	0.85		1.00						1.00	0.85
Flt Protected		1.00	1.00		1.00						1.00	1.00
Satd. Flow (prot)		1900	1615		1845						3471	1553
Flt Permitted		1.00	1.00		1.00						1.00	1.00
Satd. Flow (perm)		1900	1615		1845						3471	1553
Peak-hour factor, PHF	0.76	0.76	0.76	0.65	0.65	0.65	0.92	0.92	0.92	0.84	0.84	0.84
Adj. Flow (vph)	0	64	43	0	132	0	0	0	0	0	1235	76
RTOR Reduction (vph)	0	0	34	0	0	0	0	0	0	0	0	32
Lane Group Flow (vph)	0	64	9	0	132	0	0	0	0	0	1235	44
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	4%	4%	4%
Turn Type		NA	Perm		NA						NA	Perm
Protected Phases		4			8						6	
Permitted Phases			4									6
Actuated Green, G (s)		14.2	14.2		17.2						40.4	40.4
Effective Green, g (s)		14.2	14.2		17.2						40.4	40.4
Actuated g/C Ratio		0.20	0.20		0.25						0.58	0.58
Clearance Time (s)		9.0	9.0		6.0						6.4	6.4
Vehicle Extension (s)		3.0	3.0		3.0						0.2	0.2
Lane Grp Cap (vph)		385	327		453						2003	896
v/s Ratio Prot		0.03			c0.07						c0.36	
v/s Ratio Perm			0.01									0.03
v/c Ratio		0.17	0.03		0.29						0.62	0.05
Uniform Delay, d1		23.0	22.4		21.4						9.7	6.4
Progression Factor		0.00	0.00		0.00						1.00	1.00
Incremental Delay, d2		0.2	0.0		0.3						1.4	0.1
Delay (s)		0.2	0.0		0.4						11.1	6.5
Level of Service		A	A		A						B	A
Approach Delay (s)		0.1			0.4			0.0			10.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑	↱		↑↑	↱			
Volume (vph)	0	49	0	0	86	137	0	1275	71	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			9.0	9.0		6.4	6.4			
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (prot)		1900			1845	1568		3539	1583			
Flt Permitted		1.00			1.00	1.00		1.00	1.00			
Satd. Flow (perm)		1900			1845	1568		3539	1583			
Peak-hour factor, PHF	0.76	0.76	0.76	0.65	0.65	0.65	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	64	0	0	132	211	0	1417	79	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	33	0	0	0
Lane Group Flow (vph)	0	64	0	0	132	169	0	1417	46	0	0	0
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type		NA			NA	Perm		NA	Perm			
Protected Phases		8			4			2				
Permitted Phases						4			2			
Actuated Green, G (s)		17.2			14.2	14.2		40.4	40.4			
Effective Green, g (s)		17.2			14.2	14.2		40.4	40.4			
Actuated g/C Ratio		0.25			0.20	0.20		0.58	0.58			
Clearance Time (s)		6.0			9.0	9.0		6.4	6.4			
Vehicle Extension (s)		3.0			3.0	3.0		0.2	0.2			
Lane Grp Cap (vph)		466			374	318		2042	913			
v/s Ratio Prot		0.03			0.07			c0.40				
v/s Ratio Perm						c0.11			0.03			
v/c Ratio		0.14			0.35	0.53		0.69	0.05			
Uniform Delay, d1		20.6			24.0	24.9		10.4	6.4			
Progression Factor		0.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		0.1			0.6	1.7		2.0	0.1			
Delay (s)		0.1			24.5	26.6		12.4	6.5			
Level of Service		A			C	C		B	A			
Approach Delay (s)		0.1			25.8			12.1			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		
Volume (vph)	82	0	0	150	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	14.0			4.0		
Lane Util. Factor	1.00			1.00		
Frt	1.00			1.00		
Flt Protected	1.00			1.00		
Satd. Flow (prot)	1900			1845		
Flt Permitted	1.00			1.00		
Satd. Flow (perm)	1900			1845		
Peak-hour factor, PHF	0.76	0.76	0.74	0.74	0.92	0.92
Adj. Flow (vph)	108	0	0	203	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	108	0	0	203	0	0
Heavy Vehicles (%)	0%	0%	3%	3%	2%	2%
Turn Type	NA			NA		
Protected Phases	12			Free		
Permitted Phases						
Actuated Green, G (s)	9.2			70.0		
Effective Green, g (s)	9.2			70.0		
Actuated g/C Ratio	0.13			1.00		
Clearance Time (s)	14.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	249			1845		
v/s Ratio Prot	c0.06			0.11		
v/s Ratio Perm						
v/c Ratio	0.43			0.11		
Uniform Delay, d1	28.0			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	1.2			0.1		
Delay (s)	29.2			0.1		
Level of Service	C			A		
Approach Delay (s)	29.2			0.1	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Vol, veh/h	0	48	41	16	0	7	96	56	0	37	43	5	0	32	78	78
Peak Hour Factor	0.92	0.82	0.82	0.82	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	14	14	14	2	7	7	7	2	6	6	6	2	3	3	3
Mvmt Flow	0	59	50	20	0	12	160	93	0	40	47	5	0	40	97	97
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	9.6	11.4	9.5	10.2
HCM LOS	A	B	A	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	90%	0%	72%	0%	63%	0%	50%
Vol Right, %	0%	10%	0%	28%	0%	37%	0%	50%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	37	48	48	57	7	152	32	156
LT Vol	37	0	48	0	7	0	32	0
Through Vol	0	43	0	41	0	96	0	78
RT Vol	0	5	0	16	0	56	0	78
Lane Flow Rate	40	52	59	70	12	253	40	195
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.073	0.087	0.106	0.113	0.02	0.379	0.069	0.291
Departure Headway (Hd)	6.564	5.984	6.534	5.83	6.256	5.491	6.327	5.469
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	548	602	551	618	576	659	570	661
Service Time	4.273	3.693	4.24	3.536	3.956	3.191	4.027	3.169
HCM Lane V/C Ratio	0.073	0.086	0.107	0.113	0.021	0.384	0.07	0.295
HCM Control Delay	9.8	9.3	10	9.3	9.1	11.5	9.5	10.4
HCM Lane LOS	A	A	A	A	A	B	A	B
HCM 95th-tile Q	0.2	0.3	0.4	0.4	0.1	1.8	0.2	1.2

