

**GENOA CHARTER TOWNSHIP
PLANNING COMMISSION PUBLIC HEARING
APRIL 14, 2025
MONDAY
6:30 P.M.
AGENDA**

CALL TO ORDER:

PLEDGE OF ALLEGIANCE:

APPROVAL OF AGENDA:

DECLARATION OF CONFLICT OF INTEREST:

CALL TO THE PUBLIC: *(Note: The Board reserves the right to not begin new business after 10:00 p.m.)*

OPEN PUBLIC HEARING #1... Consideration of a special land use application, site plan and environmental impact assessment for the proposed redevelopment of 3600 Grand River Avenue including 3 new buildings: a credit union with 3 drive-through lanes and an ATM lane; a multi-tenant commercial building with a drive-through restaurant and outdoor seating; and a larger commercial building at the rear of the site. The property (parcel# 4711-05-400-004) is located on the south side of Grand River Avenue, East of Grand Oaks Drive. The request is submitted by KN West, LLC.

- A. Recommendation of Special Land Use Application
- B. Recommendation of Environmental Impact Assessment (3-24-25)
- C. Recommendation of Site Plan Review (3-24-25)

OPEN PUBLIC HEARING #2... Consideration of sketch plan for the proposed relocation of an existing stand-alone ATM with a drive-up lane located at 3599 E. Grand River Avenue, north side of Grand River Avenue, west of Latson Road. The request is petitioned by Symmetry Management.

- A. Disposition of Sketch Plan (3-13-25)

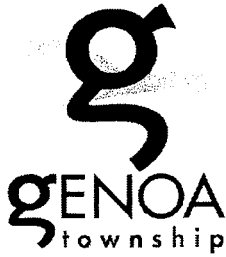
OPEN PUBLIC HEARING #3... (REQUEST TO BE POSTPONED TO THE MAY 12, 2025 PLANNING COMMISSION MEETING) Consideration of a Zoning Ordinance text, amendments to Article 13 entitled "Environmental Protection Regulations".

- A. Recommendation of Zoning Ordinance Amendments to Article 13 entitled "Environmental Protection Regulations".

ADMINISTRATIVE BUSINESS:

- Staff Report
- Annual Report
- Approval of the March 10, 2025 minutes
- Member discussion
- Adjournment

<p><small>*Citizen's Comments- In addition to providing the public with an opportunity to address the Township Board at the beginning of the meeting, opportunity to comment on individual agenda items may be offered by the Chairman as they are presented. Anyone speaking on an agenda item will be limited to 2 minutes.</small></p>



GENOA CHARTER TOWNSHIP
Application for Site Plan Review

TO THE GENOA TOWNSHIP PLANNING COMMISSION AND TOWNSHIP BOARD:

APPLICANT NAME & ADDRESS: KN West, LLC 29500 Telegraph Road, Ste 550, Southfield MI 48034
If applicant is not the owner, a letter of Authorization from Property Owner is needed.

OWNER'S NAME & ADDRESS: KN West, LLC 29500 Telegraph Road, Ste 550, Southfield MI 48034

SITE ADDRESS: 3600 E Grand River Ave PARCEL #(s): 4711-05-400-004

APPLICANT PHONE: (248) 755-7727 OWNER PHONE: (248) 755-7727

OWNER EMAIL: darrennaimi@yahoo.com

LOCATION AND BRIEF DESCRIPTION OF SITE: Site is located on the south side of Grand River
immediately west of the existing Speedway gas station and south of the Grand River Plaza shopping
center. The site currently contains a development of an unoccupied building and infrastructure.

BRIEF STATEMENT OF PROPOSED USE: The existing building and infrastructure is proposed to be
removed and the site redeveloped as a single owner development with multiple buildings and uses providing a single
cohesive development project.

THE FOLLOWING BUILDINGS ARE PROPOSED: There are 3 proposed buildings. The building at the
rear of the site will contain a Goodwill as well as an additional 12,000 sft leasable space. The frontage of
the site will contain two new buildings. One is proposed to be a financial institution and the other is a
multi-tenant commercial building with a drive-thru end cap (fast casual).

**I HEREBY CERTIFY THAT ALL INFORMATION AND DATA ATTACHED TO AND MADE
PART OF THIS APPLICATION IS TRUE AND ACCURATE TO THE BEST OF MY
KNOWLEDGE AND BELIEF.**

BY: 

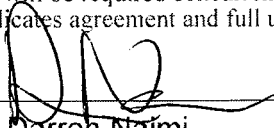
ADDRESS: 29500 Telegraph Road, Ste 550, Southfield MI 48034

Contact Information - Review Letters and Correspondence shall be forwarded to the following:

I.) Scott Tousignant, PE of Boss Engineering at scottt@bosseng.com
Name Business Affiliation E-mail Address

FEE EXCEEDANCE AGREEMENT

As stated on the site plan review fee schedule, all site plans are allocated two (2) consultant reviews and one (1) Planning Commission meeting. If additional reviews or meetings are necessary, the applicant will be required to pay the actual incurred costs for the additional reviews. If applicable, additional review fee payment will be required concurrent with submittal to the Township Board. By signing below, applicant indicates agreement and full understanding of this policy.

SIGNATURE:  DATE: 2-15-2025
PRINT NAME: Darreh Naïmi PHONE: 248-755-7727
ADDRESS: 29500 Telegraph Rd, Ste 550, Southfield MI 48034



GENOA CHARTER TOWNSHIP Special Land Use Application

This application **must** be accompanied by a site plan review application and the associated submittal requirements. (The Zoning Official may allow a less detailed sketch plan for a change in use.)

APPLICANT NAME & ADDRESS: KN West, LLC 29500 Telegraph Road, Ste 550, Southfield, MI 48034
Submit a letter of Authorization from Property Owner if application is signed by Acting Agent.

APPLICANT PHONE: (248) 755-7727 EMAIL: darrennaimi@yahoo.com

OWNER NAME & ADDRESS: KN West, LLC 29500 Telegraph Road, Ste 550, Southfield, MI 48034

SITE ADDRESS: 3600 E Grand River Ave PARCEL #(s): 4711-05-400-004

OWNER PHONE: (248) 755-7727 EMAIL: darrennaimi@yahoo.com

Location and brief description of site and surroundings:

Site is located on the south side of Grand River immediately west of the existing Speedway gas station and south of the Grand River Plaza shopping center. The site currently contains a development of an unoccupied building and associated infrastructure. The site is zoned RCD with RCD zonings to the north, east, and west of the site. There is a mixed use pud to the south, and one industrial zoning to the west.

Proposed Use:

Proposed multi building (single owner) development for a financial institution, multi-tenant commercial building with drive thru, and a large commercial building at the rear of the site proposed to contain a Goodwill and another 12,000 sft leasable space.

Describe how your request meets the Zoning Ordinance General Review Standards (section 19.03):

- a. Describe how the use will be compatible and in accordance with the goals, objectives, and policies of the Genoa Township Comprehensive Plan and subarea plans, and will promote the Statement of Purpose of the zoning district in which the use is proposed.

The proposed use will still have a commercial identity and promote internal revenue and jobs within the Township. It will revitalize an existing developed site on Grand River, which will further enhance the Grand River corridor that is seeing other development projects.

- b. Describe how the use will be designed, constructed, operated, and maintained to be compatible with, and not significantly alter, the existing or intended character of the general vicinity.

The proposed uses will provide a variety of uses, all commercial in nature which is consistent with the zoning ordinance. The uses are consistent with its surrounding uses which are nearly all zoned RCD as well, with the exception of the Mixed Use PUD to the south and 1 industrial parcel top the west. This site will promote cross connection and circulation with adjacent developments.

- c. How will the use be served adequately by essential public facilities and services such as highways, streets, police and fire protection, drainage structures, water and sewage facilities, refuse disposal and schools?

The site currently has access to Grand River Ave. An improved site access will be provided, lined up with the existing Grand River Plaza drive side opposite to provide a safer traffic pattern. Existing public sewer and water exists at the frontage of the site and will be extended as necessary to service the development. The site will be designed to accommodate fire truck circulation. and has adequate pedestrian access.

- d. Will the use involve any uses, activities, processes, or materials potentially detrimental to the natural environment, public health, safety, or welfare by reason of excessive production of traffic, noise, vibration, smoke, fumes, odors, glare, or other such nuisance? If so, how will the impacts be mitigated?

The proposed use will provide adequate stacking spaces for the drive-thru to ensure no impact on Grand River traffic. The site lighting will be designed in compliance with Twp Ordinance to ensure no excess lighting. The site will not generate odors, smoke, fumes, or vibration.

- e. Does the use have specific criteria as listed in the Zoning Ordinance (sections 3.03.02, 7.02.02, & 8.02.02)? If so, describe how the criteria are met.

7.02.02(j) (1) Building is set back 90' from the Right of Way. (2) Site is within 500' of the Arby's Drive Thru. A variance will be sought.

(3) Only 1 access to the street has been provided. (4) A direct vehicular access is shown to the Speedway.

7.02.02(m) Only 1 ingress/egress driveway on the street is proposed.

I HEREBY CERTIFY THAT ALL INFORMATION AND DATA ATTACHED TO AND MADE PART OF THIS APPLICATION ARE TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF. I AGREE TO DESIGN, CONSTRUCT AND OPERATE, AND MAINTAIN THESE PREMISES AND THE BUILDINGS, STRUCTURES, AND FACILITIES WHICH ARE GOVERNED BY THIS PERMIT IN ACCORDANCE WITH THE STATED REQUIREMENTS OF THE GENOA TOWNSHIP ZONING ORDINANCE, AND SUCH ADDITIONAL LIMITS AND SAFEGUARDS AS MAY BE MADE A PART OF THIS PERMIT.

THE UNDERSIGNED Darren Naimi STATES THAT THEY ARE THE FREE OWNER OF THE PROPERTY OF PROPERTIES DESCRIBED ABOVE AND MAKES APPLICATION FOR THIS SPECIAL LAND USE PERMIT.

BY: 

ADDRESS: 29500 Telegraph Road, Ste 550, Southfield, MI 48034

Contact Information - Review Letters and Correspondence shall be forwarded to the following:

Scott Tousignant, PE of Boss Engineering at scottt@bosseng.com
Name Business Affiliation Email

FEE EXCEEDANCE AGREEMENT

As stated on the site plan review fee schedule, all site plans are allocated two (2) consultant reviews and one (1) Planning Commission meeting. If additional reviews or meetings are necessary, the applicant will be required to pay the actual incurred costs for the additional reviews. If applicable, additional review fee payment will be required concurrent with submittal to the Township Board. By signing below, applicant indicates agreement and full understanding of this policy.

SIGNATURE: 

DATE: 2-15-2025

PRINT NAME: Darren Naimi

PHONE: 248-755-7727



April 8, 2025

Planning Commission
Genoa Township
2911 Dorr Road
Brighton, Michigan 48116

Attention:	Amy Ruthig, Planning Director
Subject:	3600 E. Grand River Redevelopment – Special Land Use and Site Plan Review #2
Location:	3600 E. Grand River Avenue – south side of Grand River, east of Grand Oaks Drive
Zoning:	RCD Regional Commercial District

Dear Commissioners:

At the Township's request, we have reviewed the revised submittal materials (plans dated 3/24/25) proposing redevelopment of the former Salvation Army property at 3600 E. Grand River Avenue.

We have reviewed the proposal in accordance with the applicable provisions of the Genoa Township Zoning Ordinance, as follows:

A. Summary

1. Section 19.03 General Special Land Use Standards:

- a. The standards of Section 19.03 are generally met, provided:
 - i. the use conditions of Section 7.02.02 are met to the Commission's satisfaction regarding compatibility and impacts; and
 - ii. the applicant addresses comments from the Township Engineer or Brighton Area Fire Authority regarding public facilities and services.

2. Section 7.02.02(i) Use Conditions (Outdoor Seating):

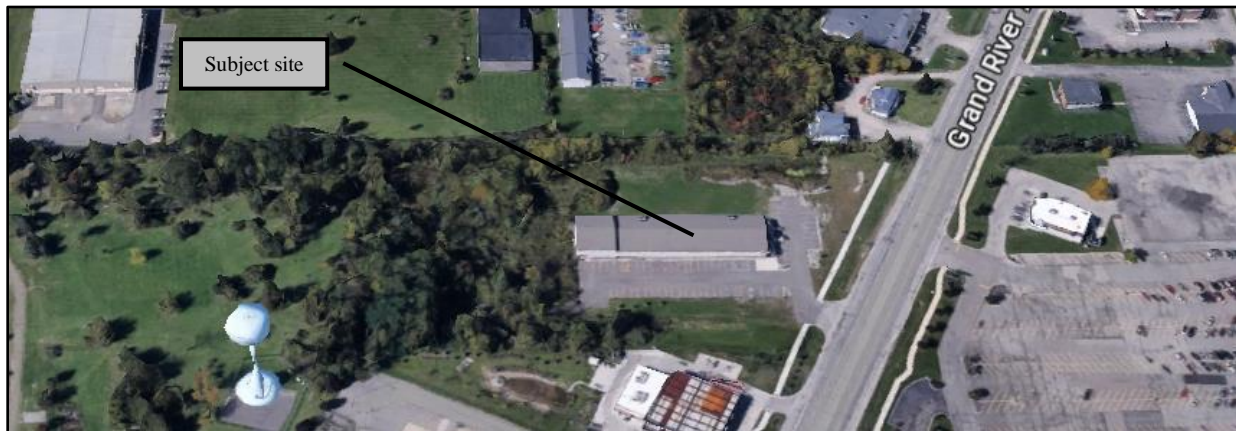
- a. The revised submittal demonstrates compliance with these conditions.

3. Section 7.02.02(j) Use Conditions (Drive-through Restaurant):

- a. The 500' spacing between drive-through restaurants is not met.
- b. The developer is coordinating a cross-access drive with the owner of the adjacent to the east.

4. Site Plan Review:

- a. We request the applicant present material and color samples to the Commission at the upcoming meeting.
- b. The circulation plan depicts 2 points where semi-truck/trailers may encroach into landscaped areas.
- c. Deliveries and refuse removal will need to be scheduled such that they do not disrupt traffic circulation.
- d. The applicant must obtain a separate sign permit prior to the installation of any signage.



Aerial view of site and surroundings (looking west)

B. Proposal/Process

The applicant requests special land use and site plan review/approval to redevelop the commercial property at 3600 E. Grand River Avenue.

More specifically, the proposal includes 3 new buildings: a credit union with 3 drive-through lanes and an ATM lane; a multi-tenant commercial building with a drive-through restaurant and outdoor seating; and a larger commercial building at the rear of the site that is intended for use by Goodwill.

Procedurally, the Planning Commission is to review the special land use, site plan, and Environmental Impact Assessment and put forth a recommendation on each to the Township Board.

C. Special Land Use Review

Section 19.03 of the Zoning Ordinance identifies the review criteria for Special Land Use applications as follows:

- 1. Master Plan.** The Township Master Plan identifies the subject site as Mixed Use – West Grand River.

This classification states that “regional commercial uses, such as auto-oriented uses (including fast-food) are only intended at interchange uses and where otherwise currently existing along Grand River Avenue.”

The subject site is located on Grand River (and within close proximity to an interchange) and there are other auto-oriented uses (gas station and drive-through restaurant) in the immediate area.

Accordingly, the Commission may find that the proposal is consistent with the Master Plan and Future Land Use Map.

- 2. Compatibility.** As the main commercial arterial roadway through the Township, Grand River Avenue is developed with a variety of office, retail, and service uses.

The combination of uses proposed for the subject site is generally consistent with the established character of the area/corridor, including auto-oriented uses in this particular area.

With that being said, the use conditions of Section 7.02.02 are intended to help ensure compatibility.

In order to make a favorable finding under this criterion, these conditions must be met to the Commission's satisfaction.

- 3. Public Facilities and Services.** As a previously developed site along the main commercial arterial roadway through the Township, we anticipate that necessary public facilities and services are already in place.

However, the applicant must address any comments provided by the Township Engineer and/or Brighton Area Fire Authority related to this criterion.

- 4. Impacts.** Similar to the comment above, the use conditions of Section 7.02.02 are intended to limit impacts of the proposal upon the site and surrounding properties.

Provided these conditions are met to the Commission's satisfaction, surrounding properties are not expected to be adversely impacted by the proposal.

- 5. Mitigation.** If further comments/concerns arise as part of the review process, the Township may require additional efforts to mitigate potential adverse impacts of the proposal.

D. Use Conditions

Restaurants with outdoor seating are subject to the use conditions of Section 7.02.02(i), as follows:

- 1. All trash containers shall be provided outside. Both recycle bins and trash receptacles shall be provided.**

The revised plan includes trash and recycling receptacles for the outdoor seating area.

- 2. For open front restaurants with window service, all signs for an open front window placed on the building shall be flat; and interior signs visible to patrons through glass or an opening shall not exceed twenty-five percent (25%) of that area.**

The revised submittal notes that window service to the outdoor seating area is not proposed.

- 3. Additional parking shall be provided for outdoor seating and standing areas.**

The parking calculations on Sheet 5 include the outdoor seating area, as required.

- 4. Outdoor noise shall not be greater than that commonly associated with a restaurant. The Township Board may place restriction on outdoor speakers or hours of operation to control the noise.**

The revised submittal notes hours of operation as 8am to 10pm and indicates that no outdoor speakers are proposed for the outdoor seating area.

- 5. The Zoning Administrator shall approve a land use permit for any outdoor seating including a sketch plan illustrating seating areas, enclosures/railings, sufficient off-street parking and lighting.**

The revised site plan demonstrates compliance with these conditions, though an administrative land use permit will be required as part of the construction process.

E. Use Conditions

Drive-through restaurants are subject to the use conditions of Section 7.02.02(j), as follows:

- 1. Principal and accessory buildings shall be setback fifty (50) feet from any adjacent public right of way line or property line.**

This standard is met.

- 2. The establishment of a new drive-through restaurant shall require the lot be separated a minimum of five hundred (500) feet from any other lot containing a drive-through restaurant.**

There is an Arby's restaurant with a drive-through northeast of the subject site that is within 500 feet. The applicant indicates that they will seek a variance from ZBA; however, it is worth noting that the Township is in the process of amending this section of the Ordinance to give the Planning Commission discretion to modify this standard.

In our opinion, the applicant would be better served to wait until such time as the Ordinance amendment is adopted (rather than seek ZBA approval).

- 3. Only one (1) access shall be provided onto any street.**

This standard is met.

- 4. Such restaurants constructed adjacent to other commercial developments shall have a direct vehicular access connection where possible.**

The plan includes a "potential" driveway connection with the adjacent gas station to the east. The revised submittal materials note that the developer is coordinating this effort with the owner of the adjacent gas station.

F. Site Plan Review

- 1. Dimensional Requirements.** The proposal complies with the dimensional requirements of the RCD, as follows:

	Min. Lot Req.		Minimum Yard Setbacks (feet)				Max. Lot Coverage (%)	Max. Height
	Area (acres)	Width (feet)	Front Yard	Side Yard	Rear Yard	Parking Lot		
RCD	2	200	70	20	50	20 front 10 side/rear	35% building 75% impervious	45' 3 stories
Proposal	5.47	389	80.5	50 (E) 38.6 (W)	125.2	25 front 10 side (E) 10 side (W) 94.6 rear	14.9% building 68.3% impervious	29' 1 story

- 2. Building Design and Materials.** The building elevation drawings identify the following primary and accent materials:

- Credit Union building – brick, stone, split-face CMU and metal trim;
- Multi-tenant building – brick, stone, EIFS and metal trim; and
- Goodwill building – brick, EIFS and metal trim.

All 3 buildings utilize an earth tone color scheme, including beige, brown and grays, though the Goodwill building also includes a blue metal band consistent with the company's colors.

Based on the revised submittal, the building material calculations demonstrate compliance with the requirements of Section 12.01.

We request the applicant present material and color samples to the Commission at the upcoming meeting.

3. Pedestrian Circulation. The plan identifies an 8-foot wide bike path, as required by Section 12.05.

A mix of 5-foot and 7-foot wide sidewalks are provided between buildings and parking areas, with crosswalk striping at appropriate locations, including between the public and private walks.

4. Vehicular Circulation. The site plan proposes a full turning movement driveway to/from Grand River Avenue (to replace the existing curb cut).

Drive aisles are of sufficient width for two-way travel around the entire site.

The truck turning templates on Sheet 5 generally depict adequate circulation for larger vehicles (fire and semi-truck/trailer) with access into and out of the proposed loading docks at the rear of the site.

It is worth noting that the semi-truck circulation plan depicts 2 points where the vehicle/trailer may encroach into the landscaped area (1 point on the east side opposite the bio-retention pond and another in the southwest corner).

The applicant must also address any comments provided by the Township Engineer and/or the Brighton Area Fire Authority with respect to vehicular circulation.

5. Parking. The site plan has been reviewed for compliance with the parking and loading requirements of Article 14, as follows:

	Required	Proposed	Comments
Parking Spaces	151	172	In compliance
Barrier Free Spaces	6	8	In compliance
Design			
Spaces (90-degree)	9' x 18'	9' x 16', 9' x 18'	In compliance (2' overhang allowed)
Drive aisle width (two-way)	24'	24' (minimum)	In compliance
Striping	Looped	Looped	In compliance
Loading/Unloading	2 spaces	2 spaces	In compliance (easterly space will disrupt traffic flow; deliveries should be scheduled during non-business hours)

6. Exterior Lighting. The lighting plan depicts 10 under canopy fixtures, 18 pole mounted fixtures and 33 wall mounted fixtures.

Detail sheets demonstrate the use of downward directed, shielded LED fixtures (the Goodwill canopy fixtures do not appear to be LEDs, but are recessed).

The revised lighting plan demonstrates compliance with fixture mounting heights and photometric readings (both along the property lines and on-site).

- 7. Landscaping.** The revised landscape plan has been reviewed for compliance with the standards of Section 12.02, as follows:

Standard	Required	Proposed	Notes
Greenbelt	20' width 10 canopy trees	25' width 10 canopy trees	In compliance
Buffer Zone "C" (E)	10' width 30 trees OR 118 shrubs	10' width 6 tree 94 shrubs	In compliance
Buffer Zone "C" (W)	10' width 39 trees OR 155 shrubs	10' width 18 trees 123 shrubs	In compliance
Buffer Zone "C" (S)	10' width 18 trees OR 72 shrubs	120' width 18 trees	In compliance
Parking Lot	17 canopy trees 1,642 SF of landscaped area 2.5' tall hedgerow OR 3' wall	17 canopy trees 4,753 SF of landscaped area 3' hedgerow	In compliance
Detention pond (bio-retention)	6 trees 58 shrubs	6 trees 60 shrubs	In compliance
Detention pond (stormwater basin)	14 trees 137 shrubs	14 trees 137 shrubs	In compliance

- 8. Waste Receptacle.** The plan includes 3 waste receptacles, each of which complies with the location, base pad, and enclosure requirements of Section 12.04.

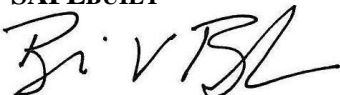
Similar to the comment regarding the easterly loading zone, refuse removal should be scheduled for an appropriate time, so as to not disrupt traffic circulation.

- 9. Signage.** The submittal identifies a compliant location for a new monument sign immediately east of the proposed driveway. Additionally, the building elevation drawings identify a 20 square foot wall sign for the Goodwill store.

The applicant must obtain a separate sign permit prior to the installation of any signage (i.e., site plan approval does not constitute approval of these signs).

Should you have any questions concerning this matter, please do not hesitate to contact our office.

Respectfully,
SAFEBUILT


 Brian V. Borden, AICP
 Michigan Planning Manager



April 8, 2025

Ms. Amy Ruthig
Genoa Township
2911 Dorr Road
Brighton, MI 48116

**Re: 3600 E. Grand River Redevelopment
Site Plan Review No. 2**

Dear Ms. Ruthig:

Tetra Tech conducted a second review of the site plan submittal for 3600 E. Grand River Redevelopment last dated March 24, 2025. The site plan was prepared by Boss Engineering on behalf of KN West, LLC. The development is located on 5.92 acres on the northwest side of the south side of East Grand River Ave, west of Latson Road. The Petitioner is proposing 3 buildings that includes retail space, a drive-through restaurant, sit down restaurant, and a financial institution. The proposed site includes storm sewer and on-site detention, as well as sanitary sewer and water main improvements. We offer the following comments:

WATER AND SANITARY

1. Since public water main and sanitary sewer is proposed, construction plans will need to be submitted to MHOG for their review and permitting with EGLE after final site plan approval with the Township.

TRAFFIC AND ROADWAYS

1. A traffic study has been provided by the petitioner. The study was prepared by Colliers Engineering and Design dated December 6, 2024. The study states it was performed with input on the scope by MDOT and was prepared in accordance with generally accepted practices within the state of Michigan. We have no objections to the findings of the report.
2. The site plan shows a potential drive extension to the existing speedway parking lot and there appears to be an existing cross access agreement in place. The plans show that a drive will be extended to the property line within the existing the cross-access agreement and completion of the cross-access drive by the adjacent property owner should be done as part of this project.

The petitioner has adequately addressed our previous comments in the revised site plan submittal, and we have no further engineering related concern with the proposed site plan. The above comments are provided for Township reference. Please call or email if you have any questions.

Sincerely,

A handwritten signature in blue ink that reads 'Shelby Byrne'.

Shelby Byrne, P.E.
Project Engineer



BRIGHTON AREA FIRE AUTHORITY

615 W. Grand River Ave.
Brighton, MI 48116
o: 810-229-6640 f: 810-229-1619

April 7, 2025

Sharon Stone-Francis
Genoa Township
2911 Dorr Road
Brighton, MI 48116

RE: 3600 E. Grand River Redevelopment
3600 E. Grand River
Genoa Twp., MI

Dear Sharon,

The Brighton Area Fire Department has reviewed the above-mentioned site plan. The plans were received for review on March 24, 2025 and the drawings are dated December '2024. The project is based on the proposed redevelopment of an existing 5.8 acre parcel. The plan calls for the demolition of an existing 15,000 square foot unoccupied structure, and the construction of three new buildings with varying uses. The plan review is based on the requirements of the International Fire Code (IFC) 2021 edition.

As submitted, the recent submittal addresses all previous fire code-related comments. The fire has no further comments regarding the project unless revisions are made that affect access and fire protection.

Additional comments will be given during the building plan review process (specific to the building plans and occupancy). The applicant is reminded that the fire authority must review the fire protection systems submittals (sprinkler & alarm) prior to permit issuance by the Building Department and that the authority will also review the building plans for life safety requirements in conjunction with the Building Department.

If you have any questions about the comments on this plan review please contact me at 810-229-6640.

Cordially,

A handwritten signature in black ink, appearing to read "RB", with a stylized flourish at the end.

Rick Boisvert, CFPS
Fire Marshal

cc: Amy Ruthig amy@genoa.org

GENOA TOWNSHIP IMPACT ASSESSMENT

3600 E Grand River Redevelopment

Prepared for:

**Property Owner:
KN West, LLC**

Applicant:

**Property Owner:
KN West, LLC**

Prepared by:

Scott Tousignant, PE



3121 E. Grand River Howell, MI 48843
517.546.4836 fax 517.548.1670
www.bosseng.com

February 18, 2025
Revised: March 24, 2025

DISCUSSION ITEMS

- A. Name(s) and address(es) of person(s) responsible for preparation of the Impact Assessment and a brief statement of their qualifications.

Prepared by:

Scott Tousignant, PE
Professional Engineer/Project Manager
Boss Engineering
3121 E Grand River
Howell, MI 48843

Prepared for:

Owner and Applicant:
KN West, LLC / Darren Naimi
29500 Telegraph Road, Suite 550
Southfield, MI 48034

- B. Description of the site, including existing structures, man-made facilities, and natural features, all-inclusive to within 100' of the property boundary.***

The site is on parcel # 4711-05-400-004 in Section 10, Genoa Township, Livingston County, MI. The site is located at 3600 East Grand River on the south side of Grand River Avenue, approximately 2500 feet west of the Grand River Ave and Latson Road intersection within the Regional Commercial District (RC) zoning.

The subject site is bordered:

- On the north by Grand River Avenue. There are also Regional Commercial District properties across Grand River Avenue such as Arby's and Grand River Plaza.
- On the east, the site is bordered by a Speedway gas station in a Regional Commercial District.
- On the south, the site abuts Cleary University's Lake Trust Stadium in the MUPUD District.
- On the west, the site is bordered by Carpet Center & Floors, a flooring store, and Tim's Income Tax Service, a tax preparation service, both zoned in the Regional Commercial District.

- C. Impact on natural features: A written description of the environmental characteristics of the site prior to development, i.e., topography, soils, vegetative cover, drainage, streams, creeks or ponds.***

This existing site contains a functionally obsolete commercial building that occupied the northern half of the site. This northern half is already disturbed with lawn areas in various amounts of upkeep from mowed to overgrown with herbaceous and woody weedy species. There are also existing swales that have been similarly colonized by weedy species such as purple loosestrife and various goldenrod species. As one proceeds into the southern end of the site, it becomes more wooded, but the relatively younger trees (mostly 5" DBH boxelder

trees) and remnants of asphalt trails and an intentionally planted row of Norway spruce (average 6" DBH) among the overgrowth suggest a previously developed use. At the southernmost point of the property, there is a line of hickory trees (average 8" DBH) that runs along the fence abutting the Lake Trust Stadium. The hickories thin out as one approaches the western edge of the site where the topography forms a natural depression.

The proposed site design would necessitate the removal of much of the trees in the southern end of the site since a building footprint and stormwater basin are planned for that area. The overall increase in impervious surface for paving the site would necessitate stormwater to be directed into the south of the site into the basin, altering the current stormwater retention/detention on-site. A proposed drive running to the East and West of the site would also remove existing turf and weedy vegetation surfaces, resulting in decreased stormwater detainment in those areas.

The soils on site are largely Miami Loams with 2 to 6% slopes. Conover Loams also is present on the central quarter of the site.

D. Impact on storm water management: description of soil erosion control measures during construction.

Storm water will be managed on site and installed before any building construction. Site storm water will be directed to catch basins to the developments stormwater management basin at the rear (southern) end of the site. This system will discharge to a storm network along Grand River Avenue to the same storm network the existing sites stormwater basin discharges to. Review and approval will be performed by MDOT as this stretch of Grand River is MDOT jurisdiction.

Detailed construction plans will be reviewed by the Township engineer and the Soil Erosion Control plans will be reviewed by the Livingston County Drain Commissioners office prior to construction commencing. Ongoing/periodic soil erosion inspections will occur per County requirements to ensure soil erosion is managed proactively.

E. Impact on surrounding land use: Description of proposed usage and other man-made facilities; how it conforms to existing and potential development patterns. Effects of added lighting, noise or air pollution which could negatively impact adjacent properties.

Proposed uses on this Regional Commercial site include a multi-tenant commercial building with drive thru end cap and a variety of retail uses and restaurant space, as well as a financial institution and larger square footage multi-tenant space containing a Goodwill. The proposed uses conform to existing and potential development patterns and will not negatively impact adjacent properties with added lighting, noise or air pollution. The proposed uses comply with the Zoning Ordinance standards. The site development will comply with Township Ordinances for lighting levels as well as noise levels.

The subject site is surrounded to the north, east, and west by other Regional Commercial zonings with the exception being a Mixed Use PUD exists to the south. Immediately south of the subject site development is Cleary University Lake Trust Stadium. The proposed uses are compatible with the existing zoning and the adjacent zonings on Grand River Ave.

F. Impact on public facilities and services: Description of number of residents, employees, patrons, and impact on general services, i.e., schools, police, fire.

The proposed commercial development does not add additional burden on the fire and police services as the site is surrounded by similar development that already receives coverage. The uses do not add population that impacts schools. The commercial retail will add to Township tax revenue as the site currently sits as a functionally obsolete commercial building. The commercial retail, Goodwill, and financial institution will add approximately 100 jobs which has a positive impact on the community.

G. Impact on public utilities: description of public utilities serving the project, i.e., water, sanitary sewer, and storm drainage system. Expected flows projected in residential units.

Site storm water will be directed through catch basins to the development's storm water management basin at the rear of the site. The stormwater management basin will discharge to the existing storm sewer system along Grand River Avenue that the existing sites stormwater basin discharges to.

MHOG sanitary sewer runs along the south side of Grand River Avenue. An extension of the public main is proposed in order to accommodate all proposed buildings.

MHOG water runs along the south side of Grand River Avenue. An extension of the public main is proposed to run to a new hydrant adjacent to the proposed commercial building at the rear of the site.

The Township REU Factor Table was utilized in estimating the proposed REU's for this development. Based on the anticipated uses depicted on the project plans there will be a total of 18.4 REU's.

H. Storage or handling of any hazardous materials: Description of any hazardous materials used, stored, or disposed of on-site.

No storing or handling of quantities of hazardous materials is expected for this development.

I. Impact on traffic and pedestrians: Description of traffic volumes to be generated and their effect on the area.

A traffic study has been performed. It is prepared under separate cover and submitted to the Township and MDOT. In summary of the Traffic Impact Study performed by Colliers Engineering & Design, "Based on the results of this study, the following should be considered to provide acceptable traffic operations with the proposed development project. 1) Construct a right-turn lane at the proposed site driveway to Grand River Avenue. 2) Optimize signal timings at the intersection of Grand River Avenue and Latson Road. 3) Optimize signal timings at the intersection of Grand River Avenue and Grand River Plaza Drive. 4) Optimize signal timings at the intersection of Grand River Avenue and Meijer/Wal-Mart Drive."

The Michigan Department of Transportation will be required to review and approve the commercial driveway approach on Grand River Avenue. Preliminary communications with MDOT indicate that the proposed drive location is acceptable and lines up with the existing

Grand River Plaza drive approach on the north side of Grand River. A cross-access easement will be provided for the adjacent site to the east.

J. Special provisions: Deed restrictions, protective covenants, etc.

20' Public Utility Easement (Liber 1847, Page 662, Livingston County Records)

None other of record

K. Description of all sources:

- Genoa Township Zoning Ordinance
- "Soil Survey of Livingston County Michigan" Soil Conservation Services, USDA
- Traffic Impact Study by Colliers Engineering & Design dated December 6, 2024



Engineering
& Design

Traffic Impact Study

December 6, 2024

3600 Grand River Retail Redevelopment Genoa Township, Livingston County, Michigan

Prepared for:

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Appendix B Existing Conditions Data
Appendix C No-Build Conditions Data
Appendix D Build Conditions Data

Introduction

This report presents the methodologies, analyses, results, and recommendations of a Traffic Impact Study (TIS) for the proposed Grand River retail redevelopment project located at 3600 Grand River Avenue in Genoa Township, Livingston County, Michigan. The project site is located on the south side of Grand River Avenue (I-96 BL) approximately ½ mile west of Latson Road as shown on **Figure 1** and was previously occupied by a Salvation Army Thrift Store. The proposed redevelopment plans would construct a new 3,600 square feet (SF) credit union with drive-through, 2,040 SF fast-food restaurant with drive through, and 29,950 SF of retail space.

Site access is currently provided via a single driveway to Grand River Avenue which is proposed to be relocated to the west to align with the existing Grand River Plaza Shopping Center driveway on the north side of Grand River Avenue. Additionally, a cross-access connection is proposed with the adjacent Speedway Gas Station to the east which would provide signalized access to Grand River Avenue via the traffic signal directly east of the Speedway. A representation of the site plan is shown on **Figure 2**. Grand River Avenue is under jurisdiction of the Michigan Department of Transportation (MDOT); whereby access permitting will be subject to MDOT review and standards. In accordance with Section 1.2.4 of the MDOT *Geometric Design Guidance*, a Traffic Impact Study (TIS) is required for site access permitting and project approvals. Additionally, the project is subject to Township review and approval as part of the site plan review process.

The purpose of this study is to identify the traffic related impacts, if any, of the proposed project on the adjacent road network. This study therefore includes analysis of the site access points as well as key off-site intersections surrounding the site. Analysis of the site access points will determine appropriate lane configurations as well as traffic control to process site traffic safely and efficiently. Key off-site intersections are analyzed to determine if new site-generated traffic passing through these locations would require improvements to mitigate any impacted traffic operations.

The scope of this study was developed based on Colliers Engineering & Design (CED) knowledge of the study area, understanding of the development program, accepted traffic engineering practice, and information published by the Institute of Transportation Engineers (ITE). Additionally, CED solicited input regarding the proposed scope of work from MDOT. The study analyses were completed using Synchro and SimTraffic, Version 12 traffic analysis software and in accordance with the methodologies and practices published by ITE and the applicable requirements of MDOT and the Township. This report is intended for use by MDOT and the Township to guide decisions related to development project approvals, access permitting, and identifying future roadway improvement needs.

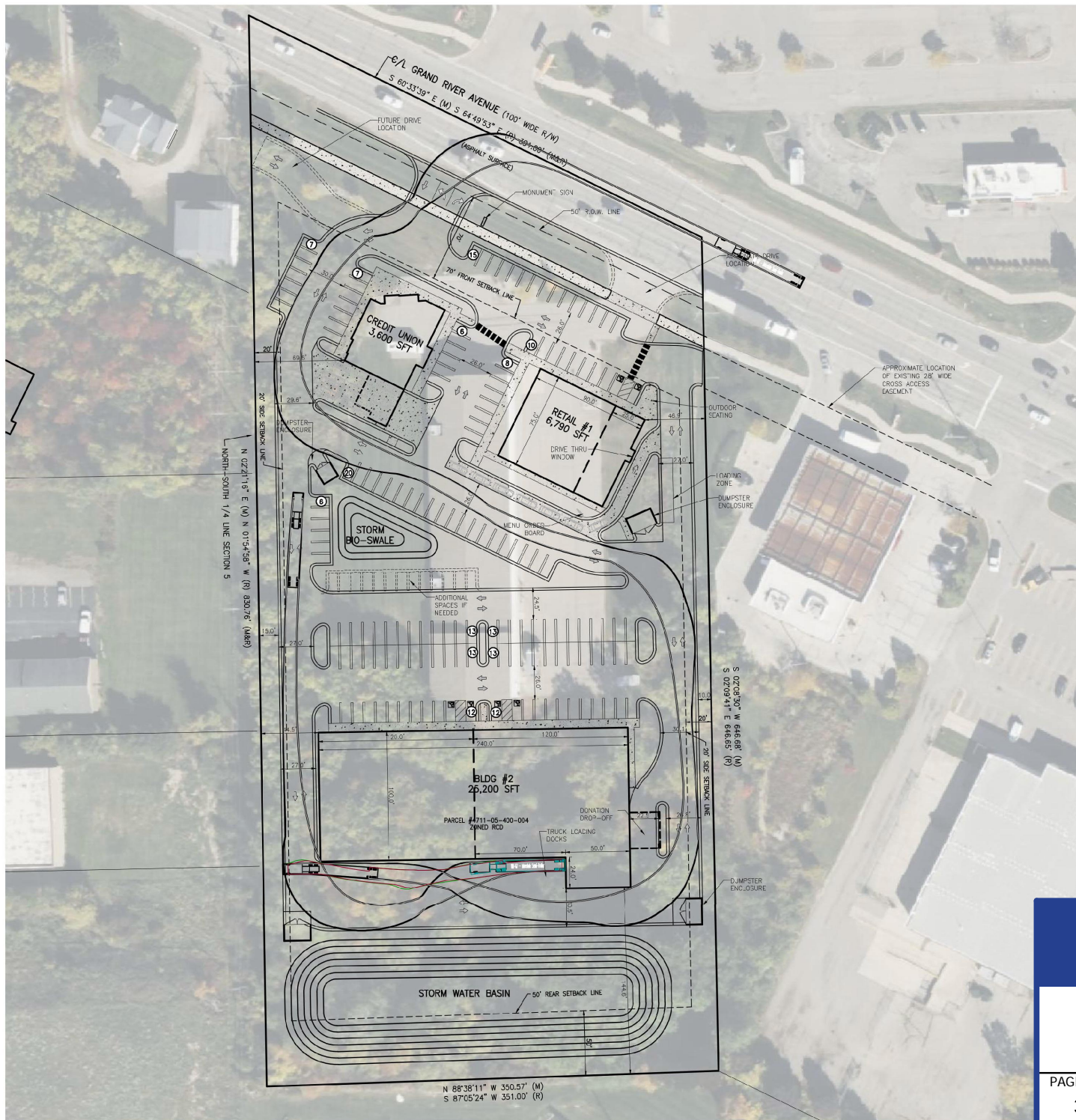


3600 Grand River Retail TIS
Genoa Township, MI

Figure 1
Study Area Map



PAGE NO.	SCALE	DATE	Collets Engineering & Design
2	No Scale	Dec '24	



3600 Grand River Retail TIS Genoa Township, MI

Figure 2
Site Plan



PAGE NO.
3

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Dec '24

Roadway Data

Road Network

Vehicle transportation for the proposed development will be provided primarily via Grand River Avenue and Latson Road. The study intersections are identified below, and further details on the study roadways are summarized in **Table 1**.

Table 1: Roadway Summary

Roadway Data	Grand River Avenue	Latson Road
Functional Class	Principal Arterial	Minor Arterial
Direction	E-W	N-S
Speed Limit (mph)	50	50
Jurisdiction	MDOT	LCRC
Cross Section	5-Lane	5-Lane
AADT	31,000	22,000
AM Peak Hour Volume	1,525	995
PM Peak Hour Volume	2,505	1,880

Study Intersections

Grand River Avenue & Latson Road

At the intersection of Grand River Avenue & Latson Road, all approaches have dual left-turn lanes, two through lanes, and an exclusive right-turn lane. The intersection is traffic signal controlled with leading protected only left-turn phasing, and right-turn overlap phasing provided for all approaches. Dynamic “No Turn on Red” signs are also provided for all approaches to prohibit right-turns during the opposing approaches protected left-turn phase. Vehicle and pedestrian actuation are provided for all approaches and movements and marked crosswalks are provided for crossing all legs.

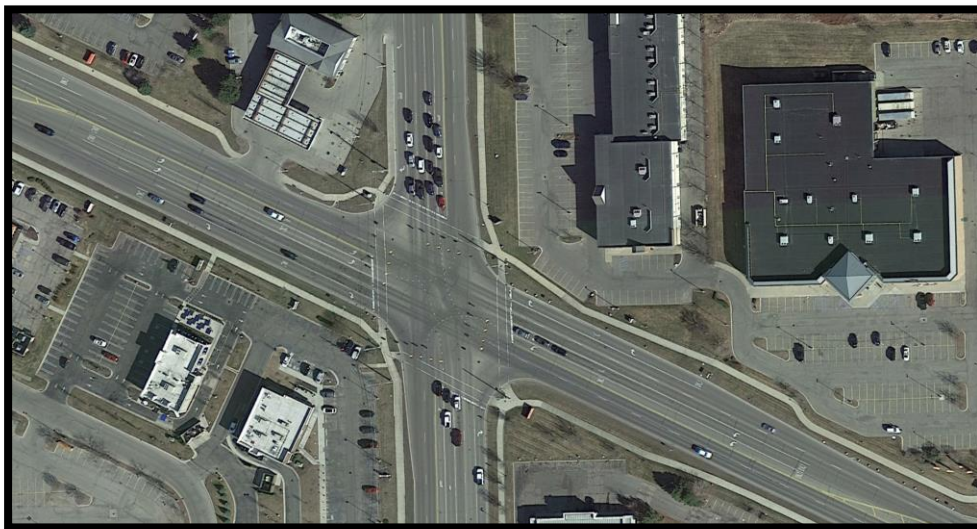


Figure 3: Grand River Avenue & Latson Road Intersection

Grand River Avenue & Meijer Drive / Wal-Mart Drive

Grand River Avenue & Meijer Drive / Wal-Mart Drive has an exclusive left-turn lane and shared through/right-turn lane on the NB and SB approaches while the EB and WB approaches have an exclusive left-turn lane, two through lanes, and exclusive right-turn lane. The intersection is traffic signal controlled with a two-phase operation. Vehicle actuation is provided for the minor driveway approaches. No marked crosswalks or pedestrian signals are provided at the intersection.



Figure 4: Grand River Avenue & Meijer Drive / Wal-Mart Drive Intersection

Grand River Avenue & Grand River Plaza Drive

Grand River Avenue & Grand River Plaza Drive has an exclusive left-turn lane and shared through/right-turn lane on the NB and SB approaches while the EB and WB approaches have an exclusive left-turn lane, two through lanes, and exclusive right-turn lane. The intersection is traffic signal controlled with a two-phase operation. Vehicle actuation is provided for the minor driveway approaches. There are no marked crosswalks at the intersection; however, pedestrian signals are provided for all legs of the intersection with pushbuttons provided for crossing Grand River Avenue.



Figure 5: Grand River Avenue & Grand River Plaza Drive Intersection

Grand River Avenue & Grand Oaks Drive

Grand River Avenue & Grand Oaks Drive has an exclusive left-turn lane and shared through/right-turn lane on the NB and SB approaches while the EB approach has an exclusive left-turn lane, two through lanes, and exclusive right-turn lane and WB approach has an exclusive left-turn lane, through lane, and shared through/right-turn lane. The intersection is traffic signal controlled with a two-phase operation. Vehicle actuation is provided for the minor road and driveway approaches. There are marked crosswalks and pedestrian signals provided for all legs of the intersection with pushbuttons provided for crossing Grand River Avenue.



Figure 6: Grand River Avenue & Grand Oaks Drive Intersection

Existing Traffic Data

Existing weekday AM (7:00 to 9:00) and PM (4:00 to 6:00) peak hour turning movement counts were collected by CED subconsultant Quality Counts (QC) at the study intersections on Tuesday November 19th, 2024. Data were collected in 15-minute intervals to establish the current peak hour traffic volumes. Major weather events, holidays, and other local special events were avoided.

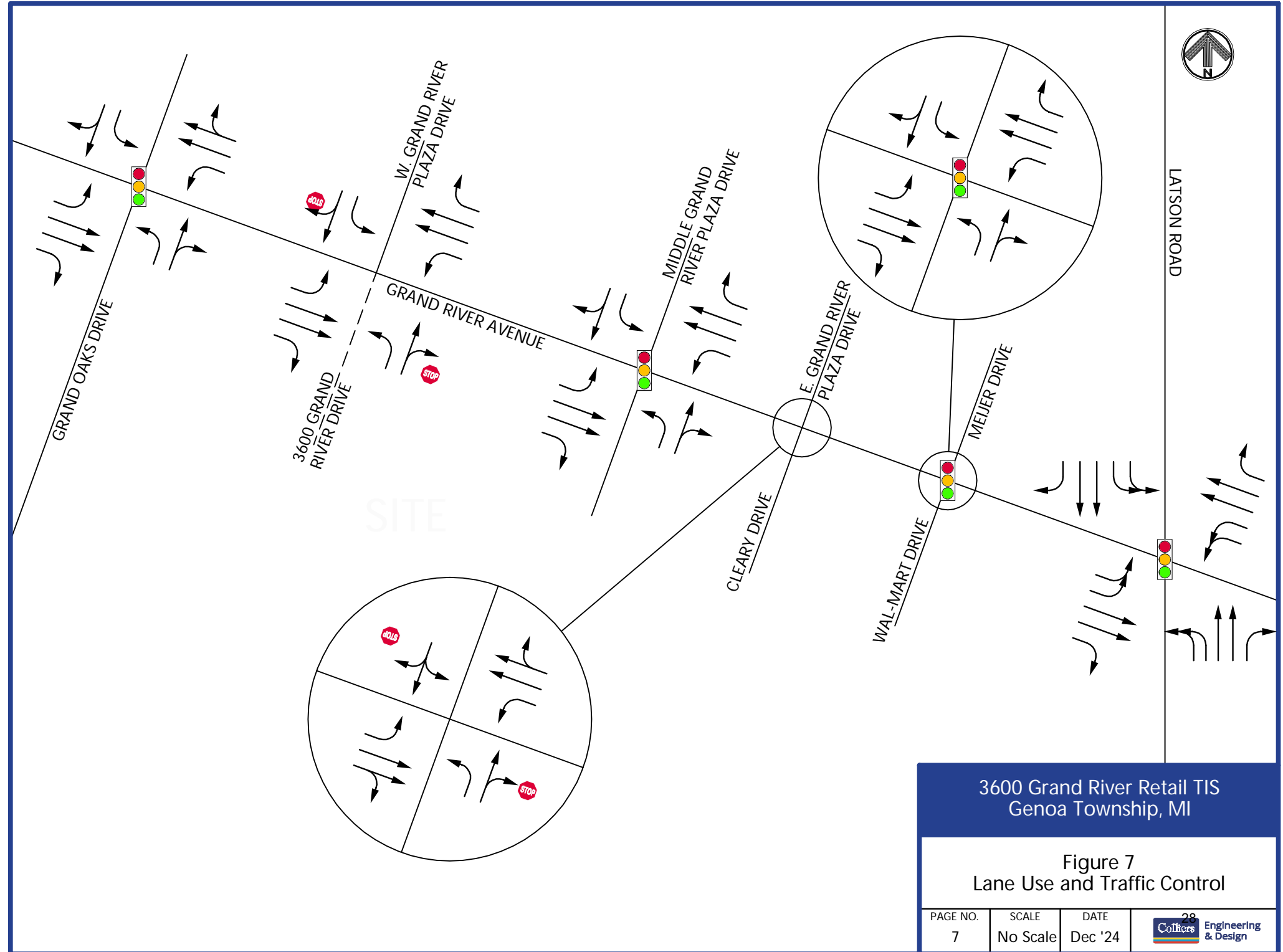
During collection of the manual intersection turning movement counts, pedestrian data and commercial truck percentages were also recorded and used in the traffic analysis. Peak hour factors (PHFs) and commercial truck percentages were calculated by approach based on the requirements of MDOT's *Electronic Traffic Control Device Guidelines*. Traffic volumes along Grand River Avenue were balanced upward between Grand Oaks Drive and the Meijer / Wal-Mart intersection. Between Latson Road and the Meijer / Wal-Mart intersection, a dummy node was utilized to account for the large amount of traffic that turns in and out of the commercial driveways located between the intersections. All relevant traffic volume data are included in **Appendix A** and the resulting 2024 baseline peak hour volumes utilized for this study are summarized on **Figure 8**.



LATSON ROAD

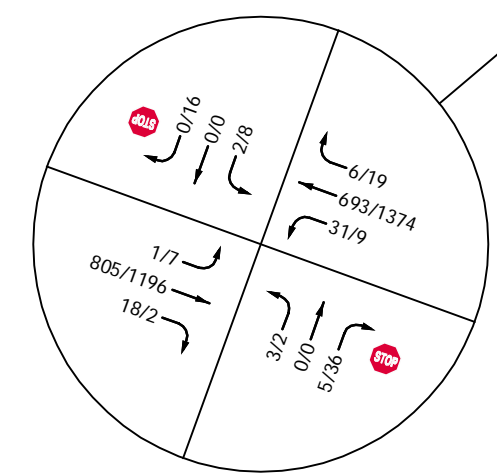
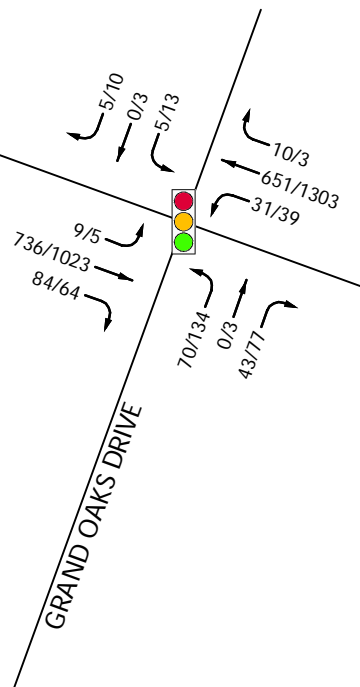
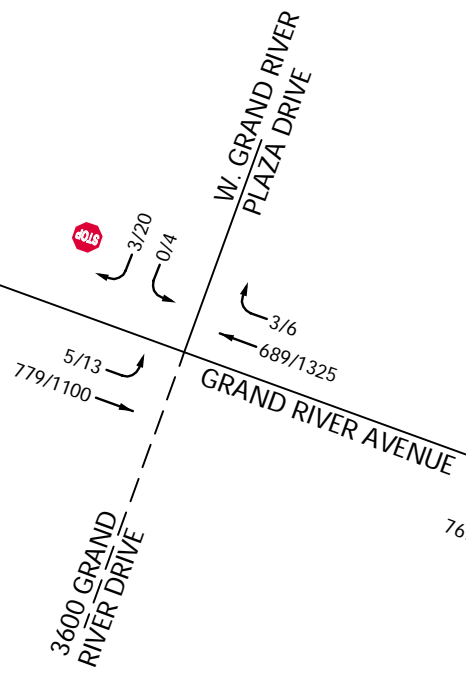
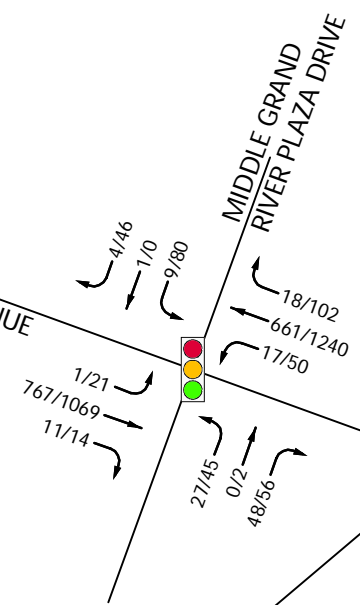
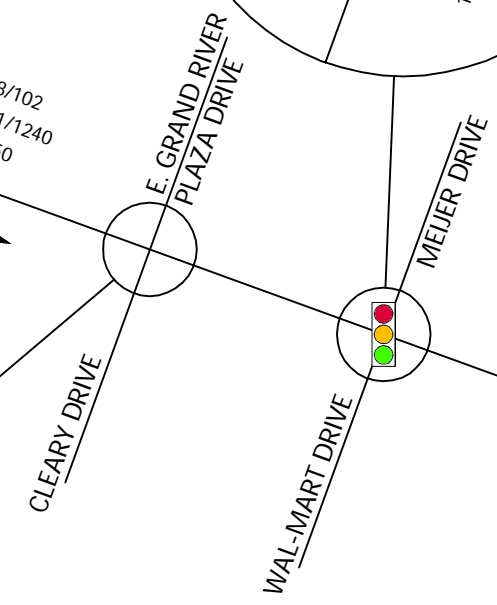
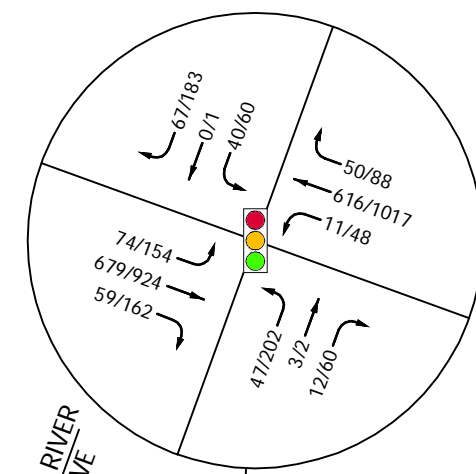
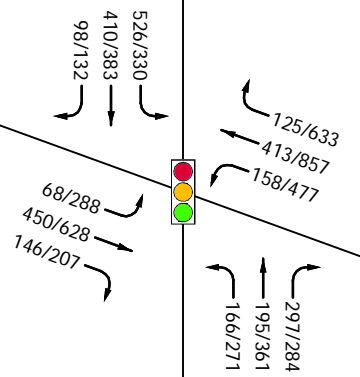
3600 Grand River Retail TIS
Genoa Township, MI

Figure 7
Lane Use and Traffic Control





LATSON ROAD



3600 Grand River Retail TIS
Genoa Township, MI

Figure 8
Existing Traffic Volumes

2024 Existing Conditions

Analysis Methodologies

The performance of the study intersections was evaluated through a qualitative measure of operating conditions called Levels of Service (LOS). Six LOS are defined with letter designations from A to F with LOS A representing minimal delay, and LOS F indicating failing conditions. Typically, LOS D is considered acceptable in suburban/urban areas.

The LOS measurement for both signalized and unsignalized intersections is average control delay, which is quantified in terms of seconds of delay per vehicle. Control delay includes deceleration delay, stopped delay, queue move-up delay, and acceleration delay. The LOS criteria for unsignalized and signalized intersections taken from the HCM are included in Appendix B.

The LOS and delay calculations are based on the procedures and methodologies outlined in the Transportation Research Board's Highway Capacity Manual, 7th Edition (HCM7) which sets forth nationally accepted standards regarding traffic operations and capacity analysis. Traffic signal timings were modeled per traffic signal timing permits provided by MDOT.

Simulations of the study network were also observed using SimTraffic in order to identify potential issues related to vehicle queuing, traffic flow between intersections, and the overall study network. The existing conditions SimTraffic models were calibrated in accordance with the procedures outlined in the MDOT *Electronic Traffic Control Device Guidelines*.

Existing Traffic Conditions

Existing peak hour vehicle delays and LOS were calculated at the study intersections based on the existing lane configurations and traffic control shown on **Figure 7**, the existing traffic volumes shown on **Figure 8**, and the methodologies presented in the HCM. The results of the existing conditions analysis are presented in **Appendix B**, summarized in **Table 2** and described in further detail below.

The results of the existing conditions analysis indicate that all approaches and movements at the study intersections are currently operating acceptably at a LOS D or better with the exception of the following:

- The NB, SB, and WB left-turn movements at the signalized intersection of Grand River Avenue & Latson Road which currently operate at a LOS E or F during the PM peak hour. Additionally, the NB and WB right-turn movements operate at a LOS F during the AM and PM peak hours, respectively.
- The NB left-turn movement at the signalized intersection of Grand River Avenue & Meijer Drive / Wal-Mart Drive which currently operates at a LOS E.
- The STOP controlled left-turn movement from the W. Grand River Plaza Drive to Grand River Avenue which operates at a LOS F during the PM peak hour.
- The STOP controlled left turn movements from the E. Grand River Plaza Drive and Cleary University Drive to Grand River Avenue which operates at a LOS E or F during both peak hours.

Table 2: Existing Conditions

Intersection	Control	Approach	Movement	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
Latson Road & Grand River Avenue (I-96 BL)	Signal	EB	Left	44.6	D	40.2	D
			Thru	33.4	C	22.8	C
			Right	24.1	C	15.1	B
		WB	Left	48.7	D	64.8	E
			Thru	26.5	C	35.4	D
			Right	12.9	B	62.5	F
		NB	Left	44.0	D	55.0	E
			Thru	35.9	D	34.3	C
			Right	96.4	F	26.0	C
		SB	Left	41.2	D	90.5	F
			Thru	29.2	C	35.0	D
			Right	24.0	C	25.1	C
Overall			40.1	D	43.5	D	
Grand River Avenue & Meijer Drive / Wal-Mart Drive	Signal	EB	Left	12.4	B	30.5	C
			Thru	15.1	B	23.4	C
			Right	9.5	A	18.0	B
		WB	Left	2.4	A	6.5	A
			Thru	0.2	A	0.8	A
			Right	0.1	A	0.2	A
		NB	Left	42.5	D	64.0	E
			Thru/Right	36.7	D	25.8	C
		SB	Left	38.5	D	28.4	C
			Thru/Right	39.5	D	28.7	C
Overall			11.2	B	17.9	B	
Grand River Avenue & Grand River Plaza Middle Drive	Signal	EB	Left	0.0	A	4.6	A
			Thru	0.3	A	0.4	A
			Right	0.0	A	0.0	A
		WB	Left	0.1	A	7.9	A
			Thru	0.2	A	12.2	B
			Right	0.0	A	6.9	A
		NB	Left	40.4	D	38.6	D
			Thru/Right	42.6	D	36.6	D
		SB	Left	42.0	D	41.6	D
			Thru/Right	39.2	D	35.9	D
Overall			2.5	A	9.7	A	
Grand River Avenue & Grand Oaks Drive	Signal	EB	Left	2.2	A	3.2	A
			Thru	3.1	A	4.8	A
			Right	2.3	A	3.3	A
		WB	Left	0.7	A	1.3	A
			Thru/Right	0.5	A	1.3	A
		NB	Left	41.9	D	39.9	D
			Thru/Right	42.2	D	37.9	D
		SB	Left/Thru/Right	39.0	D	35.5	D
Overall			4.8	A	6.2	A	
Grand River Avenue & Grand River Plaza W. Drive	STOP (Minor)	EB	Left	9.3	A	13.1	B
			Thru/Right	Free		Free	
		WB	Thru/Right	Free		Free	
		SB	Left	0.0	A	146.4	F
Right	11.0		B	15.6	C		

Table 2: Existing Conditions (continued)

Intersection	Control	Approach	Movement	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
Grand River Avenue & Grand River Plaza E. Drive / Cleary Drive	STOP (Minor)	EB	Left	9.2	A	13.2	B
			Thru/Right	Free		Free	
		WB	Left	10.6	B	11.7	B
			Thru/Right	Free		Free	
		NB	Left	49.7	E	135.1	F
			Thru/Right	12.2	B	14.8	B
		SB	Left/Thru/Right	41.2	E	120.3	F

Observation of peak hour simulations indicates acceptable traffic operations during the AM peak hour and significant vehicle queues are not observed. At the signalized intersections, vehicle queues are observed to be processed during each signal cycle with minimal residual queueing or backups. During the PM peak hour, a long vehicle queue is observed for the WB right-turn movement at the signalized intersection of Grand River Avenue & Latson Road which lasts for approximately 30 minutes of the peak hour. On the STOP controlled Grand River Plaza Drive approaches and Cleary University Drive approaches, 95th percentile queue lengths are calculated to be 66 feet (2-3 vehicles) or less during the peak periods, which is not significant.

No-Build Conditions

No-Build Traffic Volumes

Traffic impact studies typically include an evaluation of traffic operations in the future as they would be without the proposed development. This no-build condition serves to identify any mitigation that may be required, regardless of the project, and as a baseline for comparison of future buildout conditions. This scenario is comprised of existing traffic conditions, plus ambient traffic growth, plus traffic from approved developments in the study area that have yet to be constructed. At the time of this study the following developments were identified within the study area and immediate vicinity that have yet to be constructed or were currently under construction:

1. Versa Mixed-Use Development
2. Westbury Phase II Residential Development
3. SJMHS Hospital Expansion
4. Latson Road Retail Development (Mister Car Wash)
5. Forest Ridge Residential Development
6. Pine Creek Residential Development
7. Grand River Plaza Redevelopment

The vehicle trips that would be generated by the background developments were assigned to the study intersections based on the respective traffic study completed for each development. Where a traffic study was not completed for the development or the traffic study did not include the same intersections or time periods as this study, the number of vehicle trips was forecast based on data published by ITE in *Trip Generation, 11th Edition* and assigned to the study road network based on existing traffic patterns.

In addition to background developments, an ambient growth factor is applied to existing traffic volumes to account for future projects in the study area and population increases, as well as growth in regular traffic volumes due to development projects outside the study area. Publicly available data from the Southeast Michigan Council of Governments (SEMCOG), including population and employment forecasts for Genoa Township were referenced to determine an appropriate growth rate.

The SEMCOG data indicates annual population and employment growths ranging from 0.29% to 0.89% between 2020 and 2050 as shown in **Table 3**. Therefore, an ambient background growth rate of 0.75% per year was utilized for this study. The ambient growth rate and trips from the background developments were applied to the existing 2024 traffic volumes for a period of two years to forecast the no-build traffic volumes *without the proposed development*. The resultant 2026 no-build traffic volumes are summarized on **Figure 9**.

Table 3: Community Annual Growth Rate

Community	Measure	Growth
Genoa Township	Employment	0.50%
	Population	0.89%
Howell	Employment	0.41%
	Population	0.29%
Brighton	Employment	0.36%
	Population	0.76%
Brighton Township	Employment	0.44%
	Population	0.58%
Average		0.53%

No-Build Traffic Conditions

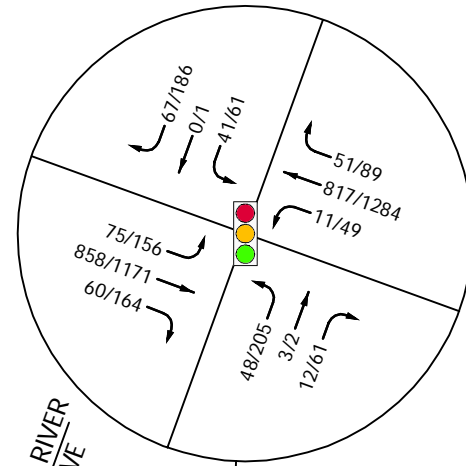
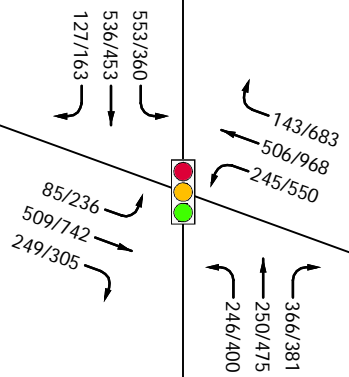
No-build peak hour vehicle delays and LOS were calculated at the study intersections based on the existing lane configurations and traffic control shown on **Figure 7**, the no-build traffic volumes shown on **Figure 9**, and the methodologies presented in the HCM. The results of the analysis of no-build conditions are presented in **Appendix C**, summarized in **Table 4**, and described in further detail below.

The results of the no-build conditions analysis indicate that all approaches and movements would continue to operate similar to existing conditions during both peak hours with the exception of the following:

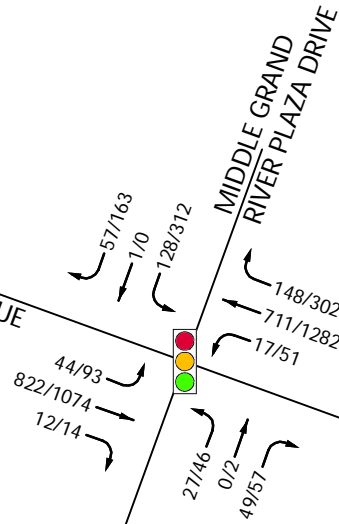
- The signalized intersection of Grand River Avenue & Latson Road which would be reduced to an overall LOS E during the PM peak hour with several approaches and movements operating at a LOS E or F during both peak hours.
- The SB left-turn movement from the signalized intersection of Grand River Avenue & Grand River Plaza Middle Drive which would be reduced to a LOS F during both peak hours.



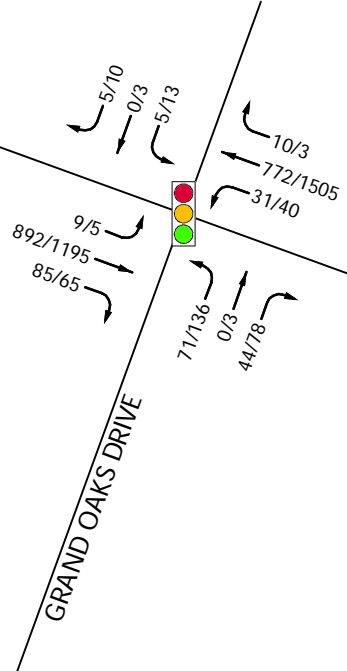
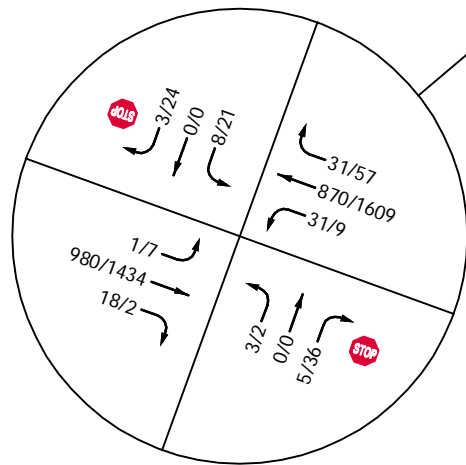
LATSON ROAD



E. GRAND RIVER PLAZA DRIVE
WAL-MART DRIVE
MEIJER DRIVE
CLEARY DRIVE



MIDDLE GRAND RIVER PLAZA DRIVE
W. GRAND RIVER PLAZA DRIVE
GRAND RIVER AVENUE
3600 GRAND RIVER DRIVE



3600 Grand River Retail TIS
Genoa Township, MI

Figure 9
No-Build Traffic Volumes

Table 4: No-Build Traffic Conditions

Intersection	Control	Approach	Movement	AM Peak Hour				PM Peak Hour			
				Existing		No-Build		Existing		No-Build	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Latson Road & Grand River Avenue (I-96 BL)	Signal	EB	Left	44.6	D	45.3	D	40.2	D	41.6	D
			Thru	33.4	C	36.2	D	22.8	C	32.0	C
			Right	24.1	C	25.8	C	15.1	B	19.8	B
		WB	Left	48.7	D	101.8	F	64.8	E	105.5	F
			Thru	26.5	C	28.9	C	35.4	D	59.2	E
			Right	12.9	B	13.3	B	62.5	F	114.6	F
		NB	Left	44.0	D	42.1	D	55.0	E	158.2	F
			Thru	35.9	D	37.8	D	34.3	C	36.4	D
			Right	96.4	F	172.0	F	26.0	C	30.4	C
		SB	Left	41.2	D	41.7	D	90.5	F	117.8	F
			Thru	29.2	C	34.9	C	35.0	D	35.7	D
			Right	24.0	C	26.2	C	25.1	C	23.9	C
		Overall		40.1	D	52.9	D	43.5	D	67.3	E
Grand River Avenue & Meijer Drive / Wal-Mart Drive	Signal	EB	Left	12.4	B	13.8	B	30.5	C	39.2	D
			Thru	15.1	B	17.2	B	23.4	C	26.2	C
			Right	9.5	A	9.6	A	18.0	B	18.1	B
		WB	Left	2.4	A	4.1	A	6.5	A	12.0	B
			Thru	0.2	A	4.1	A	0.8	A	1.4	A
			Right	0.1	A	0.4	A	0.2	A	0.2	A
		NB	Left	42.5	D	42.5	D	64.0	E	68.5	E
			Thru/Right	36.7	D	36.6	D	25.8	C	25.8	C
		SB	Left	38.5	D	38.5	D	28.4	C	28.5	C
			Thru/Right	39.5	D	39.4	D	28.7	C	28.8	C
		Overall		11.2	B	11.5	B	17.9	B	18.9	B
Grand River Avenue & Grand River Plaza Middle Drive	Signal	EB	Left	0.0	A	0.4	A	4.6	A	25.0	C
			Thru	0.3	A	0.4	A	0.4	A	0.5	A
			Right	0.0	A	0.0	A	0.0	A	0.0	A
		WB	Left	0.1	A	0.2	A	7.9	A	14.2	B
			Thru	0.2	A	0.3	A	12.2	B	22.7	C
			Right	0.0	A	0.2	A	6.9	A	16.7	B
		NB	Left	40.4	D	44.3	D	38.6	D	42.8	D
			Thru/Right	42.6	D	41.7	D	36.6	D	33.1	C
		SB	Left	42.0	D	205.3	F	41.6	D	243.5	F
			Thru/Right	39.2	D	48.8	D	35.9	D	40.7	D
		Overall		2.5	A	18.6	B	9.7	A	37.8	D
Grand River Avenue & Grand Oaks Drive	Signal	EB	Left	2.2	A	2.2	A	3.2	A	3.3	A
			Thru	3.1	A	3.4	A	4.8	A	5.3	A
			Right	2.3	A	2.4	A	3.3	A	3.4	A
		WB	Left	0.7	A	1.1	A	1.3	A	2.1	A
			Thru/Right	0.5	A	0.6	A	1.3	A	1.8	A
		NB	Left	41.9	D	42.0	D	39.9	D	39.9	D
			Thru/Right	42.2	D	42.3	D	37.9	D	37.8	D
		SB	Left/Thru/Right	39.0	D	39.0	D	35.5	D	35.3	D
		Overall		4.8	A	4.7	A	6.2	A	6.2	A

Table 4: No-Build Traffic Conditions (continued)

Intersection	Control	Approach	Movement	AM Peak Hour				PM Peak Hour			
				Existing		No-Build		Existing		No-Build	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Grand River Avenue & Grand River Plaza W. Drive	STOP (Minor)	EB	Left	9.3	A	10.4	B	13.1	B	18.5	C
			Thru/Right	Free		Free		Free		Free	
		WB	Thru/Right	Free		Free		Free		Free	
			Left	0.0	A	77.9	F	146.4	F	1,258.4	F
			Right	11.0	B	12.0	B	15.6	C	21.0	C
Grand River Avenue & Grand River Plaza E. Drive / Cleary Drive	STOP (Minor)	EB	Left	9.2	A	10.2	B	13.2	B	15.7	C
			Thru/Right	Free		Free		Free		Free	
		WB	Left	10.6	B	11.8	B	11.7	B	13.4	B
			Thru/Right	Free		Free		Free		Free	
		NB	Left	49.7	E	87.1	F	135.1	F	305.2	F
			Thru/Right	12.2	B	13.5	B	14.8	B	17.2	C
		SB	Left/Thru/Right	41.2	E	63.7	F	120.3	F	1,165.9	F

Review of network simulations continue to indicate generally acceptable traffic operations during the AM peak hour with the exception of the SB left-turn movement from the Grand River Plaza middle driveway which experience long vehicle queues. During the PM peak hour, long vehicle queues and cycle failures are observed for the NB left-turn movement and WB right-turn movement at the intersection of Grand River Avenue & Latson Road. Additionally, a long vehicle queue is observed for the SB left-turn movement from the Grand River Plaza middle driveway which lasts throughout the duration of the peak hour. Improvements to mitigate these long vehicle queues and delays are discussed in the build conditions.