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	99	21	11	200	23	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	1	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	71	71	60	60
Heavy Vehicles, %	12	0	0	4	0	0
Mvmt Flow	115	24	15	282	38	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	140	0	299	127
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	172	-
Critical Hdwy	-	-	4.1	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1456	-	685	929
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	847	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1456	-	677	929
Mov Cap-2 Maneuver	-	-	-	-	677	-
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	837	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	717	-	-	1456	-
HCM Lane V/C Ratio	0.067	-	-	0.011	-
HCM Control Delay (s)	10.4	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	0	4	0	0	3	2	80	0	0	91	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	81	81	81	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	4	0	0	5	0
Mvmt Flow	3	0	7	0	0	5	2	99	0	0	121	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	234	232	128	235	239	99	135	0	0	99	0	0
Stage 1	128	128	-	104	104	-	-	-	-	-	-	-
Stage 2	106	104	-	131	135	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	725	672	927	724	666	962	1462	-	-	1507	-	-
Stage 1	881	794	-	907	813	-	-	-	-	-	-	-
Stage 2	905	813	-	877	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	721	671	927	718	665	962	1462	-	-	1507	-	-
Mov Cap-2 Maneuver	721	671	-	718	665	-	-	-	-	-	-	-
Stage 1	880	794	-	906	812	-	-	-	-	-	-	-
Stage 2	899	812	-	871	789	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	8.8	0.2	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1462	-	-	846	962	1507	-	-
HCM Lane V/C Ratio	0.002	-	-	0.012	0.005	-	-	-
HCM Control Delay (s)	7.5	0	-	9.3	8.8	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	0	3	1	0	5	4	73	0	1	94	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	82	82	82	72	72	72
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	5	0
Mvmt Flow	7	0	5	2	0	8	5	89	0	1	131	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	236	232	131	235	232	89	131	0	0	89	0	0
Stage 1	133	133	-	99	99	-	-	-	-	-	-	-
Stage 2	103	99	-	136	133	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	723	672	924	724	672	975	1467	-	-	1519	-	-
Stage 1	875	790	-	912	817	-	-	-	-	-	-	-
Stage 2	908	817	-	872	790	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	714	669	924	717	669	975	1467	-	-	1519	-	-
Mov Cap-2 Maneuver	714	669	-	717	669	-	-	-	-	-	-	-
Stage 1	872	789	-	908	814	-	-	-	-	-	-	-
Stage 2	897	814	-	866	789	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.6	9	0.4	0.1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1467	-	-	791	920	1519	-	-
HCM Lane V/C Ratio	0.003	-	-	0.015	0.011	0.001	-	-
HCM Control Delay (s)	7.5	0	-	9.6	9	7.4	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