Build Conditions

The proposed redevelopment plans would construct a new 3,600 square feet (SF) credit union with drive-through, 2,040 SF fast-food restaurant with drive through, and 29,950 SF of retail space. Site access is currently provided via a single driveway to Grand River Avenue which is proposed to be relocated to the west to align with the existing Grand River Plaza Shopping Center driveway on the north side of Grand River Avenue. Additionally, a cross-access connection is proposed with the adjacent Speedway Gas Station to the east which would provide signalized access to Grand River Avenue via the traffic signal directly east of the Speedway.

Site Trip Generation

The number of AM and PM peak hour vehicle trips that will be generated by the proposed redevelopment were forecast based on the rates and equations published by ITE in *Trip Generation, 11th Edition*. The proposed uses were matched to the ITE land use category that most closely matches their proposed operation. For this study, ITE *Land Use #822, Strip Retail, Land Use #912, Drive-In Bank*, and *Land Use #934, Fast-Food Restaurant with Drive-Through* were utilized.

As is typical of most retail and restaurant uses, 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, which create turning movements at the site driveways, but do not increase traffic volumes on the adjacent road network or off-site intersections. ITE publishes pass-by rates for various commercial land uses in the *Trip Generation Manual Appendices* which were utilized for this

study. The number of pass-by vehicle trips was subtracted from the total number of site-generated trips to determine the number of new peak hour trips for the overall development. The resultant trip generation forecast for the proposed development is shown in **Table 5**.

Table 5: Site Trip Generation

Land Use	ITE Code	Amount	Units	ADT	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Strip Retail Plaza	822	29,950	SF	1,631	43	28	71	85	85	170
		Pass-By (40% PM)		555	0	0	0	34	34	68
		New Trips		1,076	43	28	71	51	51	102
Drive-In Bank	912	3,600	SF	361	21	15	36	38	38	76
		Pass-By (29% AM, 35% PM)		116	5	5	10	13	13	26
		New Trips		245	16	10	26	25	25	50
Fast-Food Restaurant with Drive-Through	934	2,040	SF	954	46	45	91	35	32	67
		Pass-By (50% AM, 55% PM)		506	23	23	46	18	18	36
		New Trips		448	23	22	45	17	14	31
Total		Total Trips		2,946	110	88	198	158	155	313
		Pass-By Trips		1,177	28	28	56	65	65	130
		New Trips		1,769	82	60	142	93	90	183

Trip Distribution

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 densities, and ITE methodologies. These methods indicate that pass-by trips enter and exit the development in their original direction of travel and new trips will return to their direction of origin. Peak hour traffic volumes on Grand River Avenue and Latson Road were reviewed together with local population densities to determine the origin and destinations of new site-generated traffic. Pass-by traffic was assumed to follow existing traffic patterns along Grand River Avenue. The resultant site trip distribution is summarized in **Table 6**. Site-generated trips were assigned to the site driveway and Grand River Plaza signal via the cross-access connection as summarized in **Table 7**.

Table 6: Site Trip Distribution

NEW TRIPS			PASS-BY TRIPS				
To/From	Via	AM/PM	From	To	Via	AM	PM
North	Latson Road	10%	East	West	Grand River Avenue	45%	55%
South	Latson Road	15%	West	East	Grand River Avenue	55%	45%
East	Grand River Avenue	40%					
West	Grand River Avenue	35%					
Total		100%	Total			100%	100%

Table 7: Site Driveway Percentages

To/From	Via	AM/PM	
		IN	OUT
East	Site Drive	50%	50%
	Grand River Plaza Signalized Drive	50%	50%
West	Site Drive	100%	75%
	Grand River Plaza Signalized Drive	0%	25%

The site-generated vehicle trips were assigned to the study network as shown on **Figure 10**. These trips were added to the 2026 no-build traffic volumes shown on **Figure 9** to calculate the future build traffic volumes shown on **Figure 11**.



LATSON ROAD

33/37
12/14
6/9
24/35
9/14
8/9

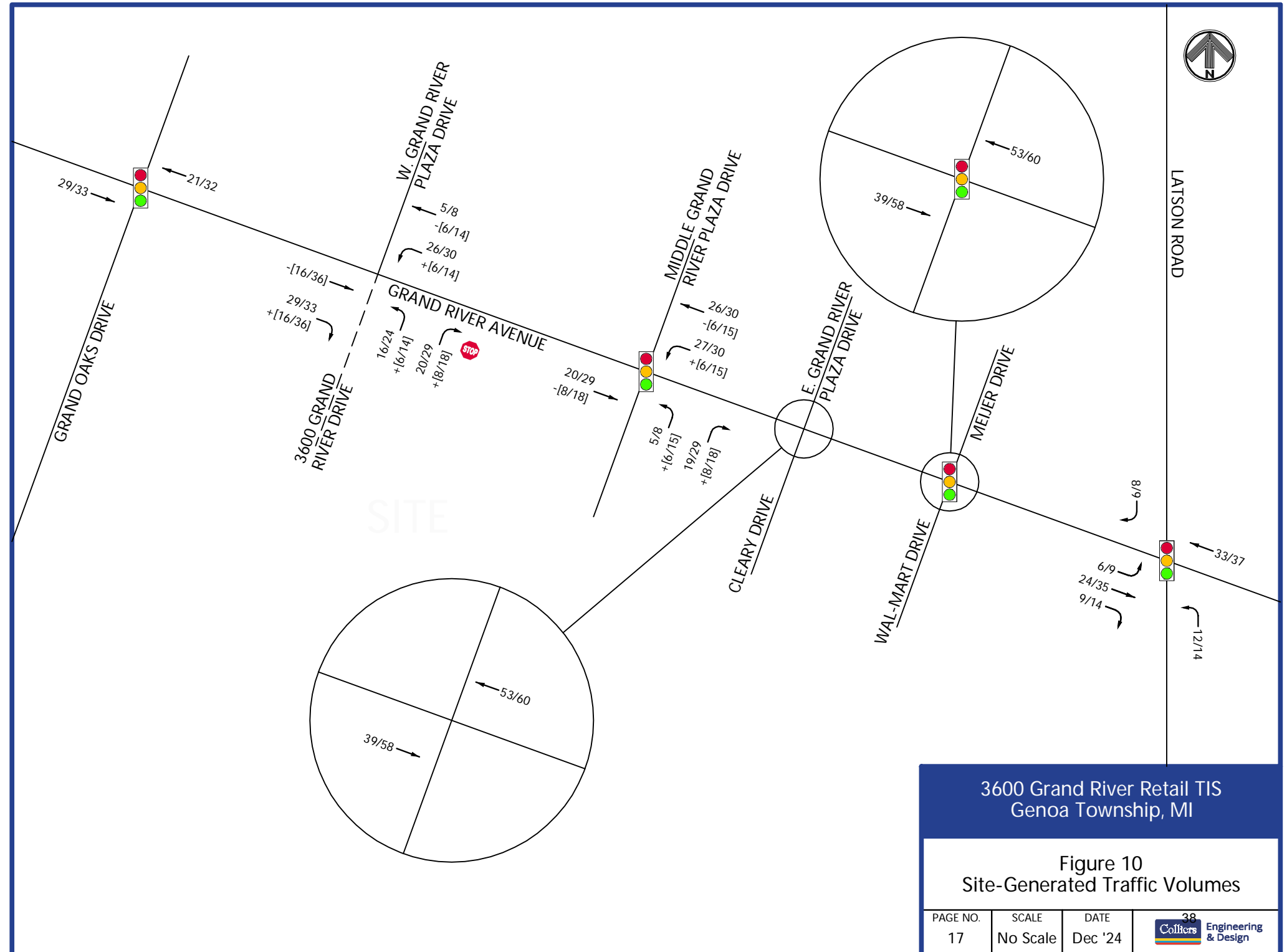
3600 Grand River Retail TIS
Genoa Township, MI

Figure 10
Site-Generated Traffic Volumes

PAGE NO.
17

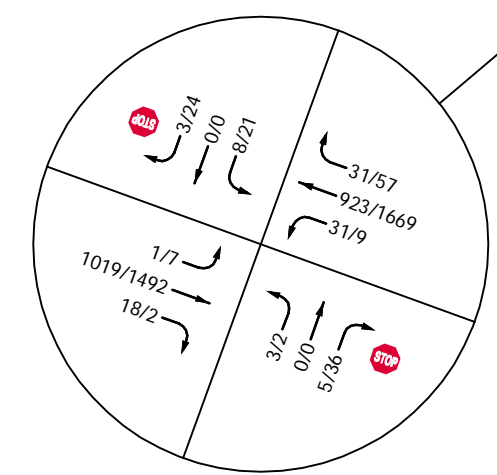
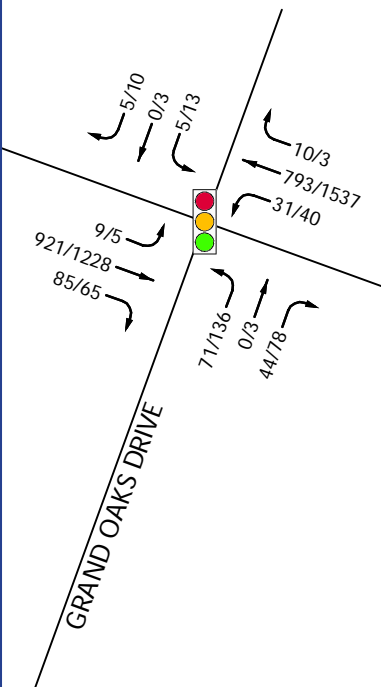
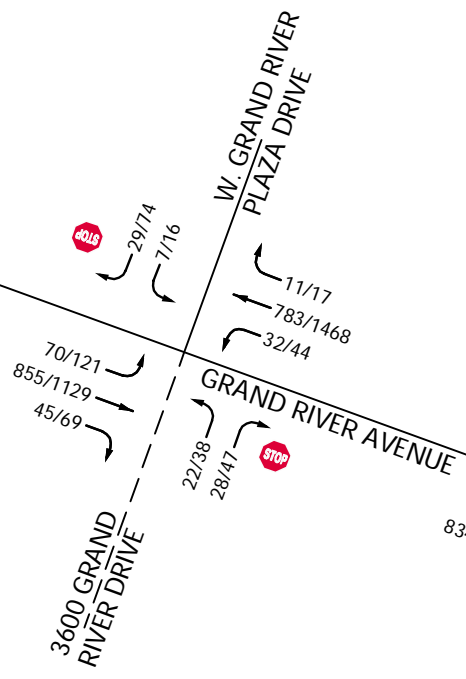
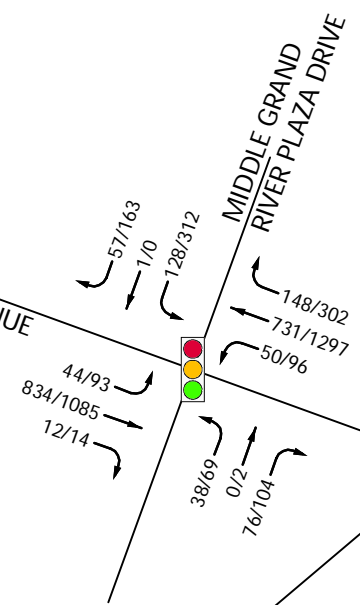
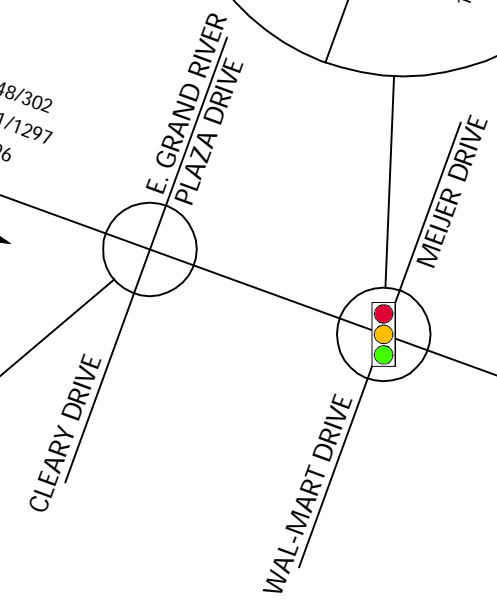
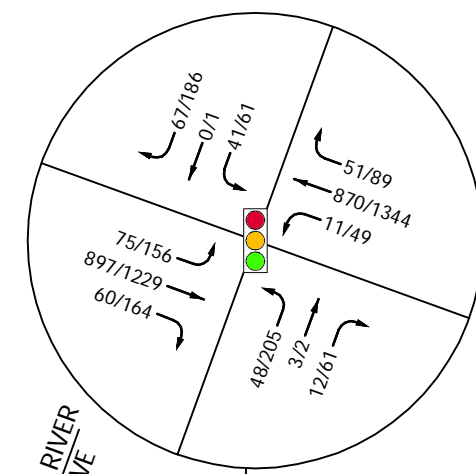
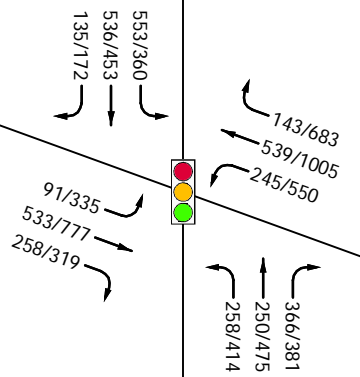
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LATSON ROAD



3600 Grand River Retail TIS
Genoa Township, MI

Figure 11
Build Traffic Volumes

Turn Lane Warrants

In order to determine the configuration of the proposed site driveway with Grand River Avenue, recommendations for right-turn lanes were evaluated in accordance with MDOT standards outlined in Section 1.1.4 of the *Geometric Design Guidance*. A center left-turn lane currently exists along Grand River Avenue to accommodate left-turns into the driveway. The results of the turn lane evaluation are shown on **Figure 12** below and indicates a right-turn lane is recommended at the proposed site driveway.

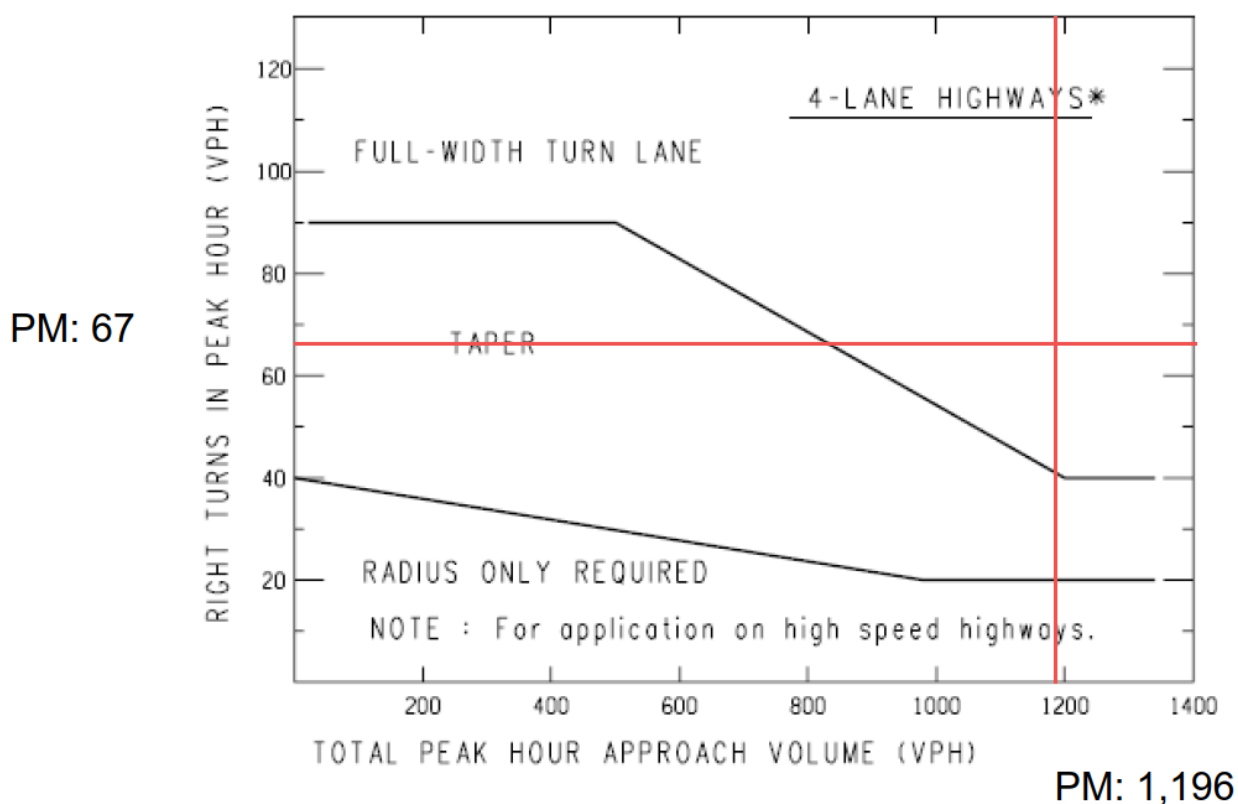


Figure 12: Grand River Avenue & Site Drive Right-Turn Lane Warrant

Build Conditions

Future build peak hour vehicle delays and LOS with the proposed redevelopment were calculated based on existing lane configurations and traffic control shown on **Figure 7**, build traffic volumes shown on **Figure 11**, and HCM methodologies. SimTraffic simulations were also utilized to evaluate traffic flow and vehicle queues throughout the study network. The build conditions results are included in **Appendix D** and summarized in **Table 8**.

Table 8: Build Traffic Conditions

Intersection	Control	Approach	Movement	AM Peak Hour				PM Peak Hour			
				No-Build		Build		No-Build		Build	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Latson Road & Grand River Avenue (I-96 BL)	Signal	EB	Left	45.3	D	45.6	D	41.6	D	41.9	D
			Thru	36.2	D	37.0	D	32.0	C	35.6	D
			Right	25.8	C	25.8	C	19.8	B	20.4	C
		WB	Left	101.8	F	101.8	F	105.5	F	105.5	F
			Thru	28.9	C	29.7	C	59.2	E	71.9	F
			Right	13.3	B	13.4	B	114.6	F	117.5	F
		NB	Left	42.1	D	41.9	D	158.2	F	175.6	F
			Thru	37.8	D	37.8	D	36.4	D	36.4	D
			Right	172.0	F	172.0	F	30.4	C	30.4	C
		SB	Left	41.7	D	41.7	D	117.8	F	117.8	F
			Thru	34.9	C	35.7	D	35.7	D	35.7	D
			Right	26.2	C	26.7	C	23.9	C	24.0	C
		Overall		52.9	D	52.7	D	67.3	E	71.2	E
Grand River Avenue & Meijer Drive / Wal-Mart Drive	Signal	EB	Left	13.8	B	14.2	B	39.2	D	41.8	D
			Thru	17.2	B	17.7	B	26.2	C	26.9	C
			Right	9.6	A	9.6	A	18.1	B	18.1	B
		WB	Left	4.1	A	4.5	A	12.0	B	13.8	B
			Thru	4.1	A	0.4	A	1.4	A	1.6	A
			Right	0.4	A	0.1	A	0.2	A	0.2	A
		NB	Left	42.5	D	42.5	D	68.5	E	68.5	E
			Thru/Right	36.6	D	36.6	D	25.8	C	25.8	C
		SB	Left	38.5	D	38.5	D	28.5	C	28.5	C
			Thru/Right	39.4	D	39.4	D	28.8	C	28.8	C
		Overall		11.5	B	11.6	B	18.9	B	19.2	B
Grand River Avenue & Grand River Plaza Middle Drive	Signal	EB	Left	0.4	A	0.4	A	25.0	C	26.1	C
			Thru	0.4	A	0.4	A	0.5	A	0.5	A
			Right	0.0	A	0.0	A	0.0	A	0.0	A
		WB	Left	0.2	A	0.5	A	14.2	B	18.1	B
			Thru	0.3	A	0.3	A	22.7	C	22.9	C
			Right	0.2	A	0.2	A	16.7	B	16.7	B
		NB	Left	44.3	D	45.2	D	42.8	D	46.2	D
			Thru/Right	41.7	D	50.6	D	33.1	C	35.0	D
		SB	Left	205.3	F	321.2	F	243.5	F	398.0	F
			Thru/Right	48.8	D	48.8	D	40.7	D	40.7	D
		Overall		18.6	B	27.0	C	37.8	D	51.8	D
Grand River Avenue & Grand Oaks Drive	Signal	EB	Left	2.2	A	2.2	A	3.3	A	3.3	A
			Thru	3.4	A	3.5	A	5.3	A	5.4	A
			Right	2.4	A	2.4	A	3.4	A	3.4	A
		WB	Left	1.1	A	1.2	A	2.1	A	2.2	A
			Thru/Right	0.6	A	0.6	A	1.8	A	1.9	A
		NB	Left	42.0	D	42.0	D	39.9	D	39.9	D
			Thru/Right	42.3	D	42.3	D	37.8	D	37.8	D
		SB	Left/Thru/Right	39.0	D	39.0	D	35.3	D	35.3	D
		Overall		4.7	A	4.6	A	6.2	A	6.3	A

Table 8: Build Traffic Conditions (continued)

Intersection	Control	Approach	Movement	AM Peak Hour				PM Peak Hour			
				No-Build		Build		No-Build		Build	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Grand River Avenue & Grand River Plaza W. Drive	STOP (Minor)	EB	Left	10.4	B	10.4	B	18.5	C	18.3	C
			Thru/Right	Free		Free		Free		Free	
		WB	Left			11.2	B			12.1	B
			Thru/Right	Free		Free		Free		Free	
		NB	Left			184.2	F			2,665.3	F
			Right			12.8	B			14.0	B
		SB	Left	77.9	F	102.3	F	1,258.4	F	1,891.3	F
			Right	12.0	B	12.0	B	21.0	C	20.9	C
Grand River Avenue & Grand River Plaza E. Drive / Cleary Drive	STOP (Minor)	EB	Left	10.2	B	10.4	B	15.7	C	16.3	C
			Thru/Right	Free		Free		Free		Free	
		WB	Left	11.8	B	12.1	B	13.4	B	13.9	B
			Thru/Right	Free		Free		Free		Free	
		NB	Left	87.1	F	100.7	F	305.2	F	374.6	F
			Thru/Right	13.5	B	13.8	B	17.2	C	17.9	C
		SB	Left/Thru/Right	63.7	F	75.4	F	1,165.9	F	1,463.7	F

The results of the build conditions analysis indicate that all approaches and movements at the study intersections will continue to operate in a manner similar to no-build conditions with the exception of the following:

- The WB through movement at the signalized intersection of Grand River Avenue & Latson Road which would continue to have vehicle delays that correspond to a LOS E; however, the volume to capacity (v/c) ratio for the movement would exceed 1.0 and therefore, operate at a LOS F.

At the proposed site driveway to Grand River Avenue, all approaches and movements would operate acceptably at a LOS D or better with the exception of the STOP controlled left-turn movement which operate at a LOS F during both peak hours. Review of peak hour simulations indicate future build traffic operations which are similar to no-build conditions. Generally acceptable traffic operations are continued to be observed during the AM peak hour with only the SB left-turn movement from the middle Grand River Plaza drive experiencing a consistent long vehicle queue. During the PM peak hour, long vehicle queues and cycle failures are continued to be observed at the intersection of Grand River Avenue & Latson Road for several approaches and movements, most notably the WB through and right-turn movements and NB and SB left-turn movements.

Build Improvements

In order to improve traffic operations in the build conditions, mitigation measures were investigated. At the intersection of Grand River Avenue & Latson Road, improvements were made as part of the I-96 & Latson Road interchange project to provide dual left-turn lanes and right turn lanes and overlap phasing on all approaches, as well as additional travel lanes along Latson Road. The intersection of Grand River Avenue & Latson Road is considered to be built out and in order to further improve network operations, widening or reconfiguration of Grand River Avenue would be required.

This may include additional through lanes, and/or median boulevard along Grand River Avenue. Such modifications to increase corridor capacity and improve intersection operations are subject to larger funding, programming, right-of-way, environmental, and other considerations. Therefore, further improvements to mitigate all movements to a LOS D or better are considered to be regional and beyond the scope of this study.

As a result, improvements at Grand River Avenue & Latson Road were limited to signal timing and traffic control modifications. Signal cycle length and timing changes were therefore evaluated. The results of this analysis indicate that optimized timings with a 90 second cycle length during both peak hours would result in improved traffic operations; however, several intersection approaches and movements would continue to operate at a LOS E or F during the peak hours.

At the intersection of Grand River Avenue & Grand River Plaza Drive and Grand River Avenue & Meijer / Wal-Mart Drive, signal timing optimization during the peak hours would result in all approaches and movements operating at a LOS D or better during both peak hours. The results of the build conditions analysis with the optimized signal timings are summarized in Table 9.

Table 9: Build Traffic Conditions with Improvements

Intersection	Control	Approach	Movement	AM Peak Hour						PM Peak Hour					
				No-Build		Build		Build IMP		No-Build		Build		Build IMP	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Latson Road & Grand River Avenue (I-96 BL)	Signal	EB	Left	45.3	D	45.6	D	46.4	D	41.6	D	41.9	D	40.3	D
			Thru	36.2	D	37.0	D	47.5	D	32.0	C	35.6	D	24.0	C
			Right	25.8	C	25.8	C	32.0	C	19.8	B	20.4	C	14.7	B
		WB	Left	101.8	F	101.8	F	49.1	D	105.5	F	105.5	F	79.7	F
			Thru	28.9	C	29.7	C	31.8	C	59.2	E	71.9	F	40.1	D
			Right	13.3	B	13.4	B	14.6	B	114.6	F	117.5	F	55.1	E
		NB	Left	42.1	D	41.9	D	42.1	D	158.2	F	175.6	F	89.0	F
			Thru	37.8	D	37.8	D	34.9	C	36.4	D	36.4	D	93.0	F
			Right	172.0	F	172.0	F	88.5	F	30.4	C	30.4	C	45.7	D
		SB	Left	41.7	D	41.7	D	43.1	D	117.8	F	117.8	F	60.9	E
			Thru	34.9	C	35.7	D	32.7	C	35.7	D	35.7	D	82.3	F
			Right	26.2	C	26.7	C	25.2	C	23.9	C	24.0	C	29.1	C
		Overall		52.9	D	52.7	D	42.9	D	67.3	E	71.2	E	54.5	D
Grand River Avenue & Meijer Drive / Wal-Mart Drive	Signal	EB	Left	13.8	B	14.2	B	0.9	A	39.2	D	41.8	D	9.5	A
			Thru	17.2	B	17.7	B	0.5	A	26.2	C	26.9	C	1.1	A
			Right	9.6	A	9.6	A	0.1	A	18.1	B	18.1	B	0.4	A
		WB	Left	4.1	A	4.5	A	0.1	A	12.0	B	13.8	B	1.4	A
			Thru	4.1	A	0.4	A	0.4	A	1.4	A	1.6	A	1.6	A
			Right	0.4	A	0.1	A	0.1	A	0.2	A	0.2	A	0.2	A
		NB	Left	42.5	D	42.5	D	42.4	D	68.5	E	68.5	E	68.5	E
			Thru/Right	36.6	D	36.6	D	36.6	D	25.8	C	25.8	C	25.8	C
		SB	Left	38.5	D	38.5	D	38.5	D	28.5	C	28.5	C	28.5	C
			Thru/Right	39.4	D	39.4	D	39.4	D	28.8	C	28.8	C	28.8	C
		Overall		11.5	B	11.6	B	3.3	A	18.9	B	19.2	B	8.2	A

Table 9: Build Traffic Conditions with Improvements (continued)

Intersection	Control	Approach	Movement	AM Peak Hour						PM Peak Hour					
				No-Build		Build		Build IMP		No-Build		Build		Build IMP	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Grand River Avenue & Grand River Plaza Middle Drive	Signal	EB	Left	0.4	A	0.4	A	0.6	A	25.0	C	26.1	C	5.7	A
			Thru	0.4	A	0.4	A	0.6	A	0.5	A	0.5	A	1.1	A
			Right	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
		WB	Left	0.2	A	0.5	A	0.7	A	14.2	B	18.1	B	2.3	A
			Thru	0.3	A	0.3	A	0.4	A	22.7	C	22.9	C	2.0	A
			Right	0.2	A	0.2	A	0.3	A	16.7	B	16.7	B	1.1	A
		NB	Left	44.3	D	45.2	D	33.1	C	42.8	D	46.2	D	28.4	C
			Thru/Right	41.7	D	50.6	D	30.8	C	33.1	C	35.0	D	21.6	C
		SB	Left	205.3	F	321.2	F	40.8	D	243.5	F	398.0	F	49.0	D
			Thru/Right	48.8	D	48.8	D	30.7	C	40.7	D	40.7	D	23.6	C
Overall			18.6	B	27.0	C	5.8	A	37.8	D	51.8	D	8.4	A	
Grand River Avenue & Grand Oaks Drive	Signal	EB	Left	2.2	A	2.2	A	2.2	A	3.3	A	3.3	A	3.3	A
			Thru	3.4	A	3.5	A	3.5	A	5.3	A	5.4	A	5.4	A
			Right	2.4	A	2.4	A	2.4	A	3.4	A	3.4	A	3.4	A
		WB	Left	1.1	A	1.2	A	1.2	A	2.1	A	2.2	A	2.2	A
			Thru/Right	0.6	A	0.6	A	0.6	A	1.8	A	1.9	A	1.9	A
		NB	Left	42.0	D	42.0	D	42.0	D	39.9	D	39.9	D	39.9	D
			Thru/Right	42.3	D	42.3	D	42.3	D	37.8	D	37.8	D	37.8	D
		SB	Left/Thru/Right	39.0	D	39.0	D	39.0	D	35.3	D	35.3	D	35.4	D
		Overall			4.7	A	4.6	A	4.6	A	6.2	A	6.3	A	6.3

Review of peak hour simulations indicate acceptable traffic operations during the AM peak hour with the optimized signal timings. During the PM peak hour, moderate vehicle queues and cycle failures are continued to be observed at the intersection of Grand River Avenue & Latson Road for several approaches and movements. Additionally, the traffic signals along Grand River Avenue at Grand Oaks Drive and the Grand River Plaza Drive help to create gaps in Grand River Avenue to facilitate turning movements from the proposed site driveway. As a result, 95th percentile queue lengths for the site driveway approach are calculated to be 116 feet (4-5 vehicles) with an average queue of 53 feet (two vehicles) which is not significant and will not interrupt internal site circulation.

Access Management

MDOT standards for the spacing of commercial drives outlined in Section 1.2.2 of Geometric Design Guidance were reviewed with respect to the proposed site driveway along Grand River Avenue. These standards are summarized in **Table 10** and indicate that the driveway spacing between the proposed driveway does not meet MDOT requirements from other driveways along the corridor including the speedway gas station driveway to the east and Carpet Center & Floors driveway to the west; however, the proposed driveway is an improvement in access management for the site by eliminating the existing closely spaced offset between the Grand River Plaza Driveway on the north side of Grand River Avenue as well as providing cross access connection to allow site traffic to utilize the signal located to the east to access the site.

Table 10: Driveway Spacing Summary

Driveway	Adjacent Driveway	Distance	MDOT Requirement
Proposed Site Drive	Speedway Gas Station Drive	330	455
	Carpet Center & Floors Drive	400	455

Vehicle Queue Evaluation

At the request of MDOT, a vehicle queue evaluation was completed at the study intersections. The results of the queue evaluation are summarized in **Table 11** and **Table 12** and SimTraffic report summaries can be found in the Appendices.

Table 11: Vehicle Queue Summary – AM Peak Hour

Intersection	Control	Approach	Movement	AM Peak Hour							
				Average Queue				95th % Queue			
				Existing	No-Build	Build	Build IMP	Existing	No-Build	Build	Build IMP
Latson Road & Grand River Avenue (I-96 BL)	Signal	EB	Left	23	27	24	19	59	62	63	52
			Thru	59	68	82	140	106	120	154	217
			Right	5	21	30	83	22	67	90	154
		WB	Left	64	127	127	97	119	225	206	173
			Thru	87	107	113	124	148	183	195	192
			Right	10	18	18	16	37	59	59	46
		NB	Left	67	116	98	92	124	304	154	152
			Thru	151	601	308	329	467	1328	640	767
			Right	231	381	351	316	412	591	556	563
		SB	Left	183	190	201	207	256	270	315	271
			Thru	106	163	233	161	171	255	391	266
			Right	47	63	86	79	99	121	152	148
Grand River Avenue & Meijer Drive / Wal-Mart Drive	Signal	EB	Left	31	36	37	43	65	71	64	84
			Thru	46	77	80	64	109	155	154	118
			Right	10	12	10	13	35	39	32	39
		WB	Left	7	9	9	11	27	31	32	32
			Thru	43	62	66	16	92	119	139	46
			Right	7	10	7	2	26	31	28	14
		NB	Left	32	26	33	36	73	62	88	76
			Thru/Right	12	11	16	16	35	35	38	43
		SB	Left	28	32	25	37	68	71	54	78
			Thru/Right	26	26	29	41	49	50	62	73
Grand River Avenue & Grand River Plaza Middle Drive	Signal	EB	Left	0	26	27	40	0	57	57	88
			Thru	30	40	47	89	84	86	97	181
			Right	2	3	0	2	16	22	0	12
		WB	Left	6	9	21	24	23	31	47	55
			Thru	13	34	37	39	43	75	89	79
			Right	1	16	21	19	8	45	62	43
		NB	Left	26	24	44	51	69	67	113	115
			Thru/Right	33	32	42	40	61	60	65	60
		SB	Left	11	255	299	109	34	396	382	186
			Thru/Right	5	94	94	62	21	173	175	135

Table 11: Vehicle Queue Summary – AM Peak Hour (continued)

Intersection	Control	Approach	Movement	AM Peak Hour							
				Average Queue				95th % Queue			
				Existing	No-Build	Build	Build IMP	Existing	No-Build	Build	Build IMP
Grand River Avenue & Grand Oaks Drive	Signal	EB	Left	5	4	8	6	21	19	28	22
			Thru	41	47	47	56	90	100	95	110
			Right	11	10	13	13	37	31	39	39
		WB	Left	19	20	18	17	47	53	44	44
			Thru/Right	34	44	43	28	84	96	104	73
		NB	Left	57	59	54	73	112	116	103	136
			Thru/Right	19	19	17	20	45	48	43	45
Grand River Avenue & Grand River Plaza W. Drive	STOP (Minor)	SB	Left/Thru/Right	13	13	12	8	43	39	39	31
		EB	Left	2	30	26	35	12	62	52	66
		WB	Left			12	21			35	48
						12	15			34	38
		NB	Right			15	23			36	46
Grand River Avenue & Grand River Plaza E. Drive / Cleary Drive	STOP (Minor)	SB	Left	0	9	7	7	0	30	28	24
			Right	2	18	14	14	13	38	30	30
		EB	Left	0	0	0	0	4	3	0	0
		WB	Left	14	18	16	17	39	45	39	42
		NB	Left	3	3	5	4	19	17	24	21
			Thru/Right	6	7	7	7	26	29	28	27
		SB	Left/Thru/Right	2	12	7	8	15	38	26	27

Table 12: Vehicle Queue Summary – PM Peak Hour

Intersection	Control	Approach	Movement	PM Peak Hour							
				Average Queue				95th % Queue			
				Existing	No-Build	Build	Build IMP	Existing	No-Build	Build	Build IMP
Latson Road & Grand River Avenue (I-96 BL)	Signal	EB	Left	78	90	82	99	135	159	126	155
			Thru	79	128	178	146	140	242	341	238
			Right	13	35	42	49	48	93	119	111
		WB	Left	217	490	496	268	393	685	697	429
			Thru	400	1653	1847	293	917	2512	2396	494
			Right	282	375	375	277	440	377	375	429
		NB	Left	126	374	368	172	192	587	528	265
			Thru	101	266	208	205	157	715	416	298
			Right	120	180	165	219	203	280	256	347
		SB	Left	168	195	180	155	239	298	247	215
			Thru	102	143	117	164	168	257	181	265
			Right	63	69	77	86	113	123	136	148
Grand River Avenue & Meijer Drive / Wal-Mart Drive	Signal	EB	Left	72	91	100	103	132	151	169	179
			Thru	88	136	146	134	146	206	224	224
			Right	26	31	31	36	57	80	61	74
		WB	Left	32	40	33	37	67	94	73	71
			Thru	144	197	206	178	216	263	274	234
			Right	24	21	24	22	52	47	49	50
		NB	Left	119	141	118	145	202	259	187	292
			Thru/Right	30	47	32	50	58	148	62	146
		SB	Left	39	44	43	45	81	85	96	96
			Thru/Right	59	64	62	56	110	116	101	106

Table 12: Vehicle Queue Summary – PM Peak Hour (continued)

Intersection	Control	Approach	Movement	PM Peak Hour							
				Average Queue				95th % Queue			
				Existing	No-Build	Build	Build IMP	Existing	No-Build	Build	Build IMP
Grand River Avenue & Grand River Plaza Middle Drive	Signal	EB	Left	12	74	67	72	36	143	135	127
			Thru	60	88	94	167	123	171	161	275
			Right	1	2	2	7	15	10	12	36
		WB	Left	25	26	50	91	57	56	93	194
			Thru	70	102	110	142	139	178	200	211
			Right	21	61	58	70	63	128	122	150
		NB	Left	50	39	66	53	105	84	133	137
			Thru/Right	34	38	45	44	62	62	54	54
		SB	Left	60	322	321	156	111	336	334	287
			Thru/Right	31	105	115	100	75	169	155	164
Grand River Avenue & Grand Oaks Drive	Signal	EB	Left	4	3	2	6	17	16	12	25
			Thru	73	96	99	96	136	167	171	180
			Right	11	12	12	13	35	35	33	37
		WB	Left	23	28	32	31	56	59	61	71
			Thru/Right	76	88	89	73	130	148	135	135
		NB	Left	83	86	90	98	150	148	141	146
			Thru/Right	28	36	29	31	65	85	73	60
		SB	Left/Thru/Right	25	20	24	24	58	51	58	56
Grand River Avenue & Grand River Plaza W. Drive	STOP (Minor)	EB	Left	10	54	56	78	32	102	93	134
		WB	Left			27	24			64	54
		NB	Left			29	31			59	54
			Right			66	33			171	72
		SB	Left	3	17	25	14	16	55	67	38
			Right	11	33	43	29	28	65	75	50
Grand River Avenue & Grand River Plaza E. Drive / Cleary Drive	STOP (Minor)	EB	Left	3	4	6	5	16	17	21	22
		WB	Left	7	7	5	7	27	27	21	28
		NB	Left	3	12	7	8	18	61	43	31
			Thru/Right	27	38	39	38	54	79	77	70
		SB	Left/Thru/Right	27	131	148	77	65	329	334	155

Conclusions

The Conclusions related to this Traffic Impact Study and relative analyses are as follows:

1. All study intersection approaches and movements currently operate acceptably at a LOS D or better during both peak hours with the exception of the following:
 - a. The NB, SB, and WB left-turn movements at the signalized intersection of Grand River Avenue & Latson Road which currently operate at a LOS E or F during the PM peak hour. Additionally, the NB and WB right-turn movements operate at a LOS F during the AM and PM peak hours, respectively.
 - b. The NB left-turn movement at the signalized intersection of Grand River Avenue & Meijer Drive / Wal-Mart Drive which currently operates at a LOS E.
 - c. The STOP controlled left-turn movement from the W. Grand River Plaza Drive to Grand River Avenue which operates at a LOS F during the PM peak hour.

- d. The STOP controlled left turn movements from the E. Grand River Plaza Drive and Cleary University Drive to Grand River Avenue which operates at a LOS E or F during both peak hours.
2. Ambient traffic growth of 0.75% was applied to establish 2026 no-build traffic volumes without the proposed development. The following background developments were also identified in the study area and included in this study.
 - a. Versa Mixed-Use Development
 - b. Westbury Phase II Residential Development
 - c. SJMHS Hospital Expansion
 - d. Latson Road Retail Development (Mister Car Wash)
 - e. Forest Ridge Residential Development
 - f. Pine Creek Residential Development
 - g. Grand River Plaza Redevelopment
3. No-build conditions analyses indicate that the intersection of Grand River Avenue & Latson Road will operate at an overall LOS E during the PM peak hour with several movements at the intersection operating at a LOS E or F.
4. A right-turn lane is warranted at the proposed site driveway to Grand River Avenue.
5. Future build conditions analyses indicate that most study intersection approaches and movements will continue to operate acceptably; however, there are several movements with undesirable or failing conditions at the intersection of Grand River Avenue & Latson Road that are expected to worsen in the future if those movements operating at a LOS E or F are not improved under no-build conditions.
6. With the improvements outlined below, all study network intersections and site driveways will operate acceptably, or in a manner similar or improved compared to no-build conditions during the peak hours.
7. Long term improvement alternatives for the Grand River Avenue & Latson Road intersection should be evaluated considering regional demands, MDOT project programming and asset management, funding, right-of-way, environmental and other considerations.

Based on the results of this study, the following should be considered to provide acceptable traffic operations with the proposed development project:

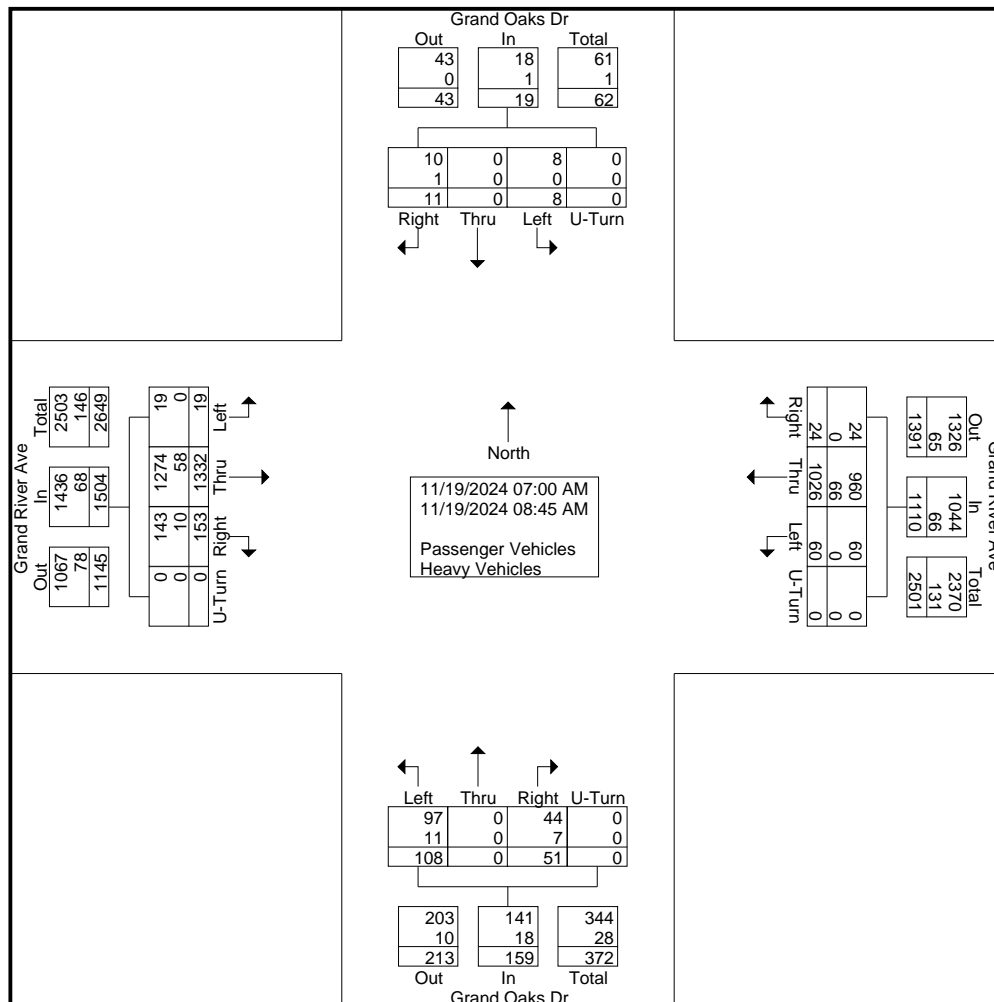
1. Construct a right-turn lane at the proposed site driveway to Grand River Avenue.
2. Optimize signal timings at the intersection of Grand River Avenue & Latson Road.
3. Optimize signal timings at the intersection of Grand River Avenue & Grand River Plaza Drive.
4. Optimize signal timings at the intersection of Grand River Avenue & Meijer / Wal-Mart Drive.

Appendix

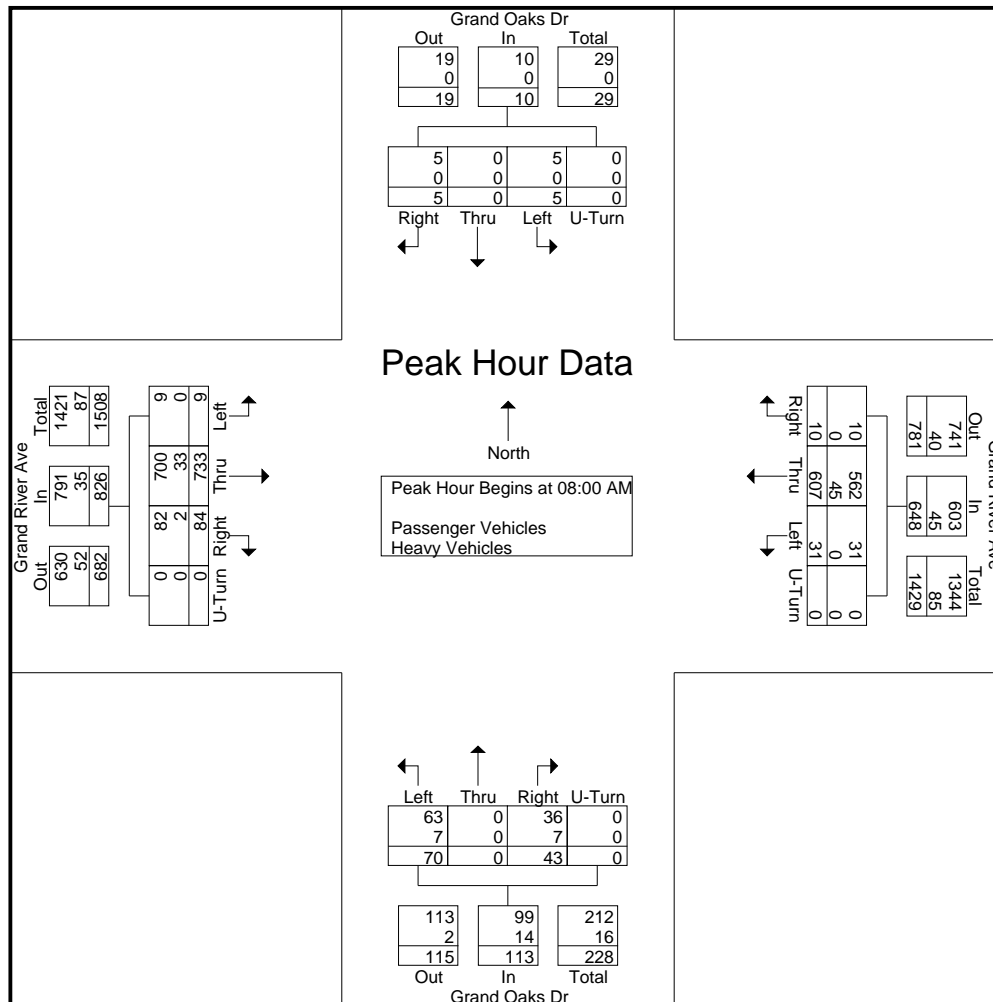
Appendix A | Traffic Count Data

Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	2	0	0	0	2	2	79	5	0	86	0	0	3	0	3	17	96	0	0	113	204
07:15 AM	0	0	2	0	2	3	97	8	0	108	2	0	8	0	10	17	155	2	0	174	294
07:30 AM	2	0	1	0	3	6	110	6	0	122	2	0	11	0	13	10	183	2	0	195	333
07:45 AM	2	0	0	0	2	3	133	10	0	146	4	0	16	0	20	25	165	6	0	196	364
Total	6	0	3	0	9	14	419	29	0	462	8	0	38	0	46	69	599	10	0	678	1195
08:00 AM	1	0	0	0	1	3	131	5	0	139	15	0	16	0	31	19	177	1	0	197	368
08:15 AM	1	0	3	0	4	1	138	4	0	143	7	0	18	0	25	23	165	2	0	190	362
08:30 AM	1	0	2	0	3	2	157	16	0	175	11	0	13	0	24	14	159	4	0	177	379
08:45 AM	2	0	0	0	2	4	181	6	0	191	10	0	23	0	33	28	232	2	0	262	488
Total	5	0	5	0	10	10	607	31	0	648	43	0	70	0	113	84	733	9	0	826	1597
Grand Total	11	0	8	0	19	24	1026	60	0	1110	51	0	108	0	159	153	1332	19	0	1504	2792
Apprch %	57.9	0	42.1	0		2.2	92.4	5.4	0		32.1	0	67.9	0		10.2	88.6	1.3	0		
Total %	0.4	0	0.3	0	0.7	0.9	36.7	2.1	0	39.8	1.8	0	3.9	0	5.7	5.5	47.7	0.7	0	53.9	
Passenger Vehicles	10	0	8	0	18	24	960	60	0	1044	44	0	97	0	141	143	1274	19	0	1436	2639
% Passenger Vehicles	90.9	0	100	0	94.7	100	93.6	100	0	94.1	86.3	0	89.8	0	88.7	93.5	95.6	100	0	95.5	94.5
Heavy Vehicles	1	0	0	0	1	0	66	0	0	66	7	0	11	0	18	10	58	0	0	68	153
% Heavy Vehicles	9.1	0	0	0	5.3	0	6.4	0	0	5.9	13.7	0	10.2	0	11.3	6.5	4.4	0	0	4.5	5.5

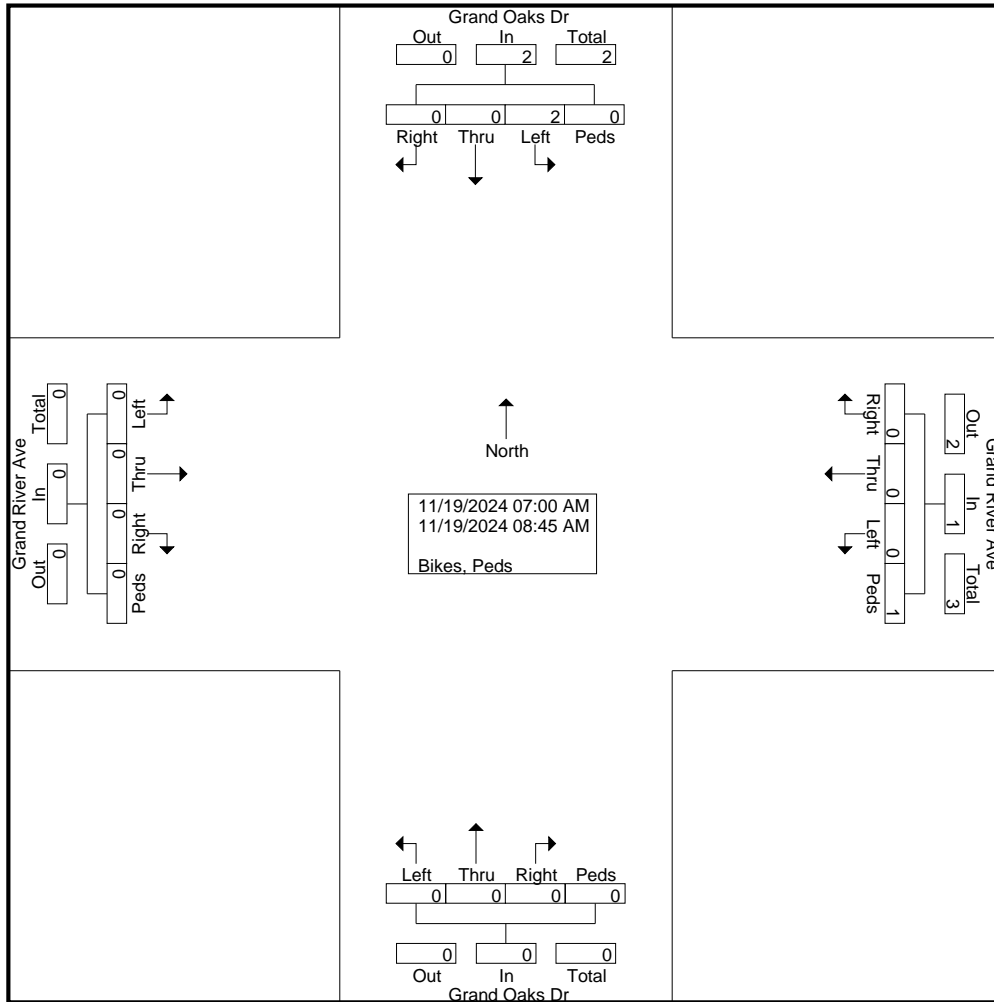


	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	0	0	0	1	3	131	5	0	139	15	0	16	0	31	19	177	1	0	197	368
08:15 AM	1	0	3	0	4	1	138	4	0	143	7	0	18	0	25	23	165	2	0	190	362
08:30 AM	1	0	2	0	3	2	157	16	0	175	11	0	13	0	24	14	159	4	0	177	379
08:45 AM	2	0	0	0	2	4	181	6	0	191	10	0	23	0	33	28	232	2	0	262	488
Total Volume	5	0	5	0	10	10	607	31	0	648	43	0	70	0	113	84	733	9	0	826	1597
% App. Total	50	0	50	0		1.5	93.7	4.8	0		38.1	0	61.9	0		10.2	88.7	1.1	0		
PHF	.625	.000	.417	.000	.625	.625	.838	.484	.000	.848	.717	.000	.761	.000	.856	.750	.790	.563	.000	.788	.818
Passenger Vehicles	5	0	5	0	10	10	562	31	0	603	36	0	63	0	99	82	700	9	0	791	1503
% Passenger Vehicles	100	0	100	0	100	100	92.6	100	0	93.1	83.7	0	90.0	0	87.6	97.6	95.5	100	0	95.8	94.1
Heavy Vehicles	0	0	0	0	0	0	45	0	0	45	7	0	7	0	14	2	33	0	0	35	94
% Heavy Vehicles	0	0	0	0	0	0	7.4	0	0	6.9	16.3	0	10.0	0	12.4	2.4	4.5	0	0	4.2	5.9

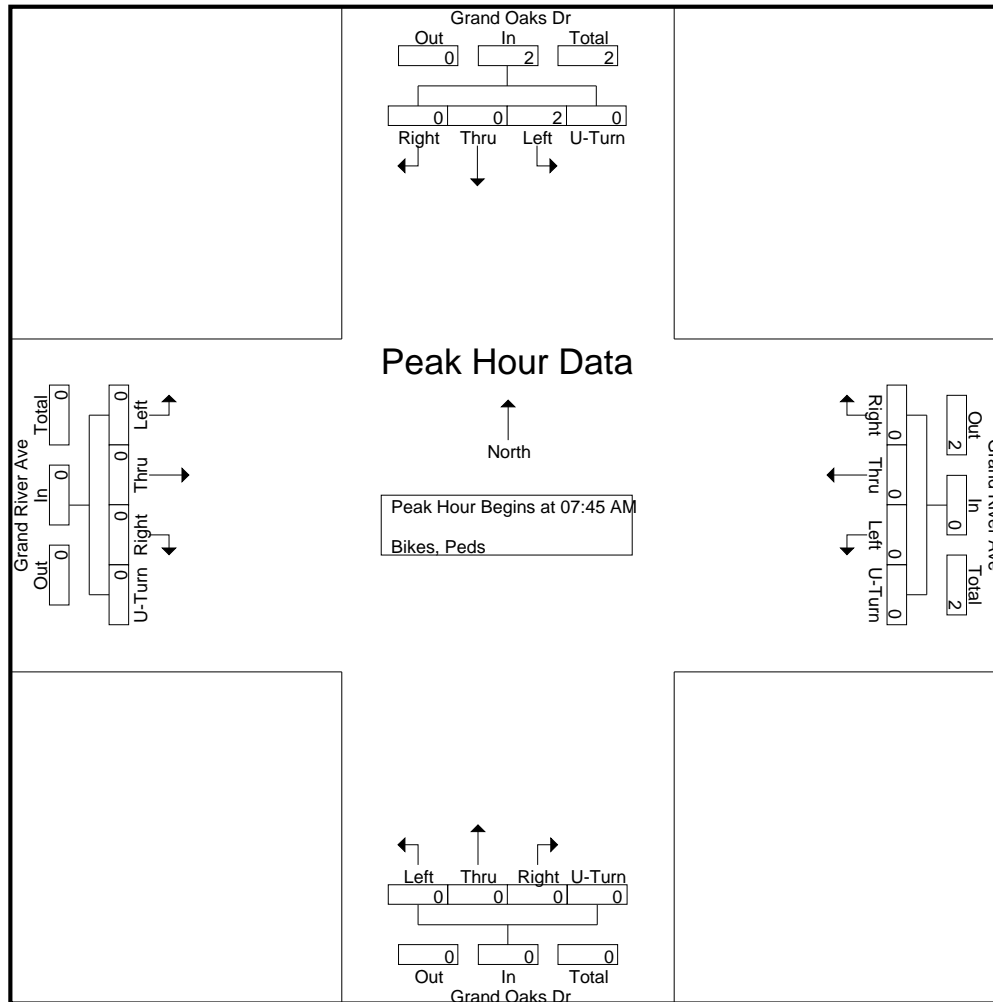


Groups Printed- Bikes, Peds

	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Grand Total	0	0	2	0	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3
Apprch %	0	0	100	0		0	0	0	100		0	0	0	0		0	0	0	0		
Total %	0	0	66.7	0	66.7	0	0	0	33.3	33.3	0	0	0	0	0	0	0	0	0	0	

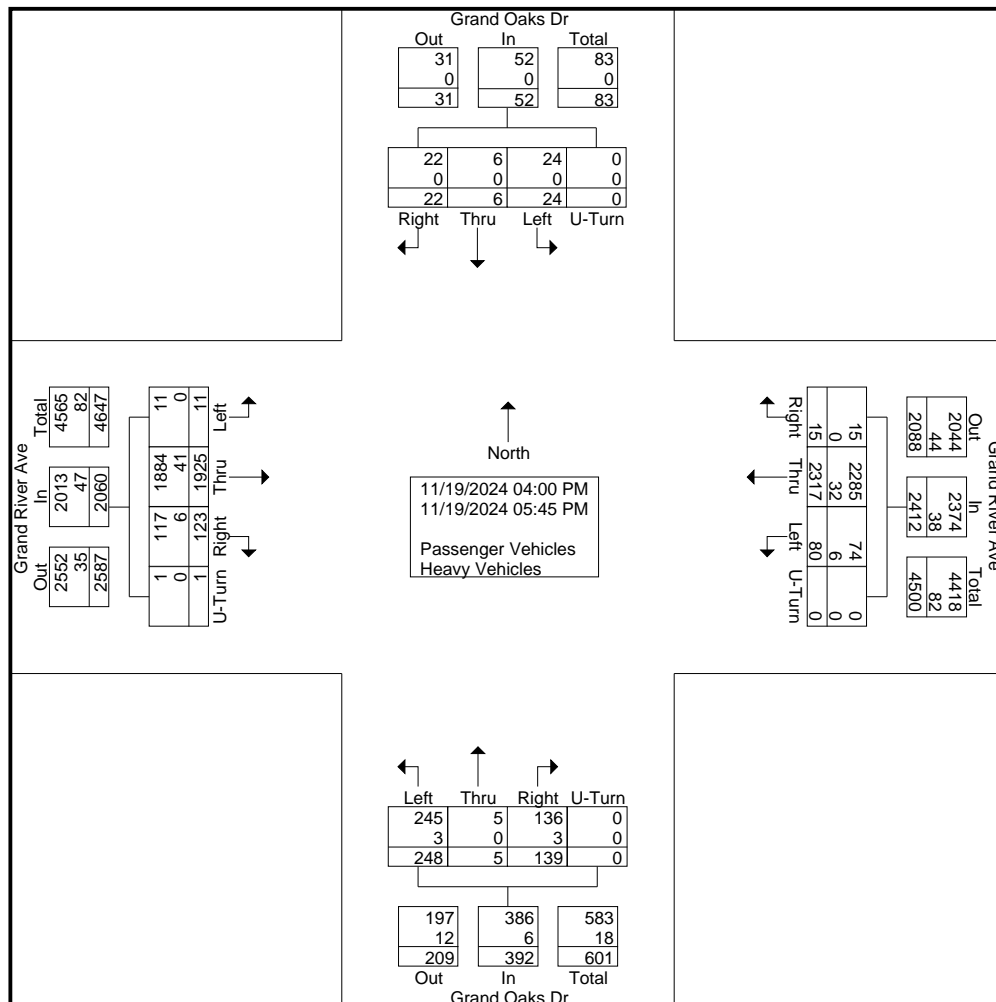


	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250



Groups Printed- Passenger Vehicles - Heavy Vehicles

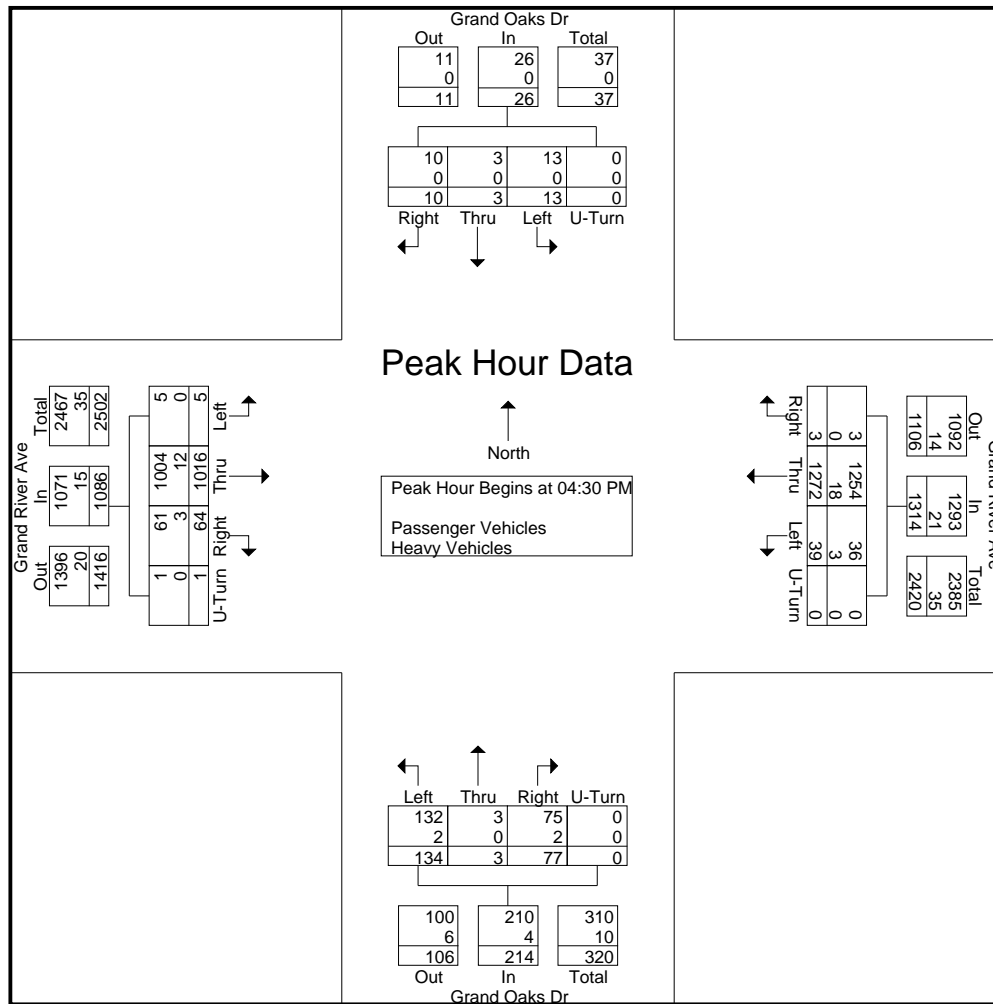
	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	6	1	3	0	10	2	272	9	0	283	29	0	39	0	68	21	267	2	0	290	651
04:15 PM	2	2	4	0	8	4	282	13	0	299	12	1	36	0	49	9	253	2	0	264	620
04:30 PM	1	0	2	0	3	0	283	11	0	294	17	1	42	0	60	15	256	1	0	272	629
04:45 PM	4	1	3	0	8	3	335	10	0	348	21	0	29	0	50	15	249	1	0	265	671
Total	13	4	12	0	29	9	1172	43	0	1224	79	2	146	0	227	60	1025	6	0	1091	2571
05:00 PM	2	1	4	0	7	0	347	11	0	358	16	0	37	0	53	18	261	2	0	281	699
05:15 PM	3	1	4	0	8	0	307	7	0	314	23	2	26	0	51	16	250	1	1	268	641
05:30 PM	3	0	3	0	6	3	271	8	0	282	12	0	22	0	34	17	188	1	0	206	528
05:45 PM	1	0	1	0	2	3	220	11	0	234	9	1	17	0	27	12	201	1	0	214	477
Total	9	2	12	0	23	6	1145	37	0	1188	60	3	102	0	165	63	900	5	1	969	2345
Grand Total	22	6	24	0	52	15	2317	80	0	2412	139	5	248	0	392	123	1925	11	1	2060	4916
Apprch %	42.3	11.5	46.2	0		0.6	96.1	3.3	0		35.5	1.3	63.3	0		6	93.4	0.5	0		
Total %	0.4	0.1	0.5	0	1.1	0.3	47.1	1.6	0	49.1	2.8	0.1	5	0	8	2.5	39.2	0.2	0	41.9	
Passenger Vehicles	22	6	24	0	52	15	2285	74	0	2374	136	5	245	0	386	117	1884	11	1	2013	4825
% Passenger Vehicles	100	100	100	0	100	100	98.6	92.5	0	98.4	97.8	100	98.8	0	98.5	95.1	97.9	100	100	97.7	98.1
Heavy Vehicles	0	0	0	0	0	0	32	6	0	38	3	0	3	0	6	6	41	0	0	47	91
% Heavy Vehicles	0	0	0	0	0	0	1.4	7.5	0	1.6	2.2	0	1.2	0	1.5	4.9	2.1	0	0	2.3	1.9





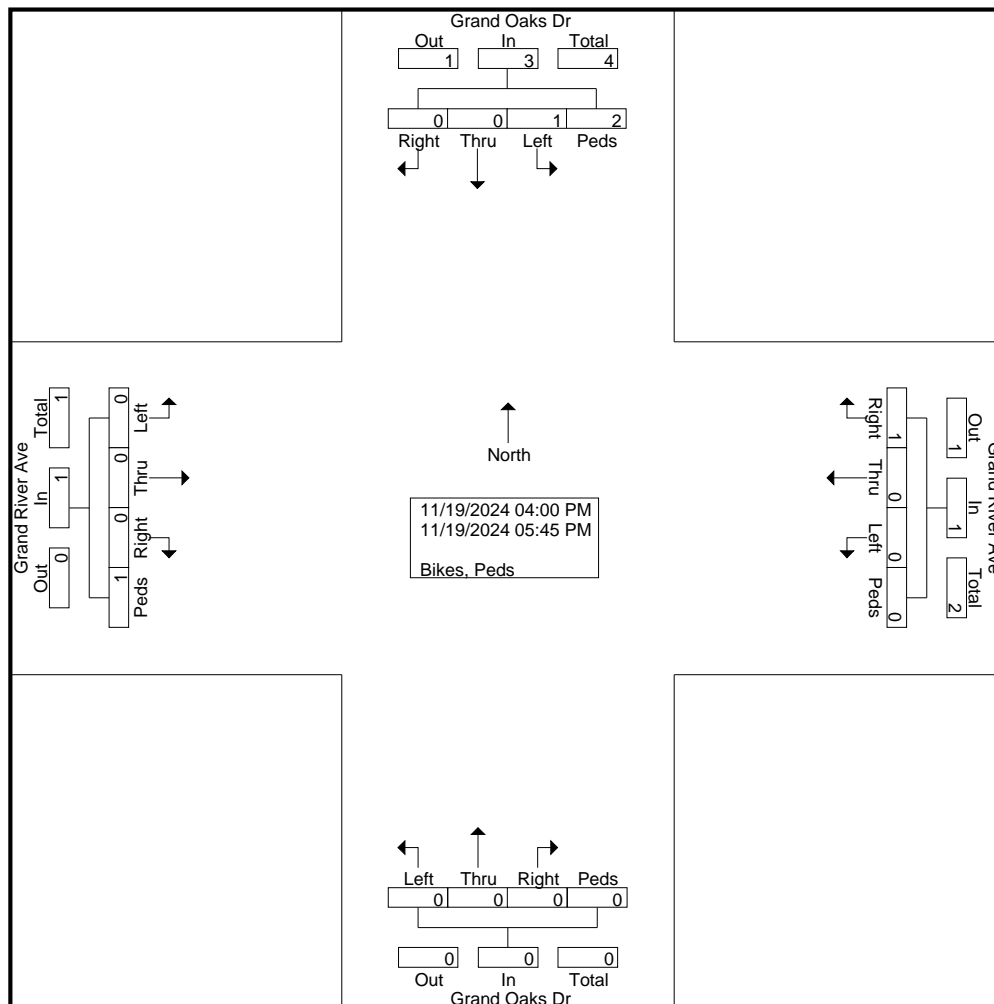
File Name : 16829802 - Grand Oaks Dr -- Grand River Ave
Site Code : 16829802
Start Date : 11/19/2024
Page No : 2