April 22, 2015
2150304

Mr. Dennis Cole, P.E.
Development Coordinator
Ottawa County Water Resources Commissioner
12220 Fillmore Street, Room 141
West Olive, MI 49460

RE: Flagstar Bank
Grand Haven Charter Township – Section 4

Dear Dennis:

Our office has reviewed the submittal from Nederveld, Inc. (last drawing date of March 24, 2015) for the subject project. The following are our comments regarding the project:

1. The proposed project includes removal of existing parking and building and construction of the proposed building and new parking and access lanes. The work is to occur over 1.4 acres. The site lies within the Vincent Drain drainage district. The Vincent Drain is located along the western property line of the site within the MDOT ROW.

2. No calculations were submitted with the drawings and no detention appears to exist on the current site or included with the proposed improvements to meet the OCWRC requirements. It appears that the proposed site has less impervious area than the existing site but we are also aware that there are issues with flooding along the Vincent Drain. Providing detention on site is recommended. There may be potential for improving and expanding the existing area in the northwest corner or providing for this detention on the southern portion of the site.

3. The review fees for the project are $600 based on current OCWRC fees and $100 Administrative fee. It is our understanding that your office has received this payment with the permit application. Please note that additional fees may be charged for continuing services according to the Standards and Specifications of OCWRC.

4. A Drain Use permit may be required as it appears there will not be a direct connection to the Vincent Drain.

5. A Soil Erosion and Sedimentation permit may be required for this site as the proposed disturbed area appears to be near the 1 acre or may be within 500 feet of a lake, stream, or drain.

Based on the above, we recommend that your office grant drainage approval once the above items are completed to your satisfaction. If you have any questions with regard to the above, please call me.

Sincerely,

Prein&Newhof

Kevin S. Kieft, P.E.

KSK/kk

cc: Mr. Jack Barr, P.E., Nederveld Engineering

P.S. The above letter was prepared to assist the Ottawa County's Water Resources Commissioner's office in their review of this Project's Storm Water Management Plan. It is not an approval and is not to be used by anyone as the Water Resources Commissioner's Approval Letter.

Ottawa County Road Commission

14110 Lakeshore Drive
P.O. Box 739
GRAND HAVEN, MI 49417
Phone (616) 842-5400 Fax (616) 850-7237

April 9, 2015

Mr. Jack Barr
Nederveld Associate
217 Grandville Ave Suite 302
Grand Rapids Mi 49503

RE: Flagstar
17250 Hayes St
Section 4, Grand Haven Township

Dear Mr. Jack Barr

I have reviewed the site plan for Flagstar. It looks like there is no work being done in the county right of way. There will not be permit needed for this project.

If you have any questions, please contact me at (616) 842-5400

Sincerely,

Jody Carter
Permit Aide