	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	1	0	2	0	3	0	283	11	0	294	17	1	42	0	60	15	256	1	0	272	629
04:45 PM	4	1	3	0	8	3	335	10	0	348	21	0	29	0	50	15	249	1	0	265	671
05:00 PM	2	1	4	0	7	0	347	11	0	358	16	0	37	0	53	18	261	2	0	281	699
05:15 PM	3	1	4	0	8	0	307	7	0	314	23	2	26	0	51	16	250	1	1	268	641
Total Volume	10	3	13	0	26	3	1272	39	0	1314	77	3	134	0	214	64	1016	5	1	1086	2640
% App. Total	38.5	11.5	50	0		0.2	96.8	3	0		36	1.4	62.6	0		5.9	93.6	0.5	0.1		
PHF	.625	.750	.813	.000	.813	.250	.916	.886	.000	.918	.837	.375	.798	.000	.892	.889	.973	.625	.250	.966	.944
Passenger Vehicles	10	3	13	0	26	3	1254	36	0	1293	75	3	132	0	210	61	1004	5	1	1071	2600
% Passenger Vehicles	100	100	100	0	100	100	98.6	92.3	0	98.4	97.4	100	98.5	0	98.1	95.3	98.8	100	100	98.6	98.5
Heavy Vehicles	0	0	0	0	0	0	18	3	0	21	2	0	2	0	4	3	12	0	0	15	40
% Heavy Vehicles	0	0	0	0	0	0	1.4	7.7	0	1.6	2.6	0	1.5	0	1.9	4.7	1.2	0	0	1.4	1.5

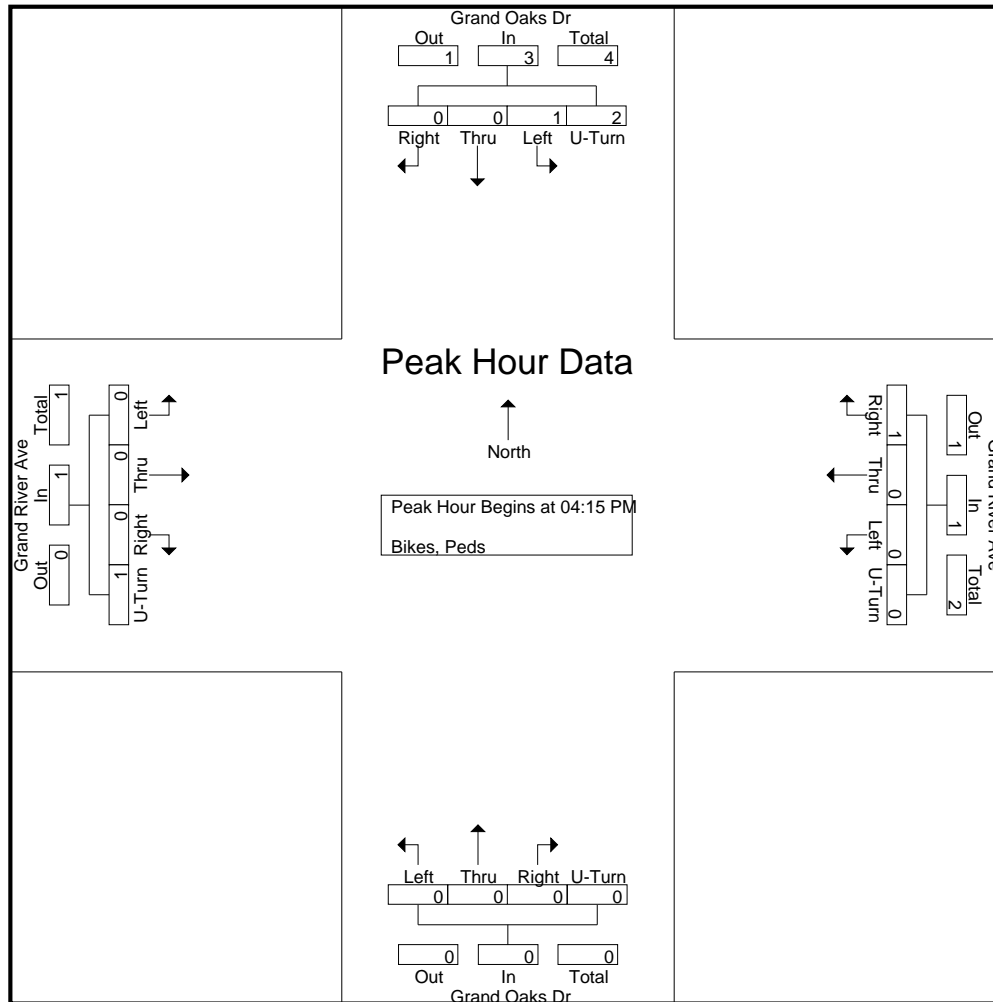


Groups Printed- Bikes, Peds

	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
05:00 PM	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Grand Total	0	0	1	2	3	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	5
Apprch %	0	0	33.3	66.7		100	0	0	0		0	0	0	0		0	0	0	100		
Total %	0	0	20	40	60	20	0	0	0	20	0	0	0	0	0	0	0	0	20	20	

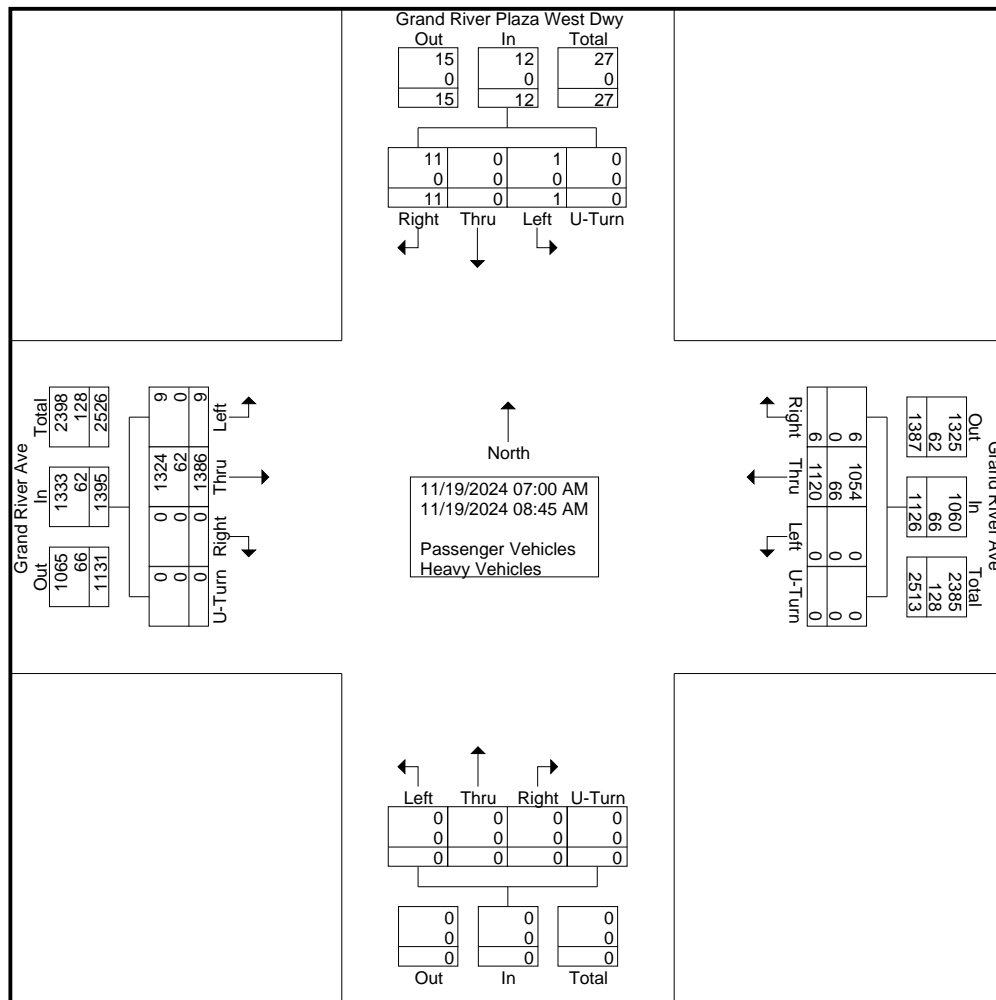


	Grand Oaks Dr Southbound					Grand River Ave Westbound					Grand Oaks Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:00 PM	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	1	2	3	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	5
% App. Total	0	0	33.3	66.7		100	0	0	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.250	.500	.750	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.625

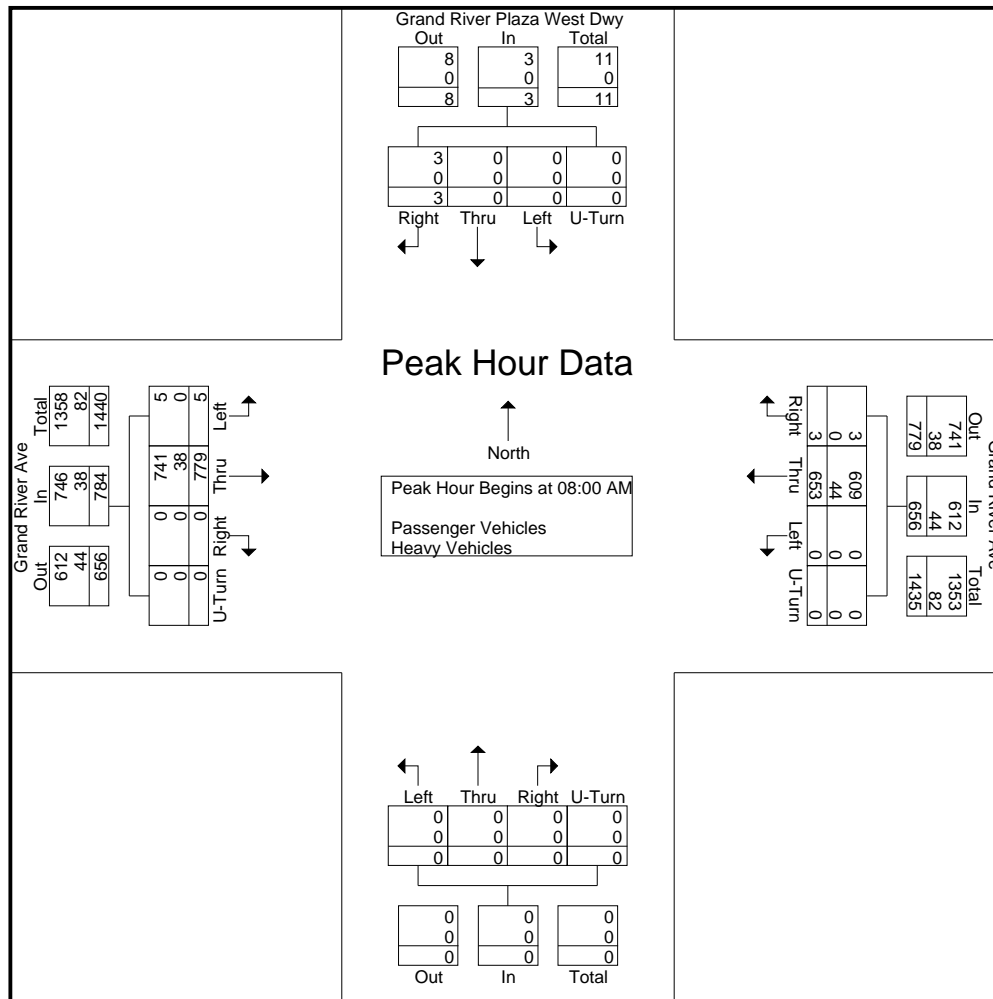


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	87	0	0	87	0	0	0	0	0	0	99	0	0	99	186
07:15 AM	2	0	0	0	2	1	111	0	0	112	0	0	0	0	0	0	155	1	0	156	270
07:30 AM	3	0	1	0	4	0	121	0	0	121	0	0	0	0	0	0	190	2	0	192	317
07:45 AM	3	0	0	0	3	2	148	0	0	150	0	0	0	0	0	0	163	1	0	164	317
Total	8	0	1	0	9	3	467	0	0	470	0	0	0	0	0	0	607	4	0	611	1090
08:00 AM	0	0	0	0	0	0	145	0	0	145	0	0	0	0	0	0	192	0	0	192	337
08:15 AM	1	0	0	0	1	1	146	0	0	147	0	0	0	0	0	0	178	0	0	178	326
08:30 AM	0	0	0	0	0	0	175	0	0	175	0	0	0	0	0	0	165	0	0	165	340
08:45 AM	2	0	0	0	2	2	187	0	0	189	0	0	0	0	0	0	244	5	0	249	440
Total	3	0	0	0	3	3	653	0	0	656	0	0	0	0	0	0	779	5	0	784	1443
Grand Total	11	0	1	0	12	6	1120	0	0	1126	0	0	0	0	0	0	1386	9	0	1395	2533
Apprch %	91.7	0	8.3	0		0.5	99.5	0	0		0	0	0	0		0	99.4	0.6	0		
Total %	0.4	0	0	0	0.5	0.2	44.2	0	0	44.5	0	0	0	0	0	0	54.7	0.4	0	55.1	
Passenger Vehicles	11	0	1	0	12	6	1054	0	0	1060	0	0	0	0	0	0	1324	9	0	1333	2405
% Passenger Vehicles	100	0	100	0	100	100	94.1	0	0	94.1	0	0	0	0	0	0	95.5	100	0	95.6	94.9
Heavy Vehicles	0	0	0	0	0	0	66	0	0	66	0	0	0	0	0	0	62	0	0	62	128
% Heavy Vehicles	0	0	0	0	0	0	5.9	0	0	5.9	0	0	0	0	0	0	4.5	0	0	4.4	5.1

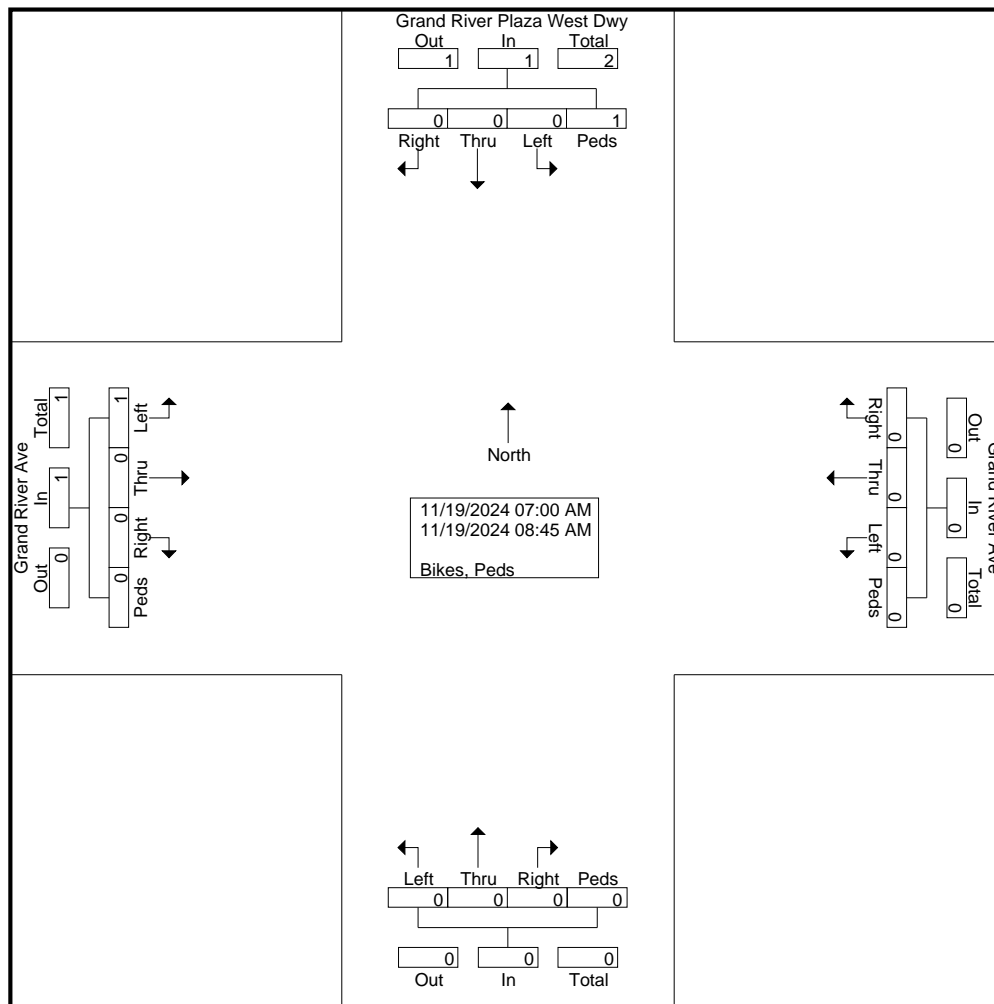


	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	145	0	0	145	0	0	0	0	0	0	192	0	0	192	337
08:15 AM	1	0	0	0	1	1	146	0	0	147	0	0	0	0	0	0	178	0	0	178	326
08:30 AM	0	0	0	0	0	0	175	0	0	175	0	0	0	0	0	0	165	0	0	165	340
08:45 AM	2	0	0	0	2	2	187	0	0	189	0	0	0	0	0	0	244	5	0	249	440
Total Volume	3	0	0	0	3	3	653	0	0	656	0	0	0	0	0	0	779	5	0	784	1443
% App. Total	100	0	0	0		0.5	99.5	0	0		0	0	0	0		0	99.4	0.6	0		
PHF	.375	.000	.000	.000	.375	.375	.873	.000	.000	.868	.000	.000	.000	.000	.000	.000	.798	.250	.000	.787	.820
Passenger Vehicles	3	0	0	0	3	3	609	0	0	612	0	0	0	0	0	0	741	5	0	746	1361
% Passenger Vehicles	100	0	0	0	100	100	93.3	0	0	93.3	0	0	0	0	0	0	95.1	100	0	95.2	94.3
Heavy Vehicles	0	0	0	0	0	0	44	0	0	44	0	0	0	0	0	0	38	0	0	38	82
% Heavy Vehicles	0	0	0	0	0	0	6.7	0	0	6.7	0	0	0	0	0	0	4.9	0	0	4.8	5.7

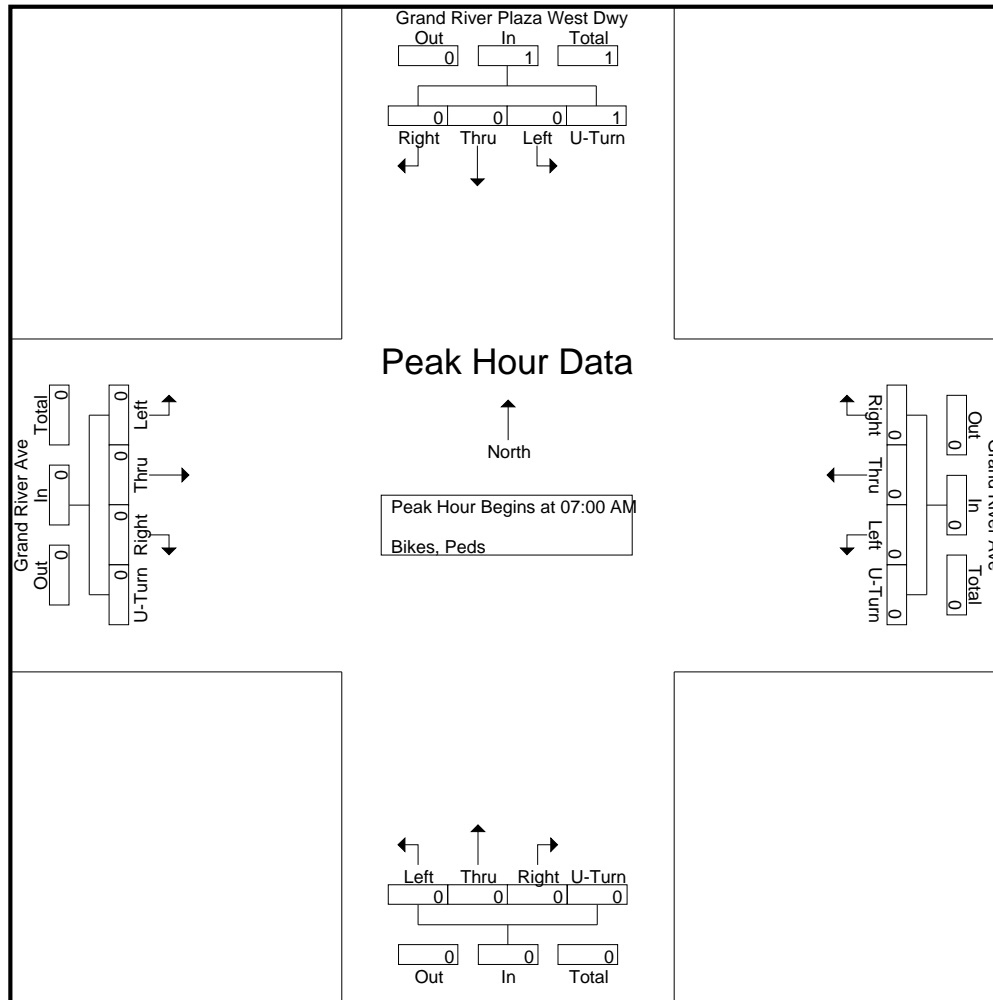


Groups Printed- Bikes, Peds

	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Grand Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Apprch %	0	0	0	100		0	0	0	0		0	0	0	0		0	0	100	0		
Total %	0	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	0	50	0	50	

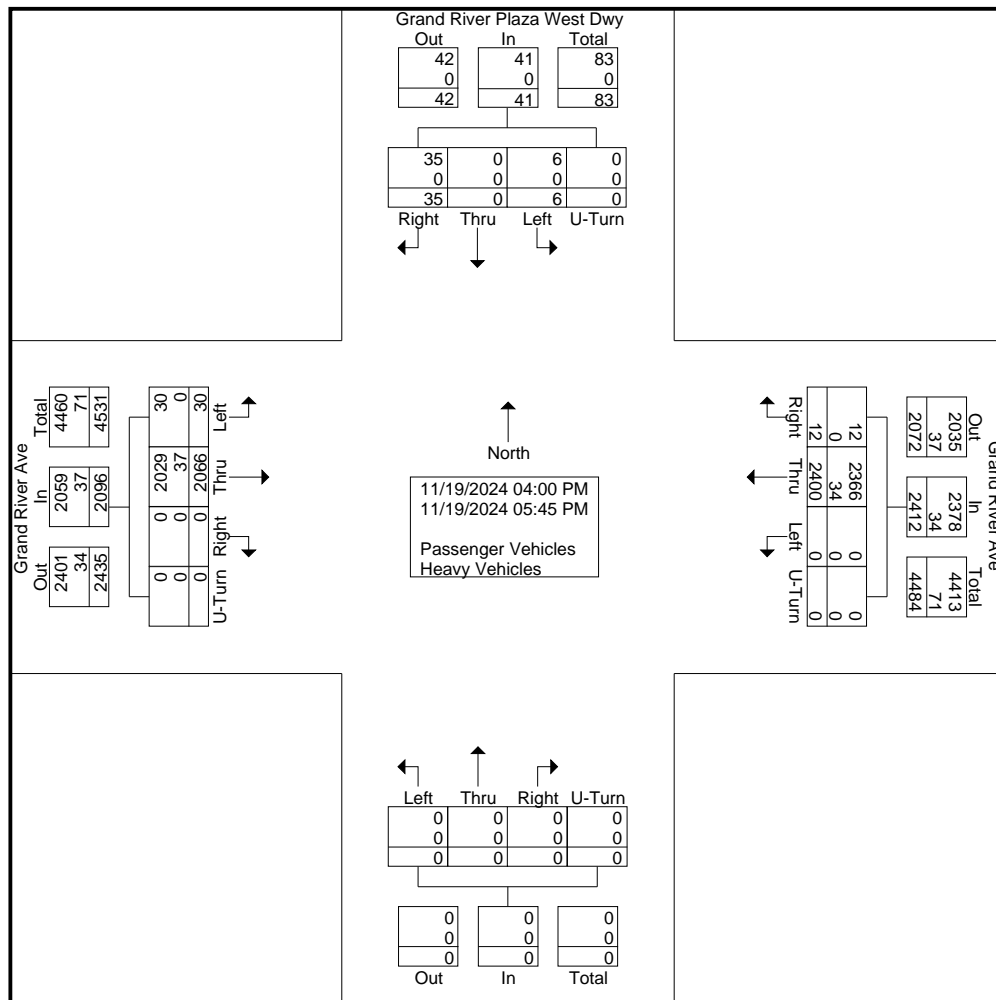


	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% App. Total	0	0	0	100		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250

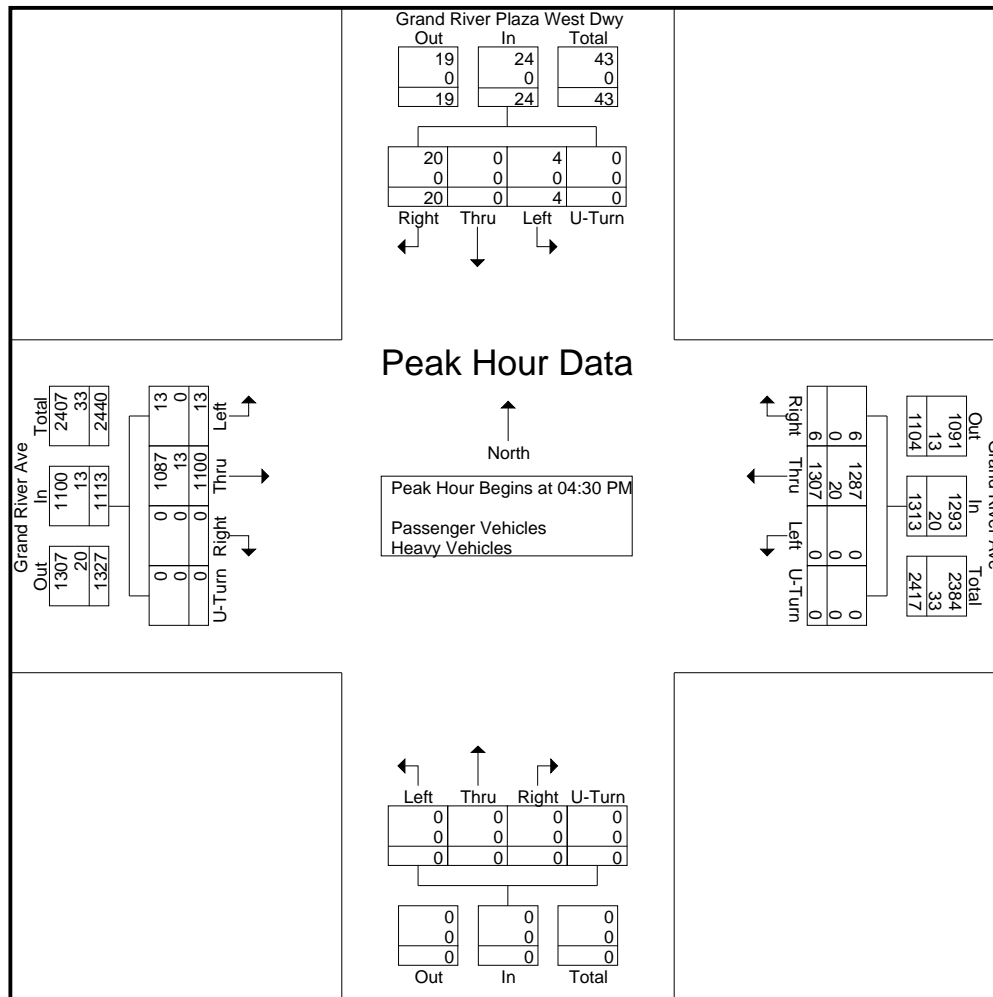


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	4	0	0	0	4	2	276	0	0	278	0	0	0	0	0	0	291	7	0	298	580
04:15 PM	8	0	1	0	9	2	291	0	0	293	0	0	0	0	0	0	267	3	0	270	572
04:30 PM	7	0	0	0	7	2	286	0	0	288	0	0	0	0	0	0	274	4	0	278	573
04:45 PM	4	0	1	0	5	1	346	0	0	347	0	0	0	0	0	0	270	3	0	273	625
Total	23	0	2	0	25	7	1199	0	0	1206	0	0	0	0	0	0	1102	17	0	1119	2350
05:00 PM	6	0	2	0	8	2	361	0	0	363	0	0	0	0	0	0	277	4	0	281	652
05:15 PM	3	0	1	0	4	1	314	0	0	315	0	0	0	0	0	0	279	2	0	281	600
05:30 PM	1	0	1	0	2	2	280	0	0	282	0	0	0	0	0	0	200	5	0	205	489
05:45 PM	2	0	0	0	2	0	246	0	0	246	0	0	0	0	0	0	208	2	0	210	458
Total	12	0	4	0	16	5	1201	0	0	1206	0	0	0	0	0	0	964	13	0	977	2199
Grand Total	35	0	6	0	41	12	2400	0	0	2412	0	0	0	0	0	0	2066	30	0	2096	4549
Apprch %	85.4	0	14.6	0		0.5	99.5	0	0		0	0	0	0		0	98.6	1.4	0		
Total %	0.8	0	0.1	0	0.9	0.3	52.8	0	0	53	0	0	0	0	0	0	45.4	0.7	0	46.1	
Passenger Vehicles	35	0	6	0	41	12	2366	0	0	2378	0	0	0	0	0	0	2029	30	0	2059	4478
% Passenger Vehicles	100	0	100	0	100	100	98.6	0	0	98.6	0	0	0	0	0	0	98.2	100	0	98.2	98.4
Heavy Vehicles	0	0	0	0	0	0	34	0	0	34	0	0	0	0	0	0	37	0	0	37	71
% Heavy Vehicles	0	0	0	0	0	0	1.4	0	0	1.4	0	0	0	0	0	0	1.8	0	0	1.8	1.6

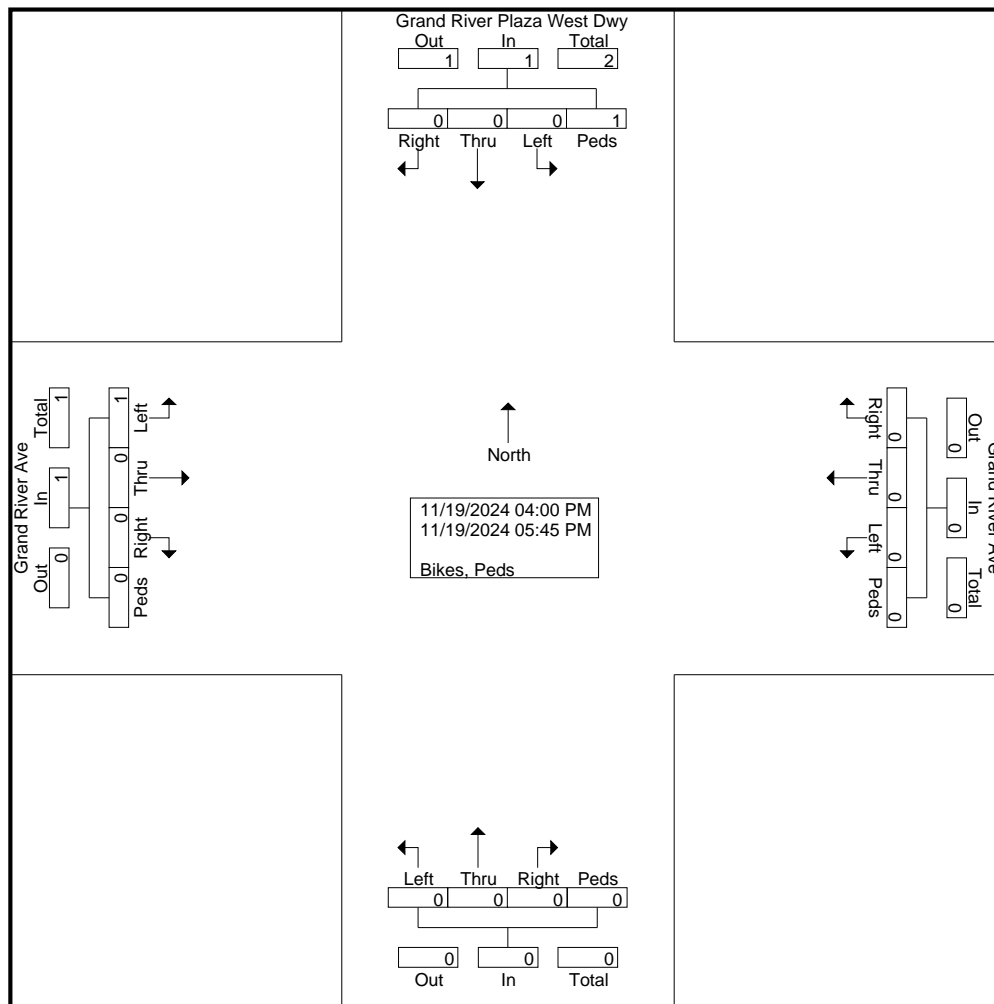


	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	7	0	0	0	7	2	286	0	0	288	0	0	0	0	0	0	274	4	0	278	573
04:45 PM	4	0	1	0	5	1	346	0	0	347	0	0	0	0	0	0	270	3	0	273	625
05:00 PM	6	0	2	0	8	2	361	0	0	363	0	0	0	0	0	0	277	4	0	281	652
05:15 PM	3	0	1	0	4	1	314	0	0	315	0	0	0	0	0	0	279	2	0	281	600
Total Volume	20	0	4	0	24	6	1307	0	0	1313	0	0	0	0	0	0	1100	13	0	1113	2450
% App. Total	83.3	0	16.7	0		0.5	99.5	0	0		0	0	0	0		0	98.8	1.2	0		
PHF	.714	.000	.500	.000	.750	.750	.905	.000	.000	.904	.000	.000	.000	.000	.000	.000	.986	.813	.000	.990	.939
Passenger Vehicles	20	0	4	0	24	6	1287	0	0	1293	0	0	0	0	0	0	1087	13	0	1100	2417
% Passenger Vehicles	100	0	100	0	100	100	98.5	0	0	98.5	0	0	0	0	0	0	98.8	100	0	98.8	98.7
Heavy Vehicles	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	13	0	0	13	33
% Heavy Vehicles	0	0	0	0	0	0	1.5	0	0	1.5	0	0	0	0	0	0	1.2	0	0	1.2	1.3

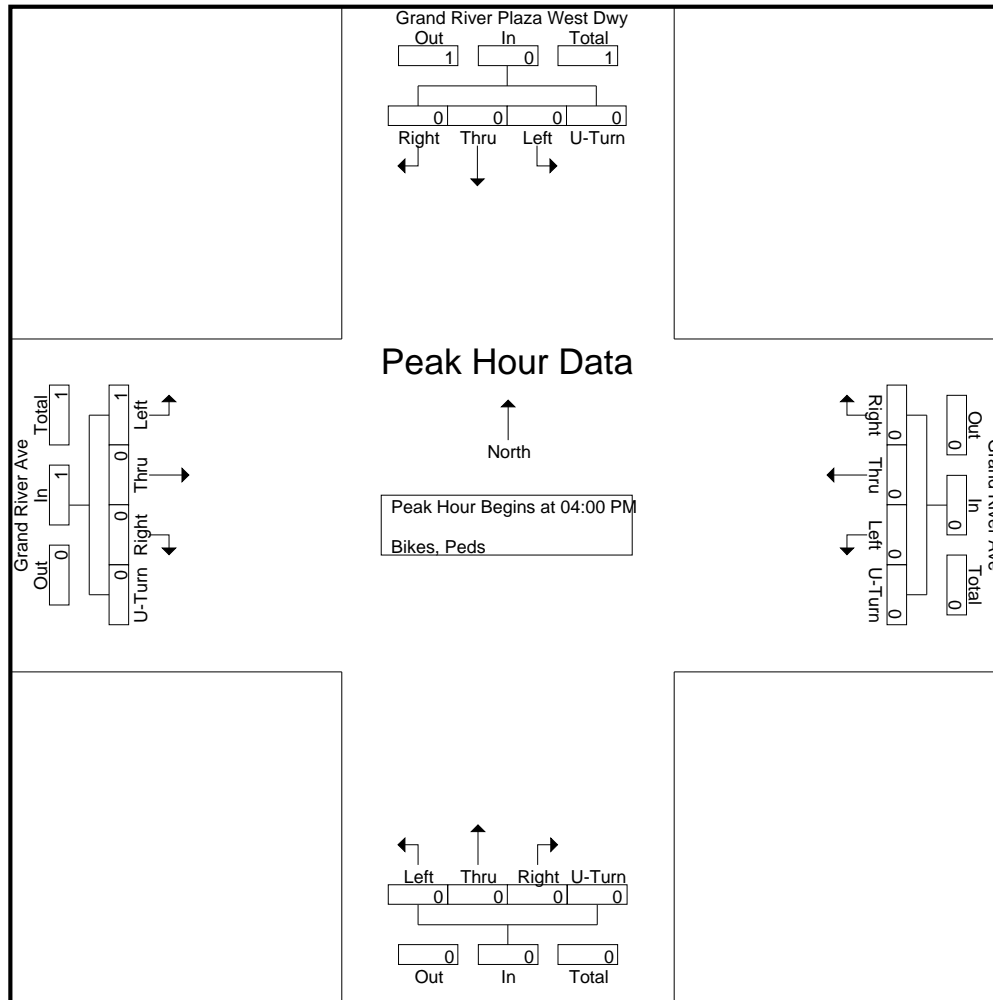


Groups Printed- Bikes, Peds

	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Apprch %	0	0	0	100		0	0	0	0		0	0	0	0		0	0	100	0		
Total %	0	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	0	50	0	50	

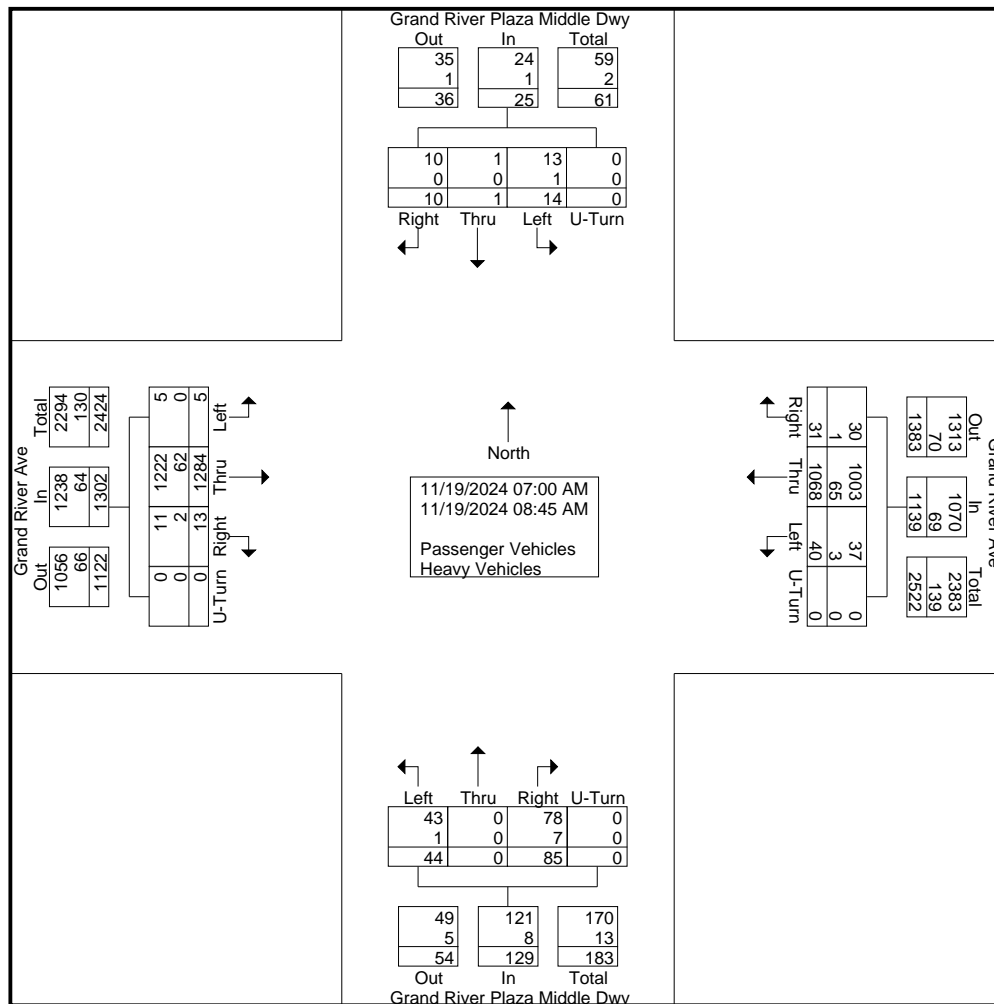


	Grand River Plaza West Dwy Southbound					Grand River Ave Westbound					Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM 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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.250

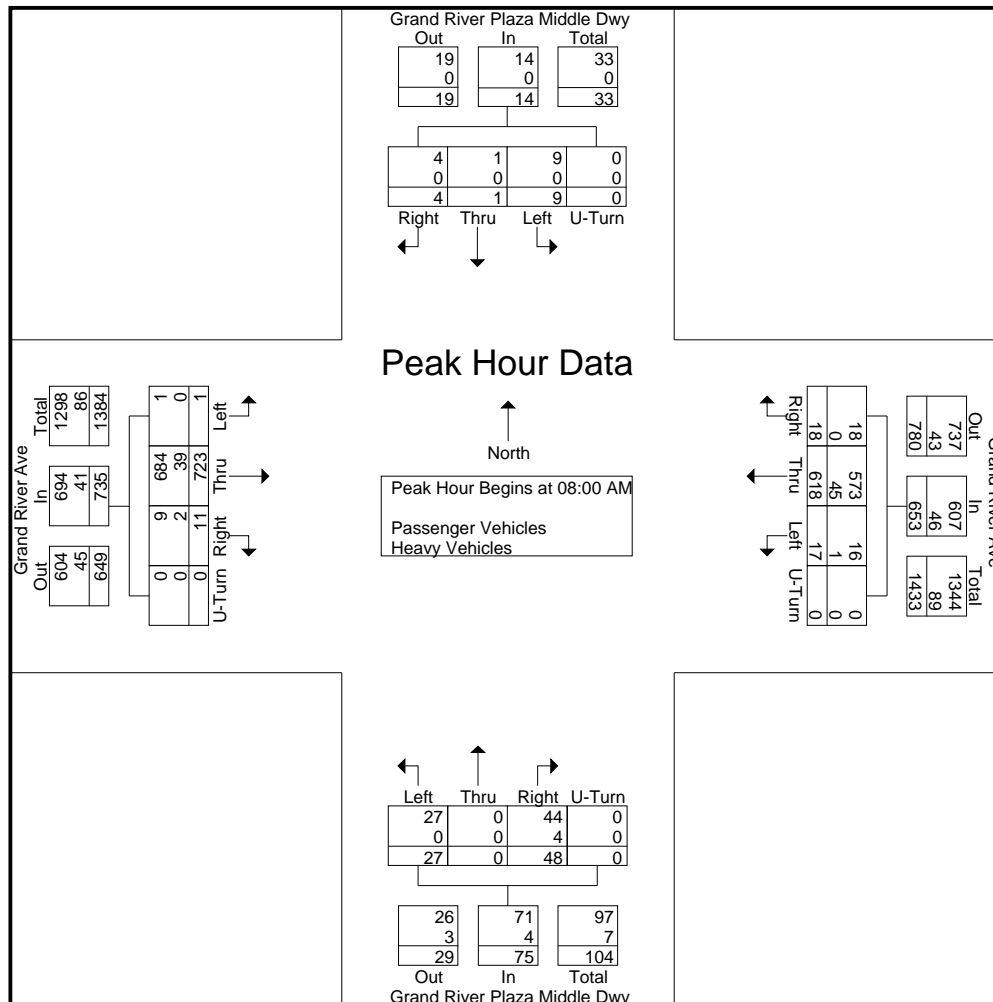


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	4	0	0	0	4	0	82	4	0	86	10	0	1	0	11	0	90	0	0	90	191
07:15 AM	1	0	2	0	3	5	108	7	0	120	9	0	7	0	16	0	149	1	0	150	289
07:30 AM	0	0	0	0	0	2	117	8	0	127	6	0	2	0	8	0	172	2	0	174	309
07:45 AM	1	0	3	0	4	6	143	4	0	153	12	0	7	0	19	2	150	1	0	153	329
Total	6	0	5	0	11	13	450	23	0	486	37	0	17	0	54	2	561	4	0	567	1118
08:00 AM	3	0	1	0	4	5	136	3	0	144	14	0	4	0	18	3	176	0	0	179	345
08:15 AM	0	0	4	0	4	4	140	3	0	147	11	0	6	0	17	2	165	0	0	167	335
08:30 AM	0	0	1	0	1	3	165	8	0	176	13	0	7	0	20	3	153	0	0	156	353
08:45 AM	1	1	3	0	5	6	177	3	0	186	10	0	10	0	20	3	229	1	0	233	444
Total	4	1	9	0	14	18	618	17	0	653	48	0	27	0	75	11	723	1	0	735	1477
Grand Total	10	1	14	0	25	31	1068	40	0	1139	85	0	44	0	129	13	1284	5	0	1302	2595
Apprch %	40	4	56	0		2.7	93.8	3.5	0		65.9	0	34.1	0		1	98.6	0.4	0		
Total %	0.4	0	0.5	0	1	1.2	41.2	1.5	0	43.9	3.3	0	1.7	0	5	0.5	49.5	0.2	0	50.2	
Passenger Vehicles	10	1	13	0	24	30	1003	37	0	1070	78	0	43	0	121	11	1222	5	0	1238	2453
% Passenger Vehicles	100	100	92.9	0	96	96.8	93.9	92.5	0	93.9	91.8	0	97.7	0	93.8	84.6	95.2	100	0	95.1	94.5
Heavy Vehicles	0	0	1	0	1	1	65	3	0	69	7	0	1	0	8	2	62	0	0	64	142
% Heavy Vehicles	0	0	7.1	0	4	3.2	6.1	7.5	0	6.1	8.2	0	2.3	0	6.2	15.4	4.8	0	0	4.9	5.5

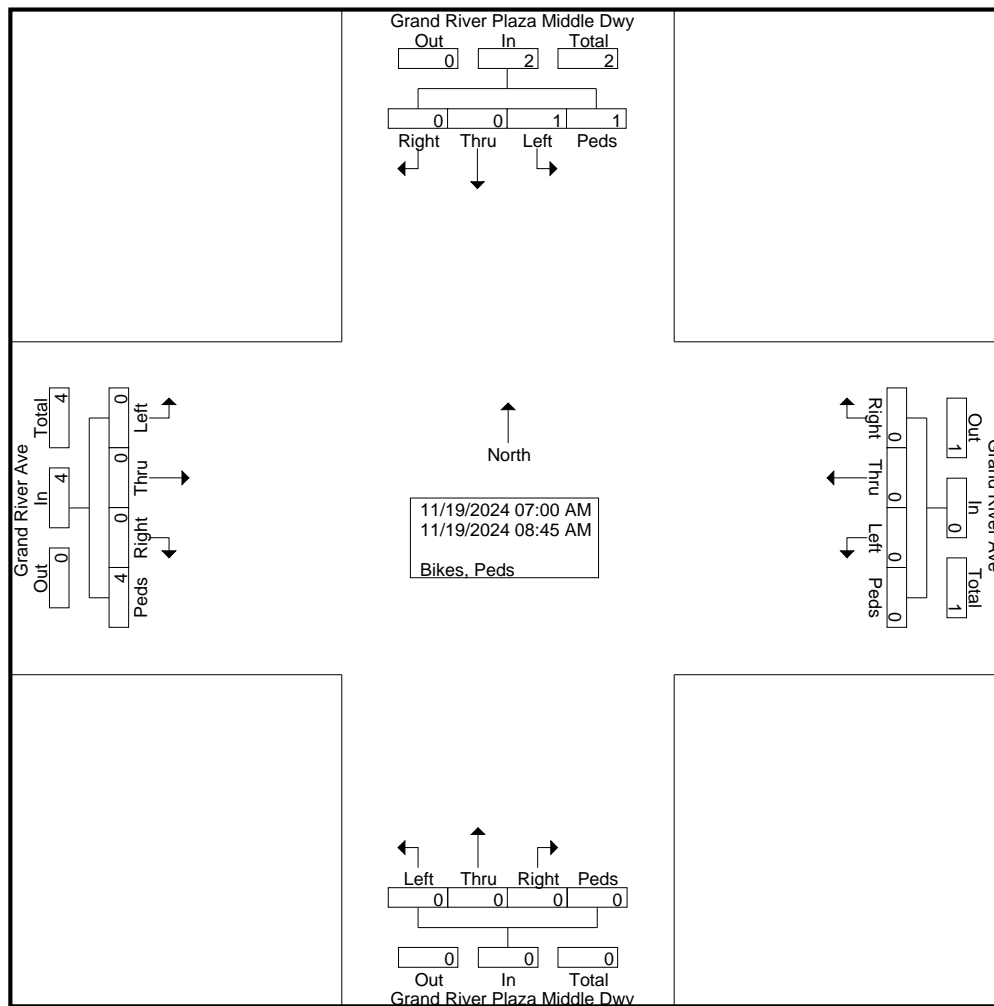


	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	3	0	1	0	4	5	136	3	0	144	14	0	4	0	18	3	176	0	0	179	345
08:15 AM	0	0	4	0	4	4	140	3	0	147	11	0	6	0	17	2	165	0	0	167	335
08:30 AM	0	0	1	0	1	3	165	8	0	176	13	0	7	0	20	3	153	0	0	156	353
08:45 AM	1	1	3	0	5	6	177	3	0	186	10	0	10	0	20	3	229	1	0	233	444
Total Volume	4	1	9	0	14	18	618	17	0	653	48	0	27	0	75	11	723	1	0	735	1477
% App. Total	28.6	7.1	64.3	0		2.8	94.6	2.6	0		64	0	36	0		1.5	98.4	0.1	0		
PHF	.333	.250	.563	.000	.700	.750	.873	.531	.000	.878	.857	.000	.675	.000	.938	.917	.789	.250	.000	.789	.832
Passenger Vehicles	4	1	9	0	14	18	573	16	0	607	44	0	27	0	71	9	684	1	0	694	1386
% Passenger Vehicles	100	100	100	0	100	100	92.7	94.1	0	93.0	91.7	0	100	0	94.7	81.8	94.6	100	0	94.4	93.8
Heavy Vehicles	0	0	0	0	0	0	45	1	0	46	4	0	0	0	4	2	39	0	0	41	91
% Heavy Vehicles	0	0	0	0	0	0	7.3	5.9	0	7.0	8.3	0	0	0	5.3	18.2	5.4	0	0	5.6	6.2

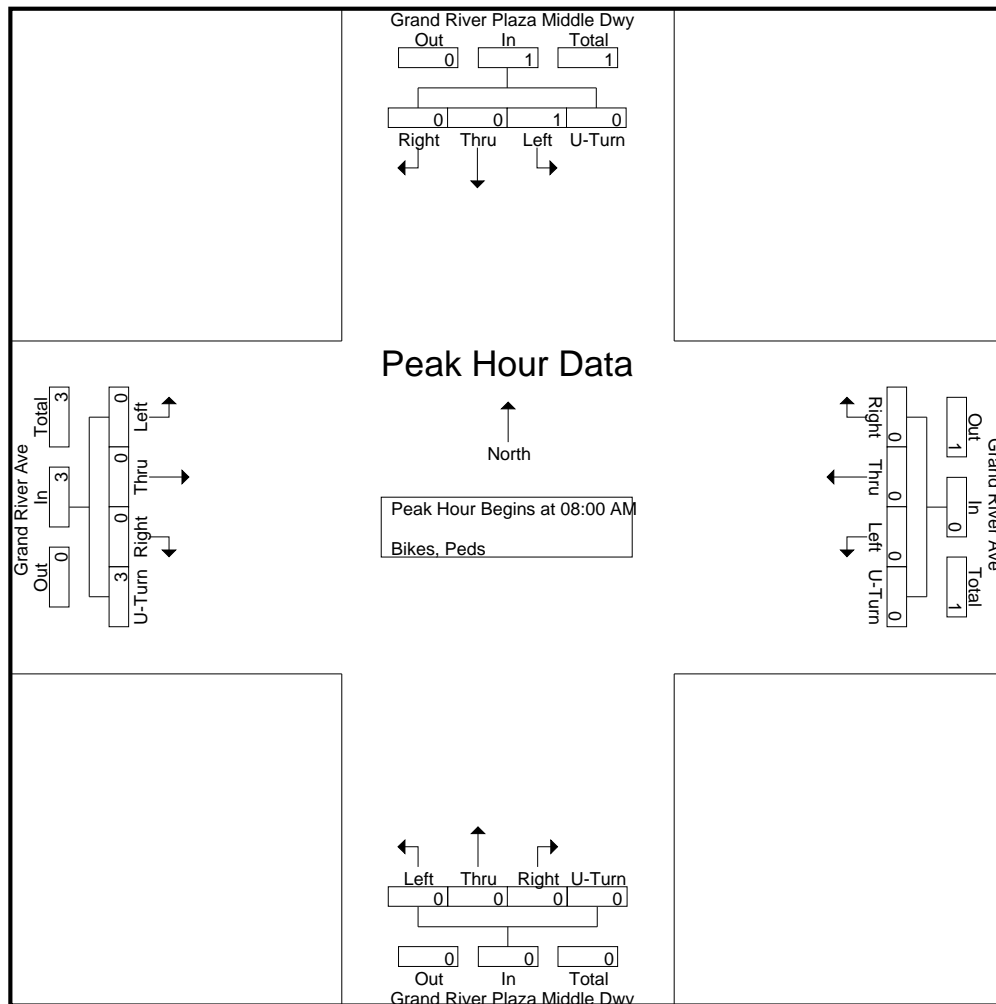


Groups Printed- Bikes, Peds

	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	4
Total	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	4
Grand Total	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	6
Apprch %	0	0	50	50		0	0	0	0		0	0	0	0		0	0	0	100		
Total %	0	0	16.7	16.7	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	66.7	66.7	

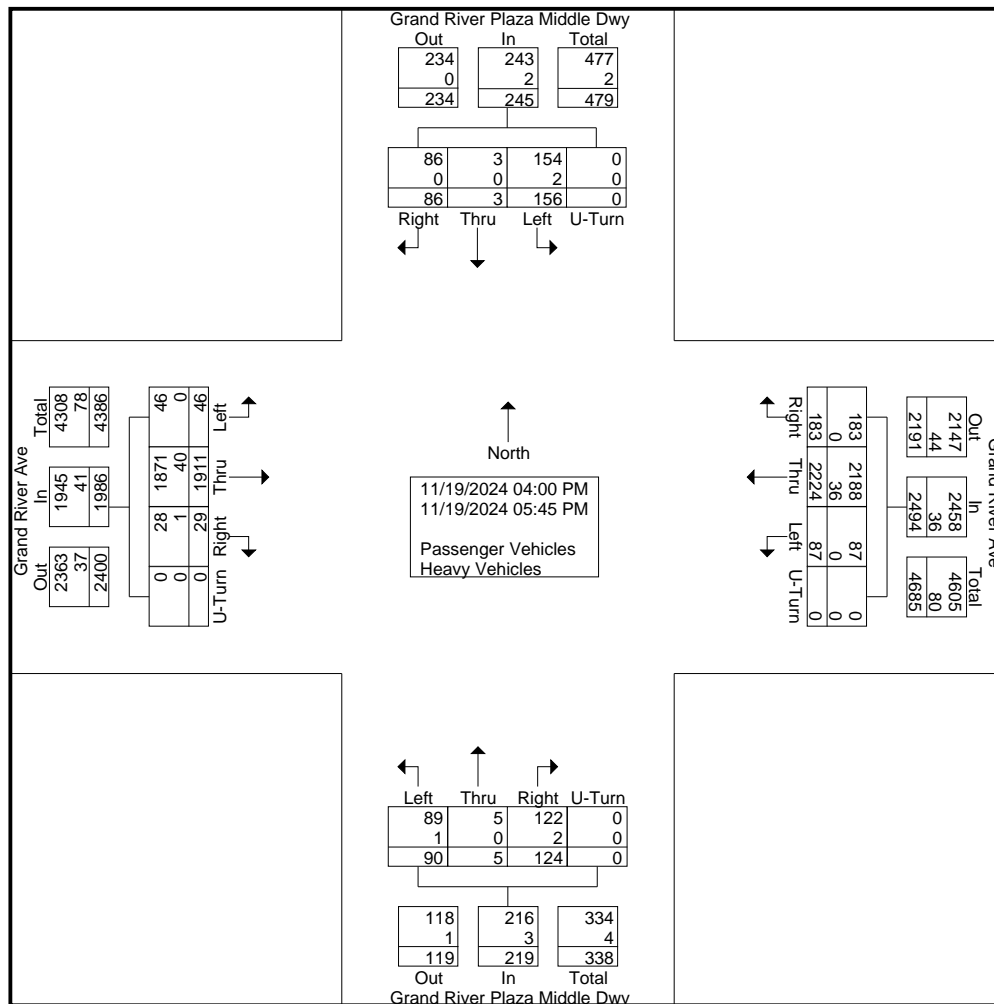


	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	4
Total Volume	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	4
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.250

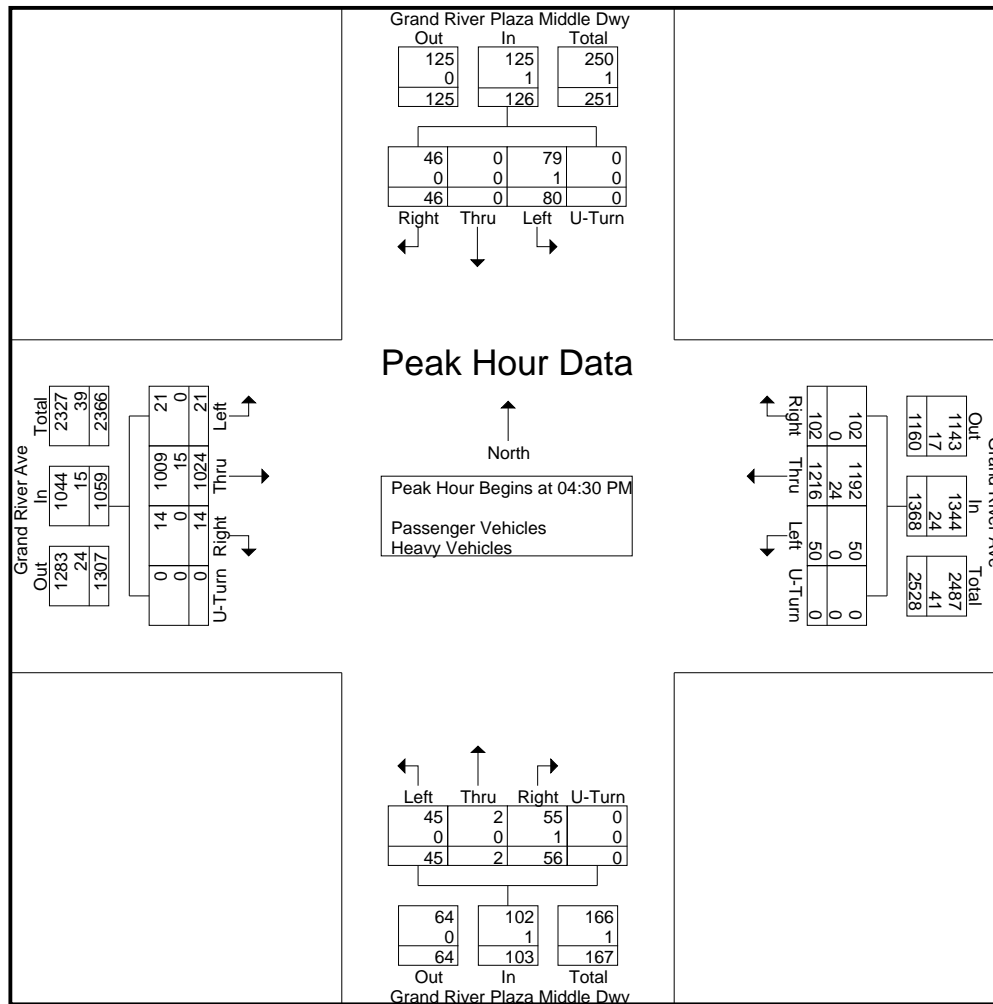


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	11	2	22	0	35	24	263	9	0	296	19	1	10	0	30	4	270	5	0	279	640
04:15 PM	12	1	19	0	32	20	269	8	0	297	17	1	9	0	27	3	242	8	0	253	609
04:30 PM	12	0	24	0	36	27	264	14	0	305	14	0	7	0	21	2	266	4	0	272	634
04:45 PM	13	0	14	0	27	29	316	15	0	360	17	1	14	0	32	4	252	4	0	260	679
Total	48	3	79	0	130	100	1112	46	0	1258	67	3	40	0	110	13	1030	21	0	1064	2562
05:00 PM	8	0	19	0	27	20	348	9	0	377	10	0	13	0	23	4	256	6	0	266	693
05:15 PM	13	0	23	0	36	26	288	12	0	326	15	1	11	0	27	4	250	7	0	261	650
05:30 PM	11	0	16	0	27	15	251	12	0	278	22	1	17	0	40	4	186	6	0	196	541
05:45 PM	6	0	19	0	25	22	225	8	0	255	10	0	9	0	19	4	189	6	0	199	498
Total	38	0	77	0	115	83	1112	41	0	1236	57	2	50	0	109	16	881	25	0	922	2382
Grand Total	86	3	156	0	245	183	2224	87	0	2494	124	5	90	0	219	29	1911	46	0	1986	4944
Apprch %	35.1	1.2	63.7	0		7.3	89.2	3.5	0		56.6	2.3	41.1	0		1.5	96.2	2.3	0		
Total %	1.7	0.1	3.2	0	5	3.7	45	1.8	0	50.4	2.5	0.1	1.8	0	4.4	0.6	38.7	0.9	0	40.2	
Passenger Vehicles	86	3	154	0	243	183	2188	87	0	2458	122	5	89	0	216	28	1871	46	0	1945	4862
% Passenger Vehicles	100	100	98.7	0	99.2	100	98.4	100	0	98.6	98.4	100	98.9	0	98.6	96.6	97.9	100	0	97.9	98.3
Heavy Vehicles	0	0	2	0	2	0	36	0	0	36	2	0	1	0	3	1	40	0	0	41	82
% Heavy Vehicles	0	0	1.3	0	0.8	0	1.6	0	0	1.4	1.6	0	1.1	0	1.4	3.4	2.1	0	0	2.1	1.7

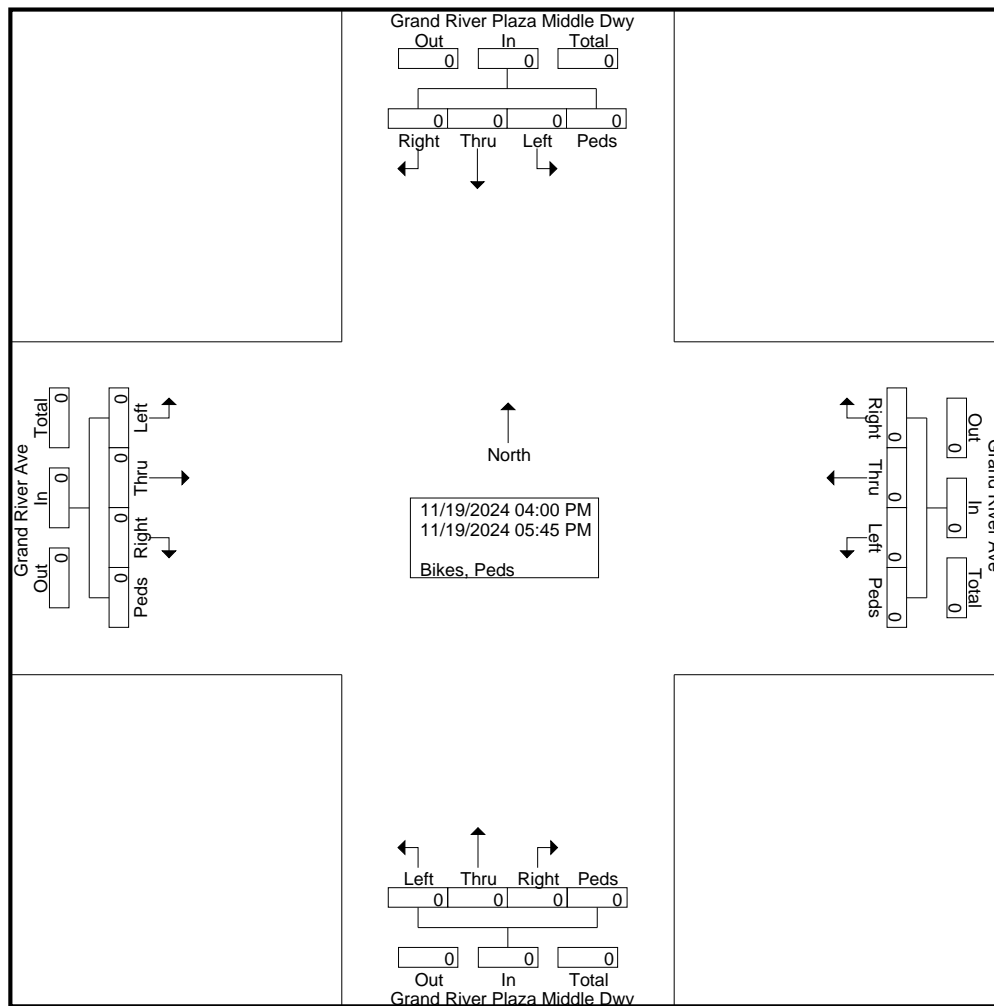


	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	12	0	24	0	36	27	264	14	0	305	14	0	7	0	21	2	266	4	0	272	634
04:45 PM	13	0	14	0	27	29	316	15	0	360	17	1	14	0	32	4	252	4	0	260	679
05:00 PM	8	0	19	0	27	20	348	9	0	377	10	0	13	0	23	4	256	6	0	266	693
05:15 PM	13	0	23	0	36	26	288	12	0	326	15	1	11	0	27	4	250	7	0	261	650
Total Volume	46	0	80	0	126	102	1216	50	0	1368	56	2	45	0	103	14	1024	21	0	1059	2656
% App. Total	36.5	0	63.5	0		7.5	88.9	3.7	0		54.4	1.9	43.7	0		1.3	96.7	2	0		
PHF	.885	.000	.833	.000	.875	.879	.874	.833	.000	.907	.824	.500	.804	.000	.805	.875	.962	.750	.000	.973	.958
Passenger Vehicles	46	0	79	0	125	102	1192	50	0	1344	55	2	45	0	102	14	1009	21	0	1044	2615
% Passenger Vehicles	100	0	98.8	0	99.2	100	98.0	100	0	98.2	98.2	100	100	0	99.0	100	98.5	100	0	98.6	98.5
Heavy Vehicles	0	0	1	0	1	0	24	0	0	24	1	0	0	0	1	0	15	0	0	15	41
% Heavy Vehicles	0	0	1.3	0	0.8	0	2.0	0	0	1.8	1.8	0	0	0	1.0	0	1.5	0	0	1.4	1.5

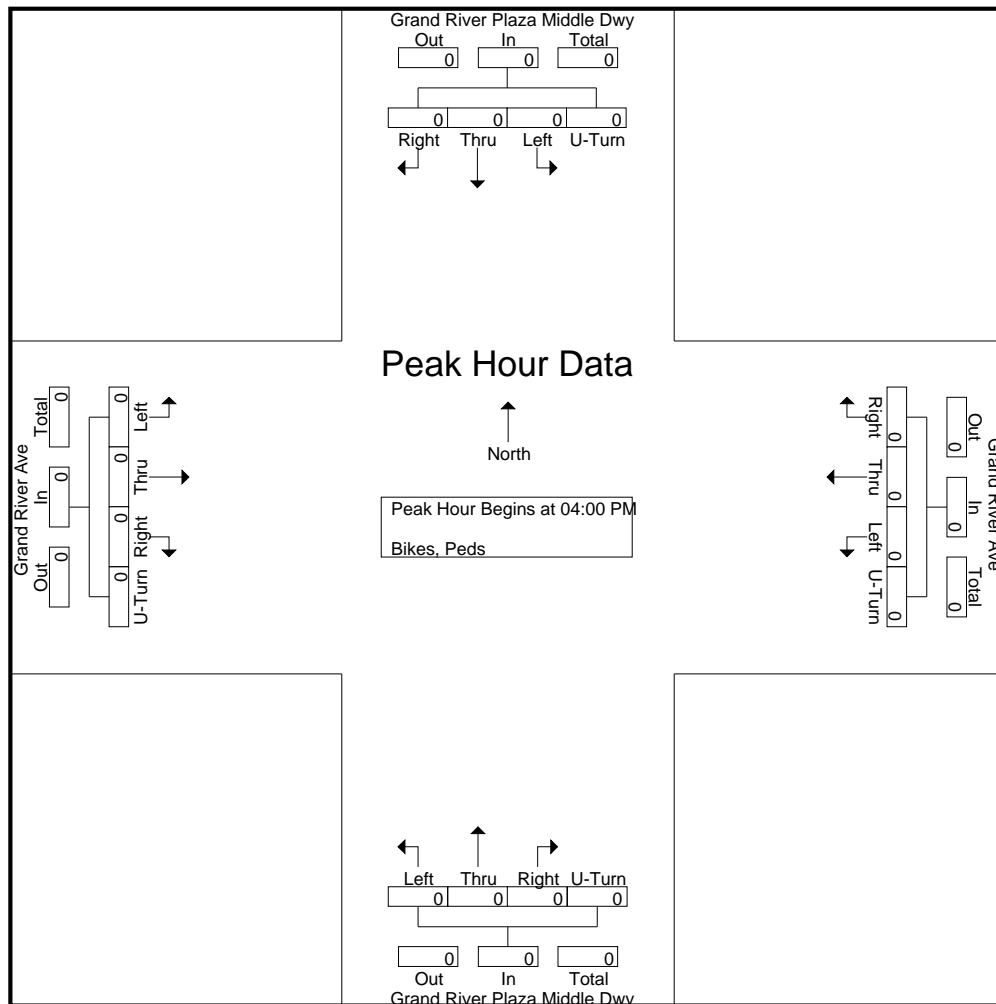


Groups Printed- Bikes, Peds

	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					

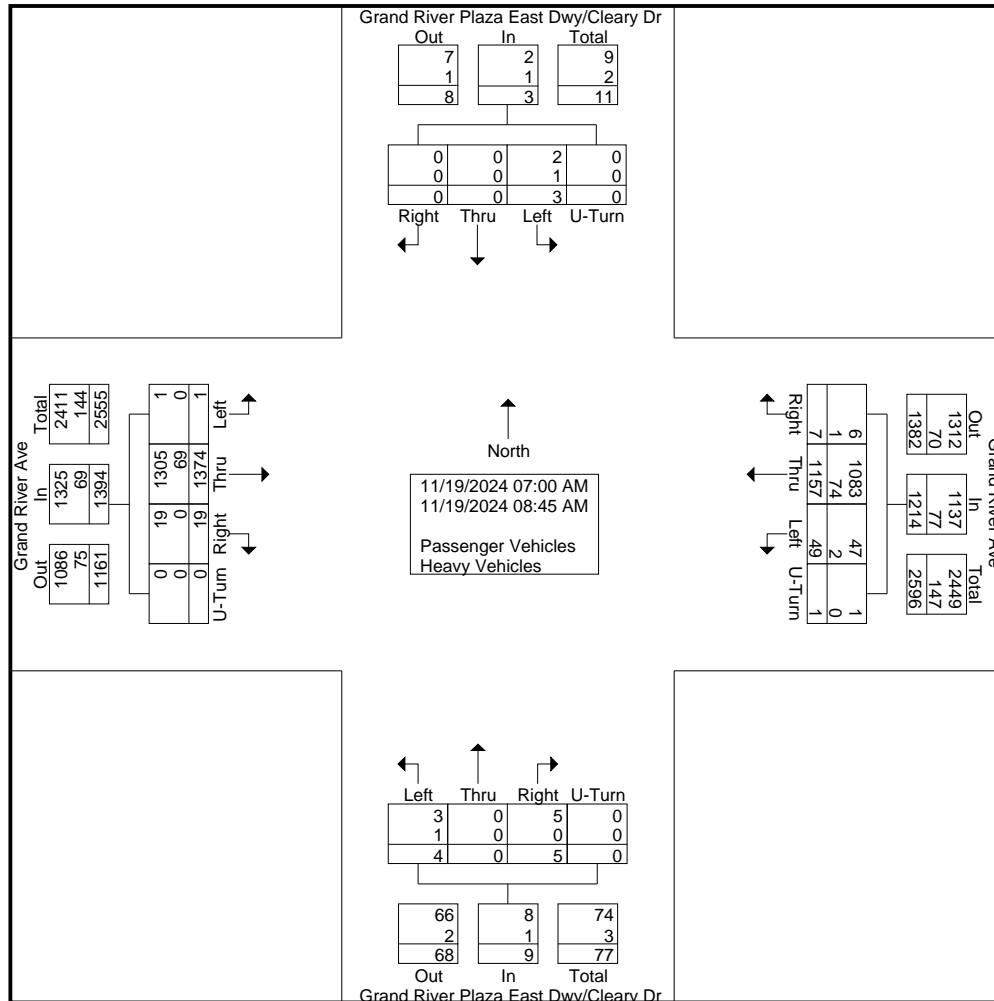


	Grand River Plaza Middle Dwy Southbound					Grand River Ave Westbound					Grand River Plaza Middle Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

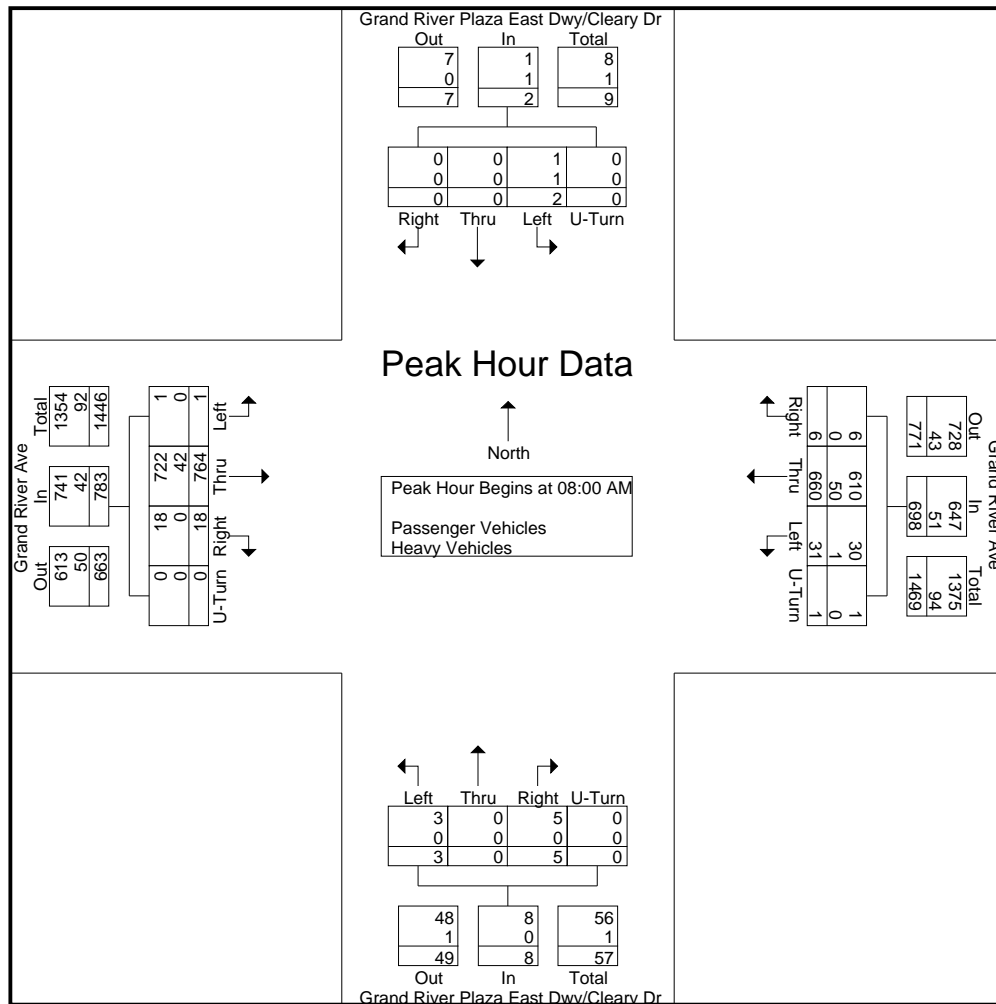


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	0	0	0	0	0	1	91	1	0	93	0	0	0	0	0	0	98	0	0	98	191
07:15 AM	0	0	0	0	0	0	125	4	0	129	0	0	0	0	0	0	165	0	0	165	294
07:30 AM	0	0	1	0	1	0	127	3	0	130	0	0	1	0	1	1	180	0	0	181	313
07:45 AM	0	0	0	0	0	0	154	10	0	164	0	0	0	0	0	0	167	0	0	167	331
Total	0	0	1	0	1	1	497	18	0	516	0	0	1	0	1	1	610	0	0	611	1129
08:00 AM	0	0	0	0	0	1	149	10	0	160	1	0	0	0	1	0	189	0	0	189	350
08:15 AM	0	0	1	0	1	1	143	12	0	156	0	0	2	0	2	8	171	0	0	179	338
08:30 AM	0	0	1	0	1	3	183	3	0	189	1	0	1	0	2	4	167	0	0	171	363
08:45 AM	0	0	0	0	0	1	185	6	1	193	3	0	0	0	3	6	237	1	0	244	440
Total	0	0	2	0	2	6	660	31	1	698	5	0	3	0	8	18	764	1	0	783	1491
Grand Total	0	0	3	0	3	7	1157	49	1	1214	5	0	4	0	9	19	1374	1	0	1394	2620
Apprch %	0	0	100	0		0.6	95.3	4	0.1		55.6	0	44.4	0		1.4	98.6	0.1	0		
Total %	0	0	0.1	0	0.1	0.3	44.2	1.9	0	46.3	0.2	0	0.2	0	0.3	0.7	52.4	0	0	53.2	
Passenger Vehicles	0	0	2	0	2	6	1083	47	1	1137	5	0	3	0	8	19	1305	1	0	1325	2472
% Passenger Vehicles	0	0	66.7	0	66.7	85.7	93.6	95.9	100	93.7	100	0	75	0	88.9	100	95	100	0	95.1	94.4
Heavy Vehicles	0	0	1	0	1	1	74	2	0	77	0	0	1	0	1	0	69	0	0	69	148
% Heavy Vehicles	0	0	33.3	0	33.3	14.3	6.4	4.1	0	6.3	0	0	25	0	11.1	0	5	0	0	4.9	5.6

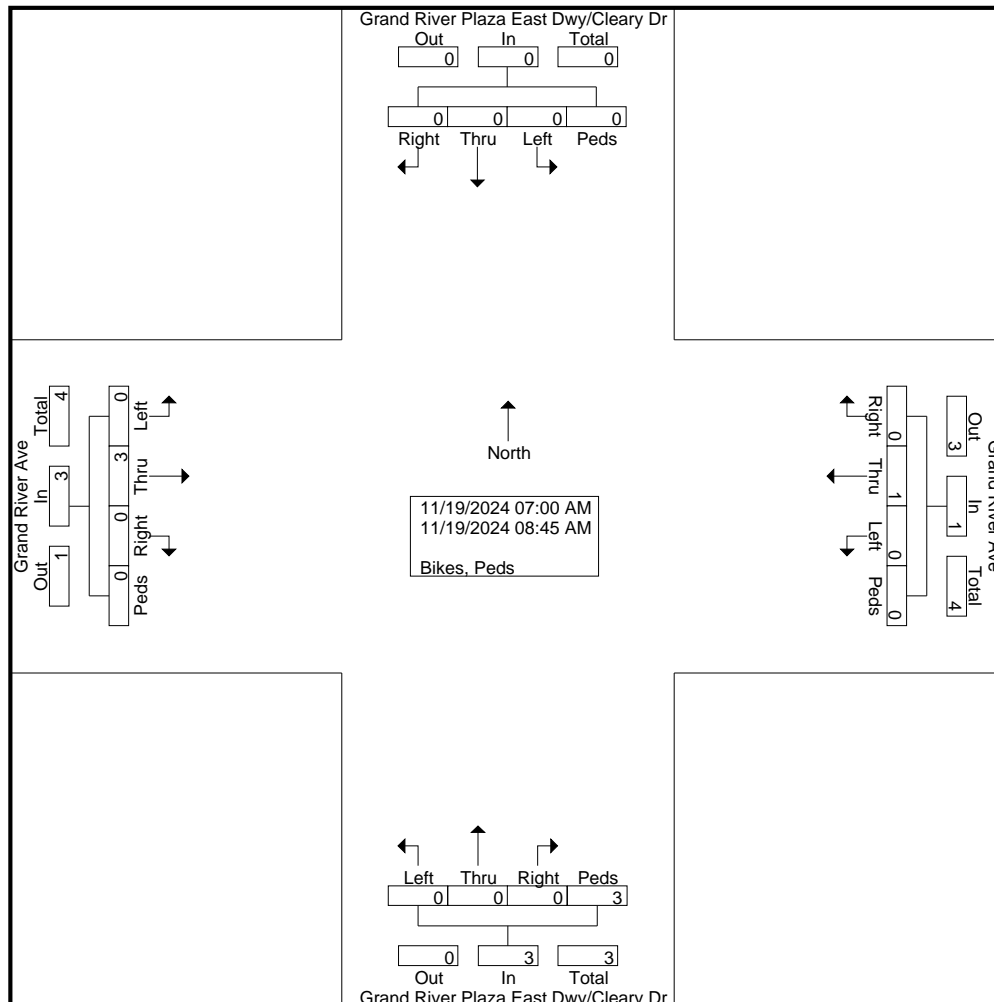


	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	1	149	10	0	160	1	0	0	0	1	0	189	0	0	189	350
08:15 AM	0	0	1	0	1	1	143	12	0	156	0	0	2	0	2	8	171	0	0	179	338
08:30 AM	0	0	1	0	1	3	183	3	0	189	1	0	1	0	2	4	167	0	0	171	363
08:45 AM	0	0	0	0	0	1	185	6	1	193	3	0	0	0	3	6	237	1	0	244	440
Total Volume	0	0	2	0	2	6	660	31	1	698	5	0	3	0	8	18	764	1	0	783	1491
% App. Total	0	0	100	0		0.9	94.6	4.4	0.1		62.5	0	37.5	0		2.3	97.6	0.1	0		
PHF	.000	.000	.500	.000	.500	.500	.892	.646	.250	.904	.417	.000	.375	.000	.667	.563	.806	.250	.000	.802	.847
Passenger Vehicles	0	0	1	0	1	6	610	30	1	647	5	0	3	0	8	18	722	1	0	741	1397
% Passenger Vehicles	0	0	50.0	0	50.0	100	92.4	96.8	100	92.7	100	0	100	0	100	100	94.5	100	0	94.6	93.7
Heavy Vehicles	0	0	1	0	1	0	50	1	0	51	0	0	0	0	0	0	42	0	0	42	94
% Heavy Vehicles	0	0	50.0	0	50.0	0	7.6	3.2	0	7.3	0	0	0	0	0	0	5.5	0	0	5.4	6.3



Groups Printed- Bikes, Peds

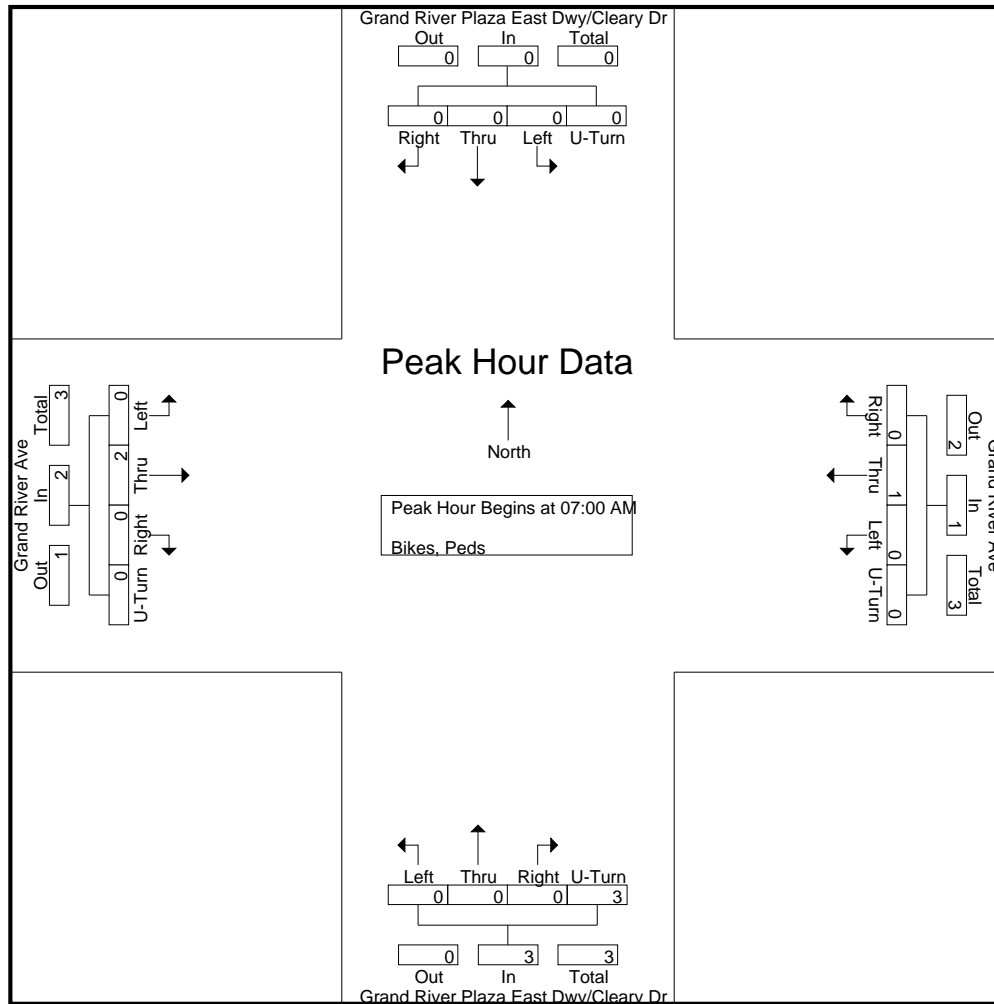
	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	0	0	1	3
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	3	3	0	2	0	0	2	6
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Grand Total	0	0	0	0	0	0	1	0	0	1	0	0	0	3	3	0	3	0	0	3	7
Apprch %	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	100	0	0	0	0
Total %	0	0	0	0	0	0	14.3	0	0	14.3	0	0	0	42.9	42.9	0	42.9	0	0	42.9	





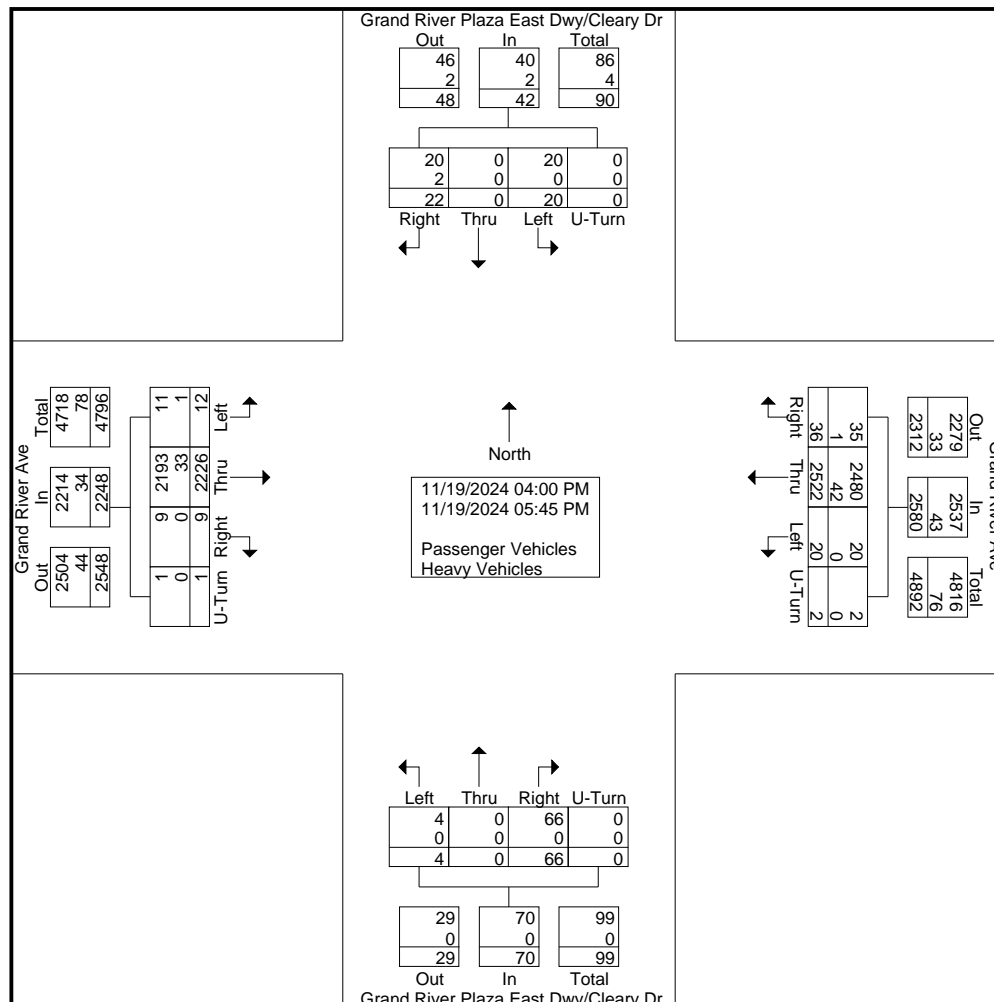
File Name : 16829807 - Grand River Plaza East Dwy_Cleary Dr -- Grand River Ave
Site Code : 16829807
Start Date : 11/19/2024
Page No : 2

	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	0	0	1	3
Total Volume	0	0	0	0	0	0	1	0	0	1	0	0	0	3	3	0	2	0	0	2	6
% App. Total	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	100	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.375	.375	.000	.500	.000	.000	.500	.500

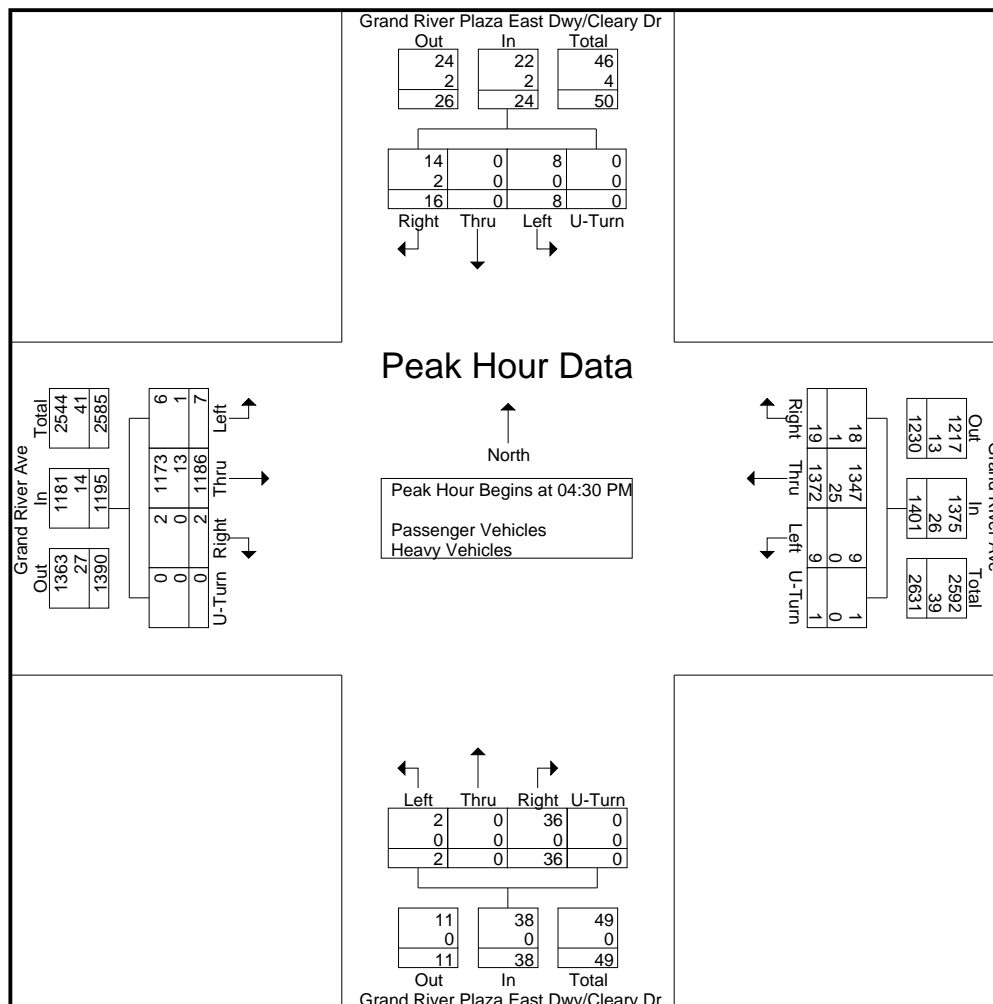


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	0	0	1	0	1	1	305	3	0	309	6	0	0	0	6	1	318	3	0	322	638
04:15 PM	4	0	2	0	6	8	298	3	1	310	9	0	1	0	10	0	276	0	1	277	603
04:30 PM	3	0	1	0	4	6	313	1	0	320	9	0	0	0	9	1	306	6	0	313	646
04:45 PM	3	0	3	0	6	5	360	2	0	367	6	0	1	0	7	1	291	0	0	292	672
Total	10	0	7	0	17	20	1276	9	1	1306	30	0	2	0	32	3	1191	9	1	1204	2559
05:00 PM	7	0	3	0	10	5	370	2	1	378	15	0	0	0	15	0	294	1	0	295	698
05:15 PM	3	0	1	0	4	3	329	4	0	336	6	0	1	0	7	0	295	0	0	295	642
05:30 PM	1	0	5	0	6	3	284	2	0	289	4	0	1	0	5	4	223	1	0	228	528
05:45 PM	1	0	4	0	5	5	263	3	0	271	11	0	0	0	11	2	223	1	0	226	513
Total	12	0	13	0	25	16	1246	11	1	1274	36	0	2	0	38	6	1035	3	0	1044	2381
Grand Total	22	0	20	0	42	36	2522	20	2	2580	66	0	4	0	70	9	2226	12	1	2248	4940
Apprch %	52.4	0	47.6	0		1.4	97.8	0.8	0.1		94.3	0	5.7	0		0.4	99	0.5	0		
Total %	0.4	0	0.4	0	0.9	0.7	51.1	0.4	0	52.2	1.3	0	0.1	0	1.4	0.2	45.1	0.2	0	45.5	
Passenger Vehicles	20	0	20	0	40	35	2480	20	2	2537	66	0	4	0	70	9	2193	11	1	2214	4861
% Passenger Vehicles	90.9	0	100	0	95.2	97.2	98.3	100	100	98.3	100	0	100	0	100	100	98.5	91.7	100	98.5	98.4
Heavy Vehicles	2	0	0	0	2	1	42	0	0	43	0	0	0	0	0	0	33	1	0	34	79
% Heavy Vehicles	9.1	0	0	0	4.8	2.8	1.7	0	0	1.7	0	0	0	0	0	0	1.5	8.3	0	1.5	1.6

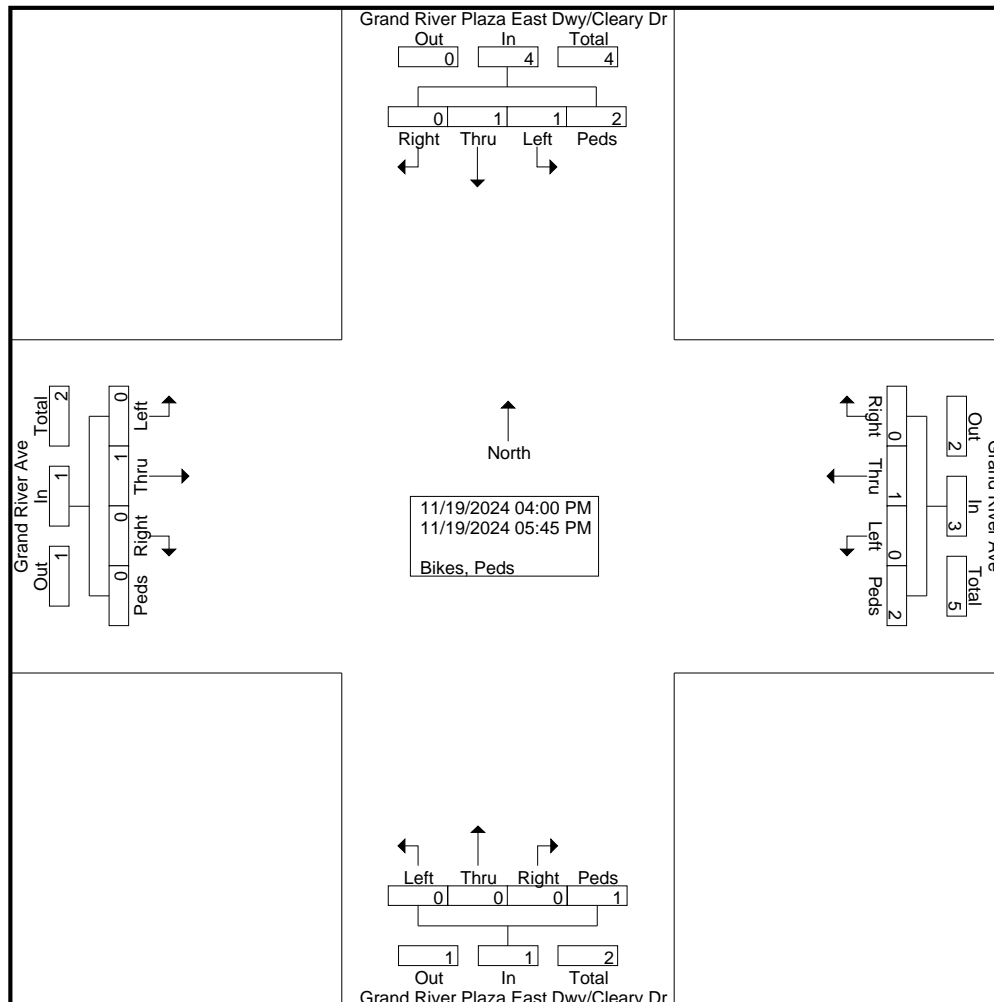


	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	3	0	1	0	4	6	313	1	0	320	9	0	0	0	9	1	306	6	0	313	646
04:45 PM	3	0	3	0	6	5	360	2	0	367	6	0	1	0	7	1	291	0	0	292	672
05:00 PM	7	0	3	0	10	5	370	2	1	378	15	0	0	0	15	0	294	1	0	295	698
05:15 PM	3	0	1	0	4	3	329	4	0	336	6	0	1	0	7	0	295	0	0	295	642
Total Volume	16	0	8	0	24	19	1372	9	1	1401	36	0	2	0	38	2	1186	7	0	1195	2658
% App. Total	66.7	0	33.3	0		1.4	97.9	0.6	0.1		94.7	0	5.3	0		0.2	99.2	0.6	0		
PHF	.571	.000	.667	.000	.600	.792	.927	.563	.250	.927	.600	.000	.500	.000	.633	.500	.969	.292	.000	.954	.952
Passenger Vehicles	14	0	8	0	22	18	1347	9	1	1375	36	0	2	0	38	2	1173	6	0	1181	2616
% Passenger Vehicles	87.5	0	100	0	91.7	94.7	98.2	100	100	98.1	100	0	100	0	100	100	98.9	85.7	0	98.8	98.4
Heavy Vehicles	2	0	0	0	2	1	25	0	0	26	0	0	0	0	0	0	13	1	0	14	42
% Heavy Vehicles	12.5	0	0	0	8.3	5.3	1.8	0	0	1.9	0	0	0	0	0	0	1.1	14.3	0	1.2	1.6



Groups Printed- Bikes, Peds

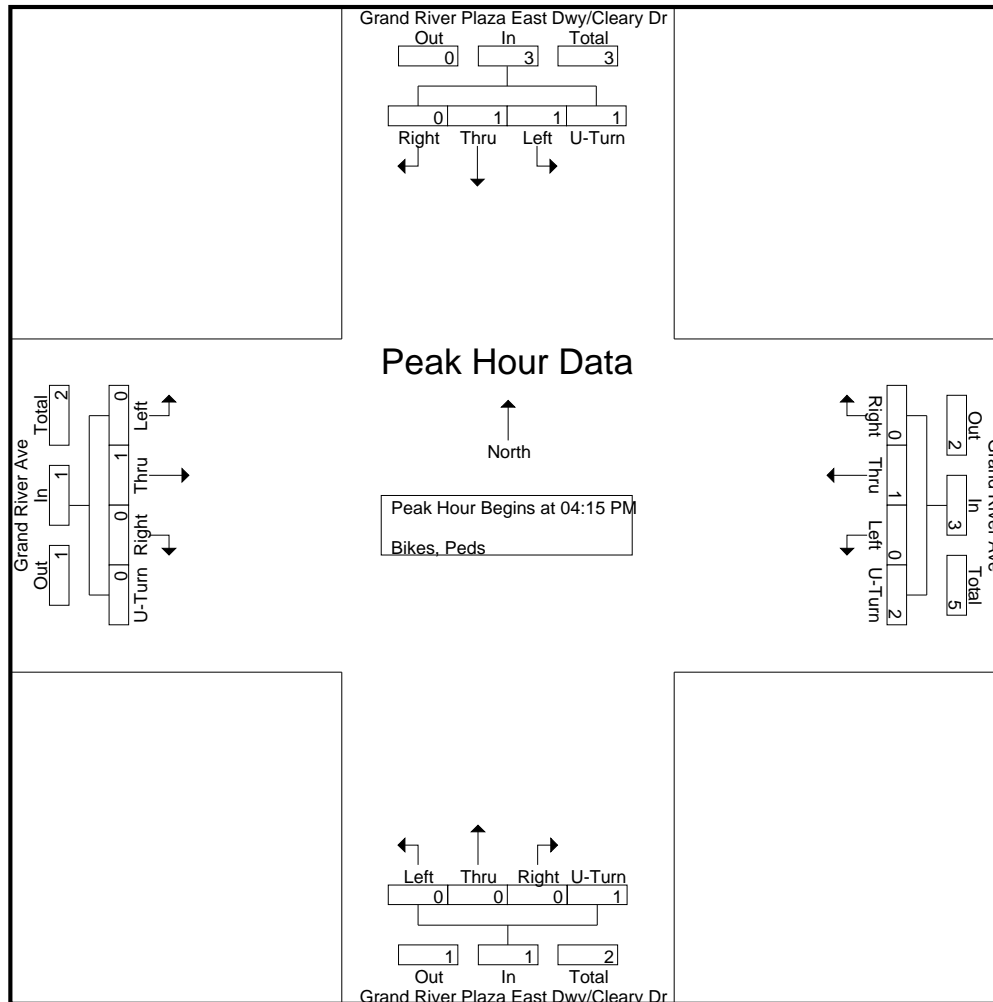
	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	1	2
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
04:45 PM	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	1	1	2	0	0	0	2	2	0	0	0	1	1	0	1	0	0	1	6
05:00 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	1	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Grand Total	0	1	1	2	4	0	1	0	2	3	0	0	0	1	1	0	1	0	0	1	9
Apprch %	0	25	25	50		0	33.3	0	66.7		0	0	0	100		0	100	0	0		
Total %	0	11.1	11.1	22.2	44.4	0	11.1	0	22.2	33.3	0	0	0	11.1	11.1	0	11.1	0	0	11.1	





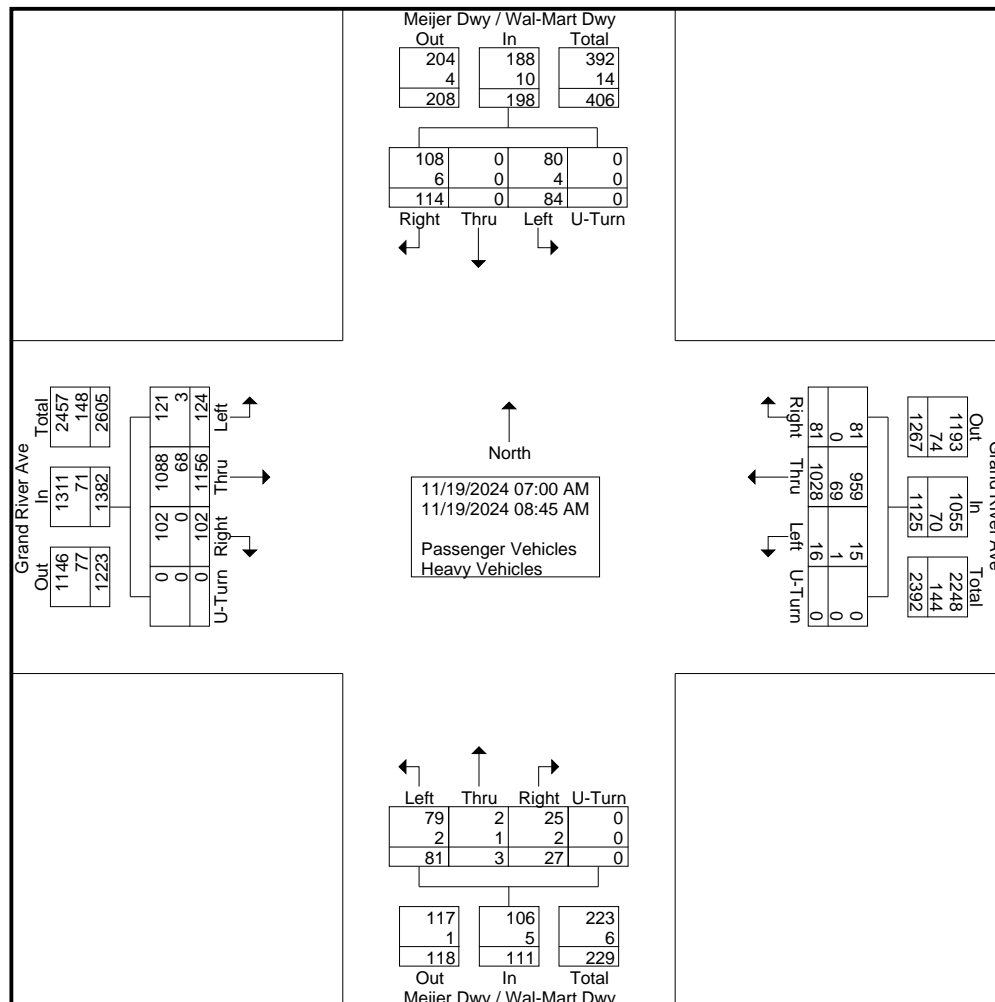
File Name : 16829808 - Grand River Plaza East Dwy_Cleary Dr -- Grand River Ave
 Site Code : 16829808
 Start Date : 11/19/2024
 Page No : 2

	Grand River Plaza East Dwy/Cleary Dr Southbound					Grand River Ave Westbound					Grand River Plaza East Dwy/Cleary Dr Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	2
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
04:45 PM	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
05:00 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	1	1	1	3	0	1	0	2	3	0	0	0	1	1	0	1	0	0	1	8
% App. Total	0	33.3	33.3	33.3		0	33.3	0	66.7		0	0	0	100		0	100	0	0		
PHF	.000	.250	.250	.250	.750	.000	.250	.000	.500	.750	.000	.000	.000	.250	.250	.000	.250	.000	.000	.250	1.00

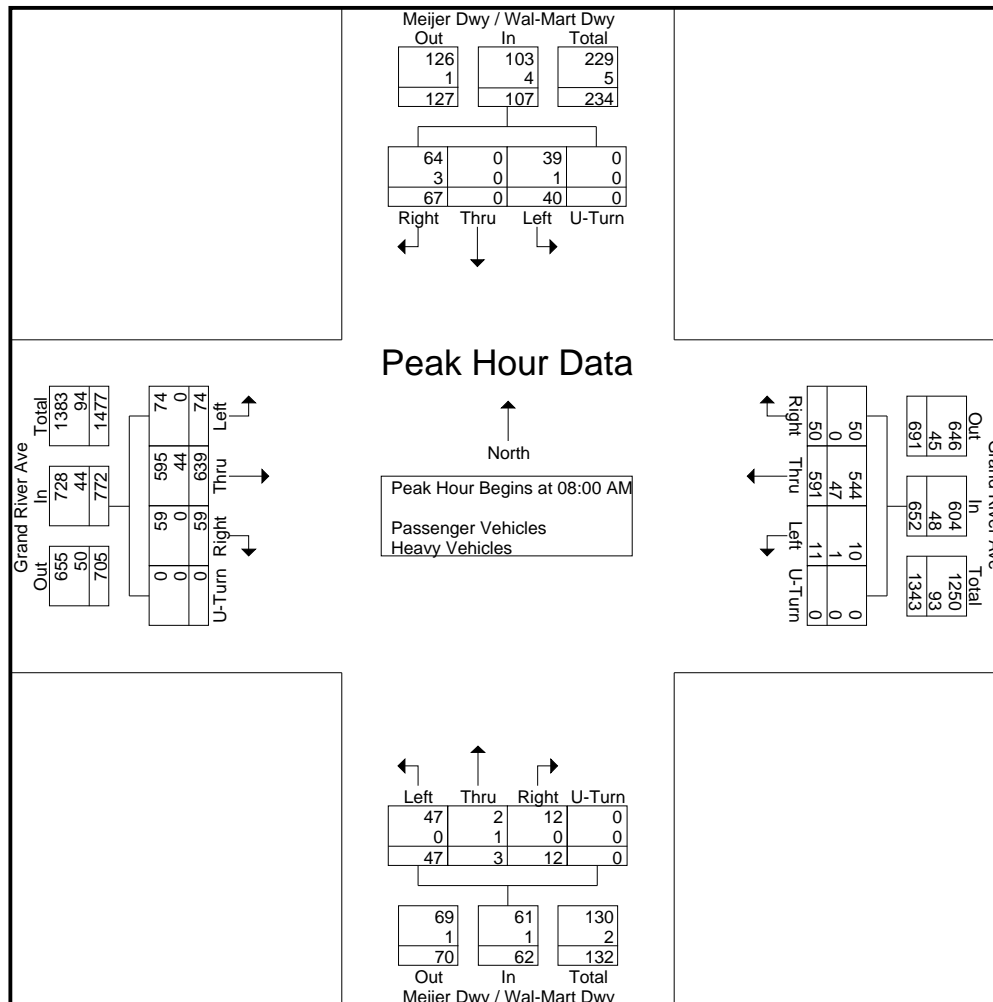


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	7	0	12	0	19	7	80	1	0	88	3	0	7	0	10	7	83	6	0	96	213
07:15 AM	12	0	13	0	25	7	109	0	0	116	1	0	7	0	8	9	145	14	0	168	317
07:30 AM	12	0	8	0	20	12	113	2	0	127	5	0	8	0	13	12	150	16	0	178	338
07:45 AM	16	0	11	0	27	5	135	2	0	142	6	0	12	0	18	15	139	14	0	168	355
Total	47	0	44	0	91	31	437	5	0	473	15	0	34	0	49	43	517	50	0	610	1223
08:00 AM	18	0	11	0	29	14	128	1	0	143	4	1	12	0	17	13	165	12	0	190	379
08:15 AM	11	0	12	0	23	8	133	3	0	144	3	2	11	0	16	18	143	13	0	174	357
08:30 AM	22	0	7	0	29	10	159	2	0	171	2	0	9	0	11	9	136	22	0	167	378
08:45 AM	16	0	10	0	26	18	171	5	0	194	3	0	15	0	18	19	195	27	0	241	479
Total	67	0	40	0	107	50	591	11	0	652	12	3	47	0	62	59	639	74	0	772	1593
Grand Total	114	0	84	0	198	81	1028	16	0	1125	27	3	81	0	111	102	1156	124	0	1382	2816
Apprch %	57.6	0	42.4	0		7.2	91.4	1.4	0		24.3	2.7	73	0		7.4	83.6	9	0		
Total %	4	0	3	0	7	2.9	36.5	0.6	0	40	1	0.1	2.9	0	3.9	3.6	41.1	4.4	0	49.1	
Passenger Vehicles	108	0	80	0	188	81	959	15	0	1055	25	2	79	0	106	102	1088	121	0	1311	2660
% Passenger Vehicles	94.7	0	95.2	0	94.9	100	93.3	93.8	0	93.8	92.6	66.7	97.5	0	95.5	100	94.1	97.6	0	94.9	94.5
Heavy Vehicles	6	0	4	0	10	0	69	1	0	70	2	1	2	0	5	0	68	3	0	71	156
% Heavy Vehicles	5.3	0	4.8	0	5.1	0	6.7	6.2	0	6.2	7.4	33.3	2.5	0	4.5	0	5.9	2.4	0	5.1	5.5

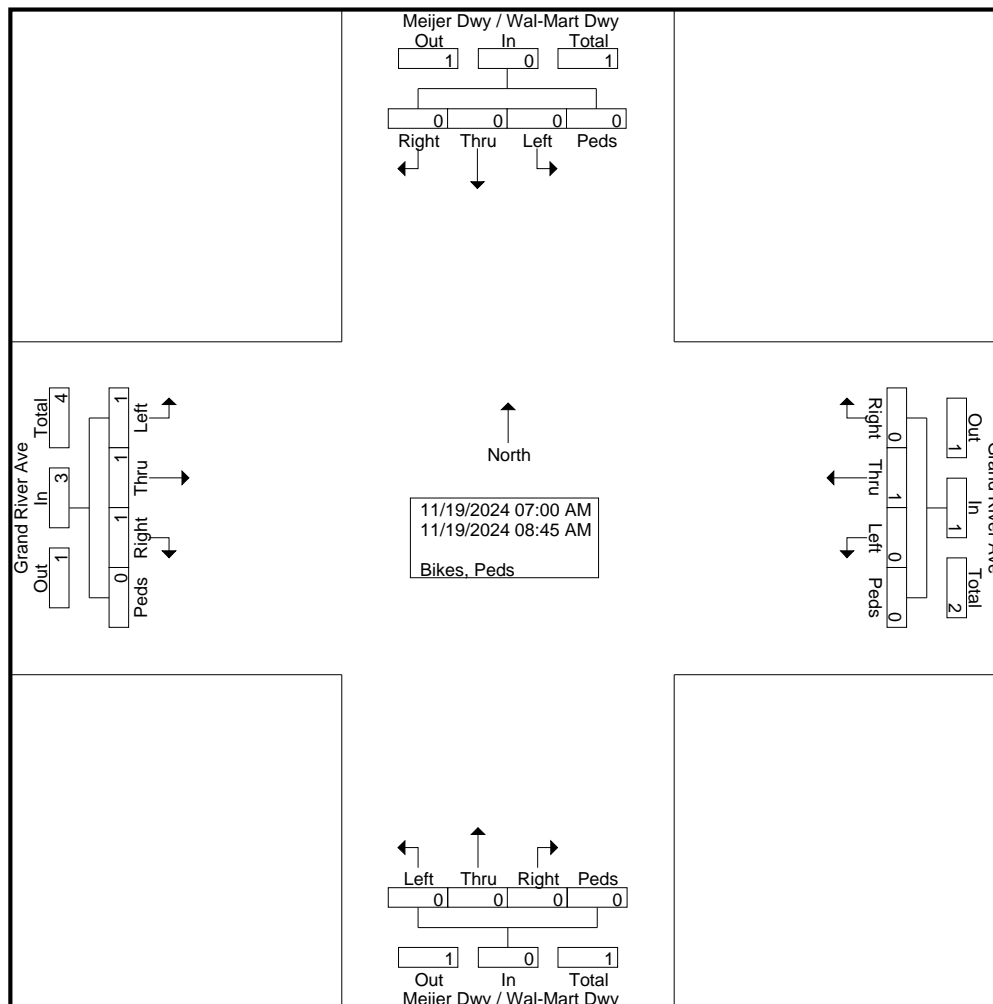


	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	18	0	11	0	29	14	128	1	0	143	4	1	12	0	17	13	165	12	0	190	379
08:15 AM	11	0	12	0	23	8	133	3	0	144	3	2	11	0	16	18	143	13	0	174	357
08:30 AM	22	0	7	0	29	10	159	2	0	171	2	0	9	0	11	9	136	22	0	167	378
08:45 AM	16	0	10	0	26	18	171	5	0	194	3	0	15	0	18	19	195	27	0	241	479
Total Volume	67	0	40	0	107	50	591	11	0	652	12	3	47	0	62	59	639	74	0	772	1593
% App. Total	62.6	0	37.4	0		7.7	90.6	1.7	0		19.4	4.8	75.8	0		7.6	82.8	9.6	0		
PHF	.761	.000	.833	.000	.922	.694	.864	.550	.000	.840	.750	.375	.783	.000	.861	.776	.819	.685	.000	.801	.831
Passenger Vehicles	64	0	39	0	103	50	544	10	0	604	12	2	47	0	61	59	595	74	0	728	1496
% Passenger Vehicles	95.5	0	97.5	0	96.3	100	92.0	90.9	0	92.6	100	66.7	100	0	98.4	100	93.1	100	0	94.3	93.9
Heavy Vehicles	3	0	1	0	4	0	47	1	0	48	0	1	0	0	1	0	44	0	0	44	97
% Heavy Vehicles	4.5	0	2.5	0	3.7	0	8.0	9.1	0	7.4	0	33.3	0	0	1.6	0	6.9	0	0	5.7	6.1

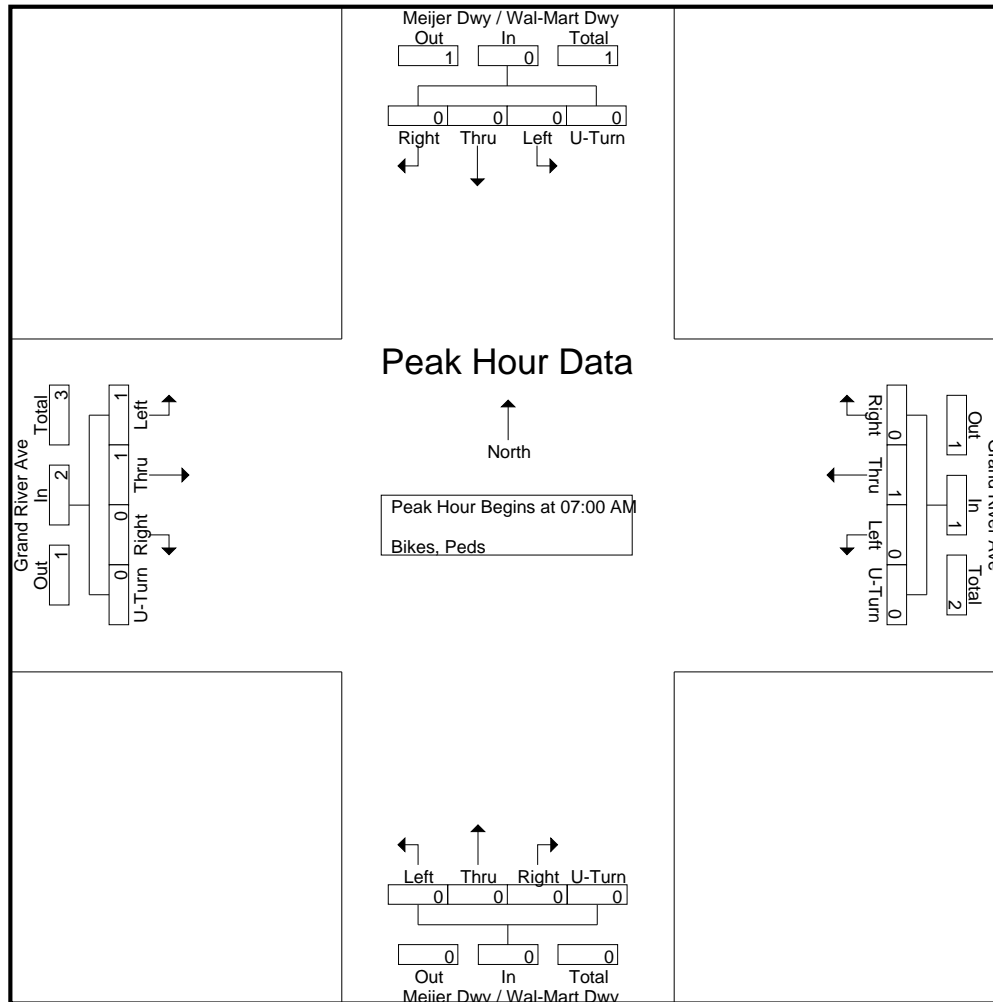


Groups Printed- Bikes, Peds

	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound						
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	3	3
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Grand Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	3	4
Apprch %	0	0	0	0		0	100	0	0		0	0	0	0		33.3	33.3	33.3	0			
Total %	0	0	0	0	0	0	25	0	0	25	0	0	0	0	0	25	25	25	0	75		

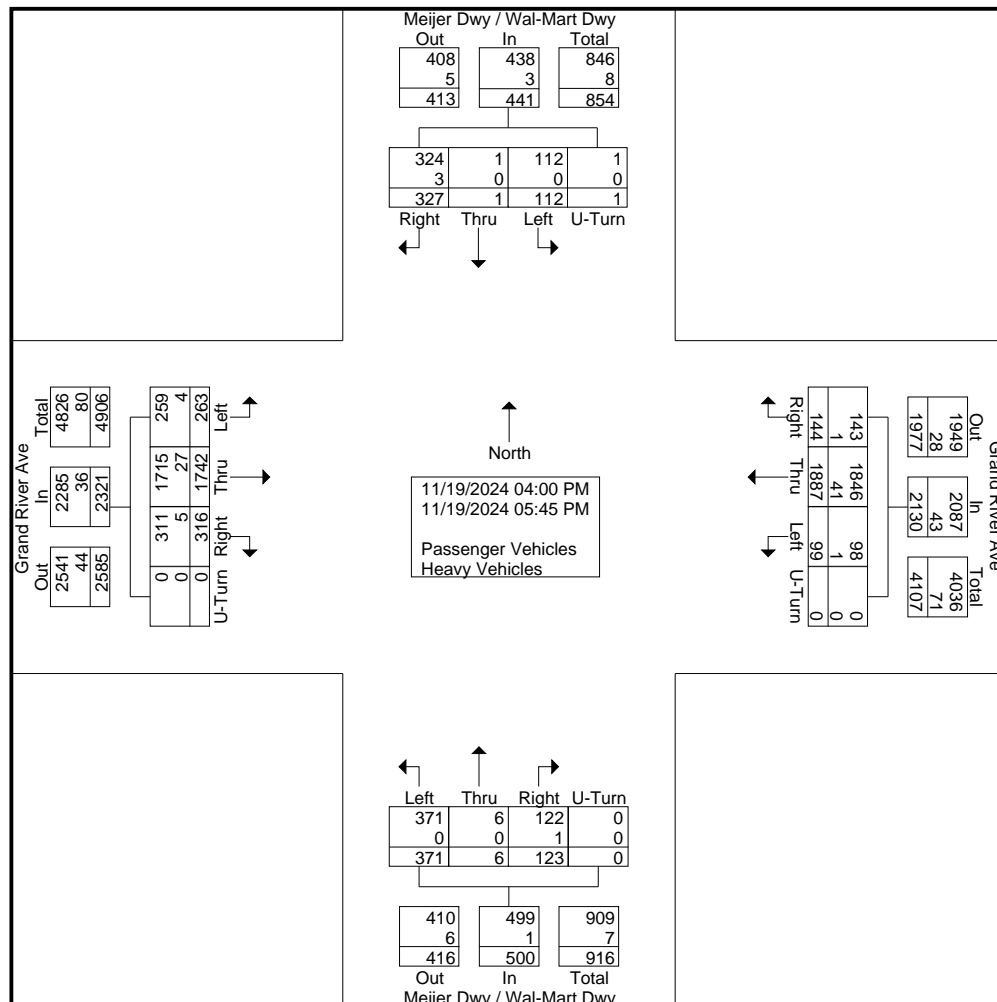


	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	3
% App. Total	0	0	0	0	0	0	100	0	0		0	0	0	0		0	50	50	0		
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.250	.250	.000	.500	.750

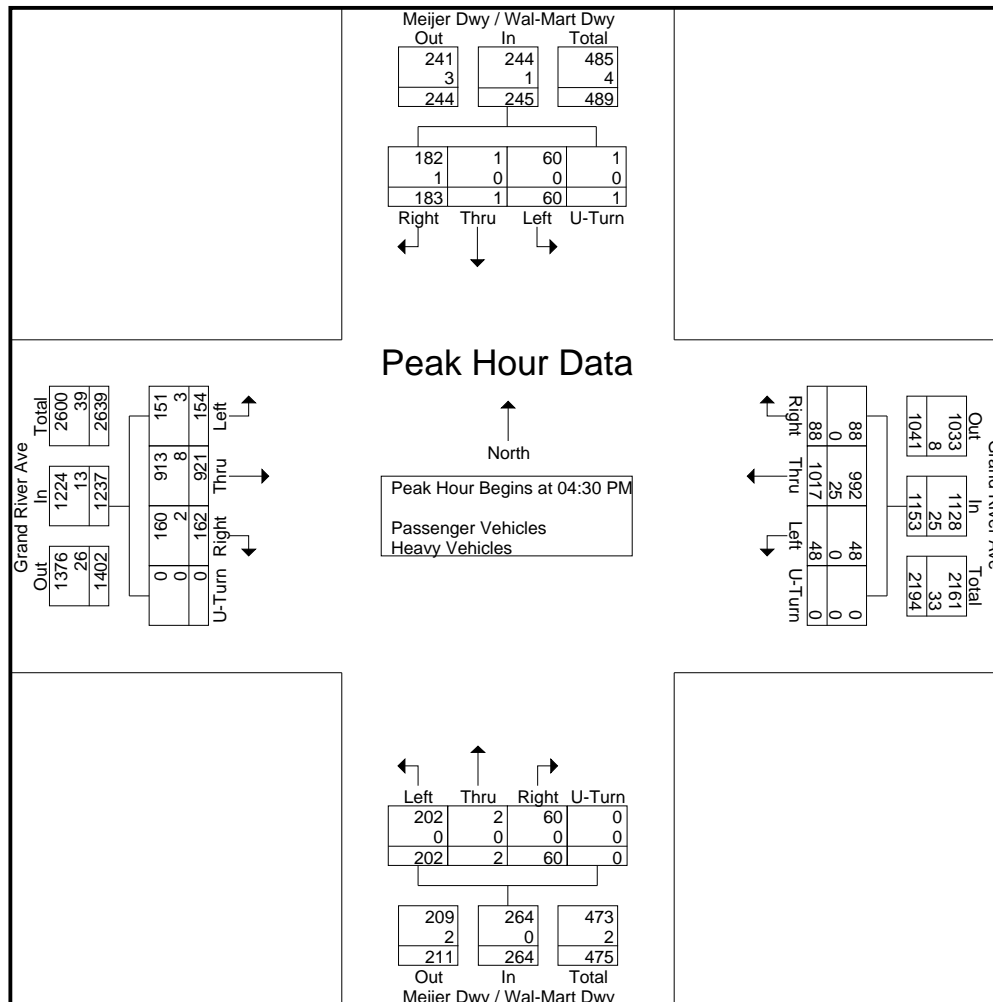


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	34	0	15	0	49	14	227	8	0	249	16	0	48	0	64	46	253	27	0	326	688
04:15 PM	37	0	14	0	51	15	233	18	0	266	14	3	40	0	57	40	217	28	0	285	659
04:30 PM	34	0	15	1	50	18	226	12	0	256	14	2	61	0	77	40	246	31	0	317	700
04:45 PM	41	1	17	0	59	23	272	13	0	308	18	0	54	0	72	41	222	41	0	304	743
Total	146	1	61	1	209	70	958	51	0	1079	62	5	203	0	270	167	938	127	0	1232	2790
05:00 PM	51	0	17	0	68	23	286	12	0	321	14	0	43	0	57	33	239	39	0	311	757
05:15 PM	57	0	11	0	68	24	233	11	0	268	14	0	44	0	58	48	214	43	0	305	699
05:30 PM	37	0	15	0	52	16	213	10	0	239	15	0	39	0	54	30	177	26	0	233	578
05:45 PM	36	0	8	0	44	11	197	15	0	223	18	1	42	0	61	38	174	28	0	240	568
Total	181	0	51	0	232	74	929	48	0	1051	61	1	168	0	230	149	804	136	0	1089	2602
Grand Total	327	1	112	1	441	144	1887	99	0	2130	123	6	371	0	500	316	1742	263	0	2321	5392
Apprch %	74.1	0.2	25.4	0.2		6.8	88.6	4.6	0		24.6	1.2	74.2	0		13.6	75.1	11.3	0		
Total %	6.1	0	2.1	0	8.2	2.7	35	1.8	0	39.5	2.3	0.1	6.9	0	9.3	5.9	32.3	4.9	0	43	
Passenger Vehicles	324	1	112	1	438	143	1846	98	0	2087	122	6	371	0	499	311	1715	259	0	2285	5309
% Passenger Vehicles	99.1	100	100	100	99.3	99.3	97.8	99	0	98	99.2	100	100	0	99.8	98.4	98.5	98.5	0	98.4	98.5
Heavy Vehicles	3	0	0	0	3	1	41	1	0	43	1	0	0	0	1	5	27	4	0	36	83
% Heavy Vehicles	0.9	0	0	0	0.7	0.7	2.2	1	0	2	0.8	0	0	0	0.2	1.6	1.5	1.5	0	1.6	1.5

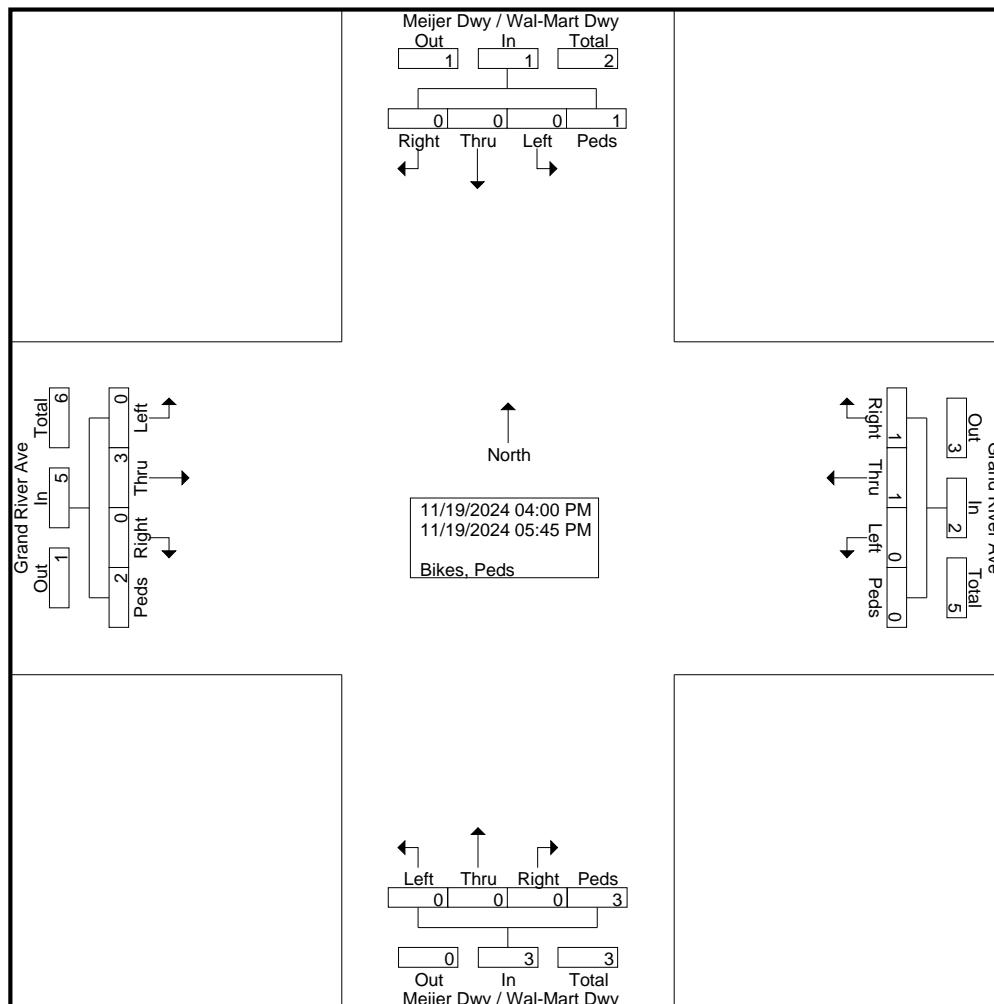


	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	34	0	15	1	50	18	226	12	0	256	14	2	61	0	77	40	246	31	0	317	700
04:45 PM	41	1	17	0	59	23	272	13	0	308	18	0	54	0	72	41	222	41	0	304	743
05:00 PM	51	0	17	0	68	23	286	12	0	321	14	0	43	0	57	33	239	39	0	311	757
05:15 PM	57	0	11	0	68	24	233	11	0	268	14	0	44	0	58	48	214	43	0	305	699
Total Volume	183	1	60	1	245	88	1017	48	0	1153	60	2	202	0	264	162	921	154	0	1237	2899
% App. Total	74.7	0.4	24.5	0.4		7.6	88.2	4.2	0		22.7	0.8	76.5	0		13.1	74.5	12.4	0		
PHF	.803	.250	.882	.250	.901	.917	.889	.923	.000	.898	.833	.250	.828	.000	.857	.844	.936	.895	.000	.976	.957
Passenger Vehicles	182	1	60	1	244	88	992	48	0	1128	60	2	202	0	264	160	913	151	0	1224	2860
% Passenger Vehicles	99.5	100	100	100	99.6	100	97.5	100	0	97.8	100	100	100	0	100	98.8	99.1	98.1	0	98.9	98.7
Heavy Vehicles	1	0	0	0	1	0	25	0	0	25	0	0	0	0	0	2	8	3	0	13	39
% Heavy Vehicles	0.5	0	0	0	0.4	0	2.5	0	0	2.2	0	0	0	0	0	1.2	0.9	1.9	0	1.1	1.3

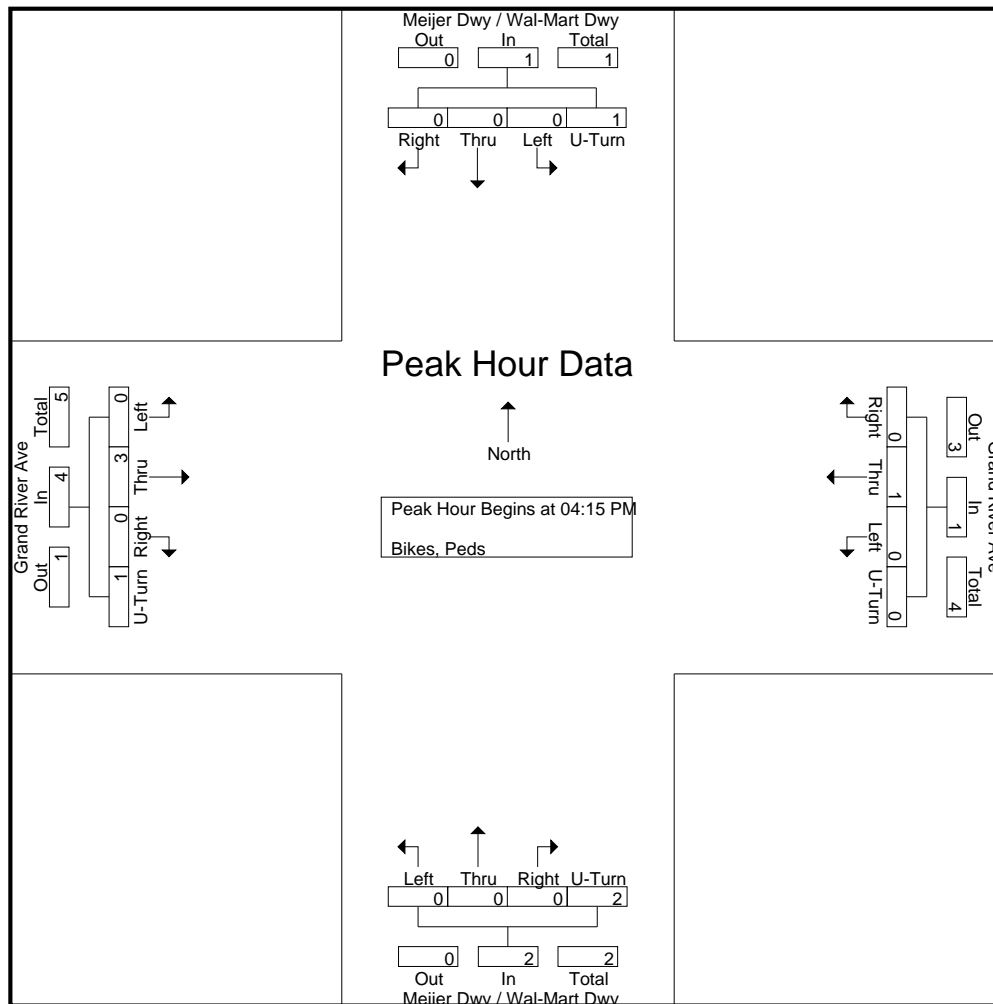


Groups Printed- Bikes, Peds

	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	2
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	2	2	0	2	0	2	4	7
05:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	1	1	0	0	2	0	0	0	1	1	0	1	0	0	1	4
Grand Total	0	0	0	1	1	1	1	0	0	2	0	0	0	3	3	0	3	0	2	5	11
Apprch %	0	0	0	100		50	50	0	0		0	0	0	100		0	60	0	40		
Total %	0	0	0	9.1	9.1	9.1	9.1	0	0	18.2	0	0	0	27.3	27.3	0	27.3	0	18.2	45.5	

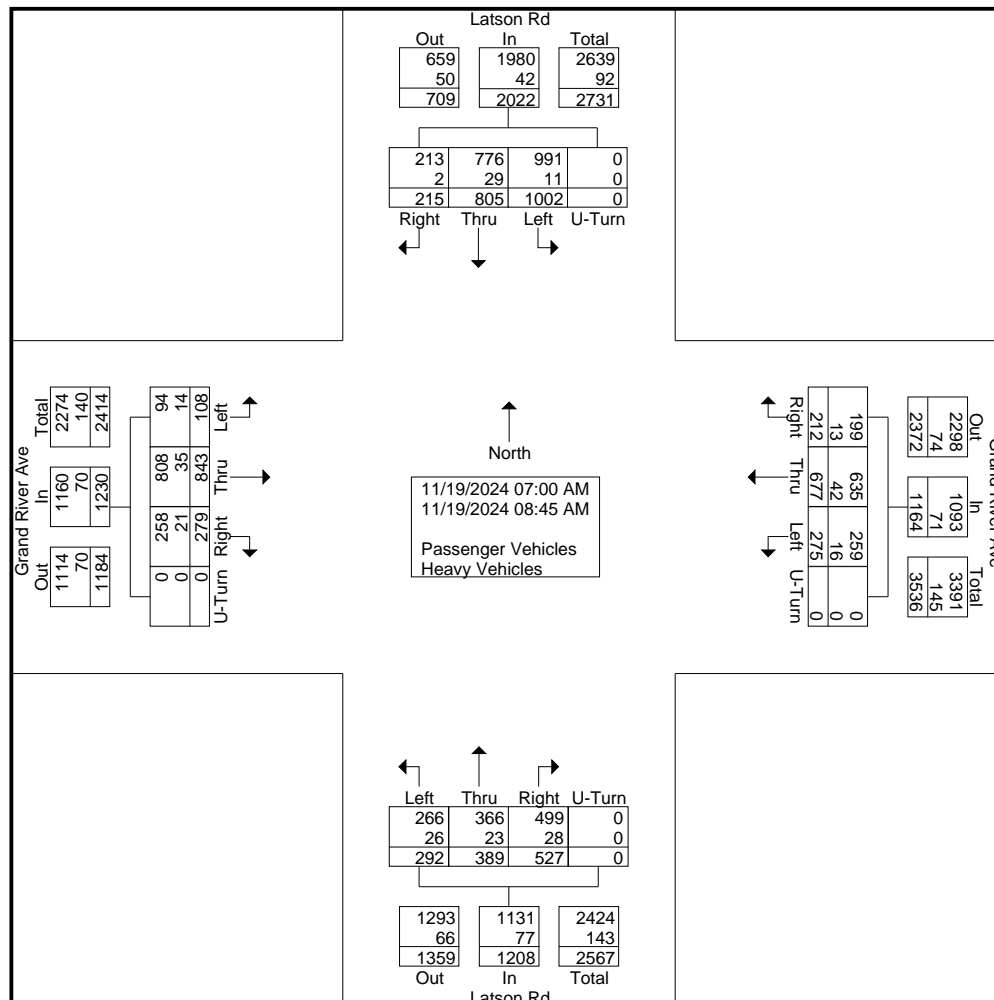


	Meijer Dwy / Wal-Mart Dwy Southbound					Grand River Ave Westbound					Meijer Dwy / Wal-Mart Dwy Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	2
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
05:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total Volume	0	0	0	1	1	0	1	0	0	1	0	0	0	2	2	0	3	0	1	4	8
% App. Total	0	0	0	100		0	100	0	0		0	0	0	100		0	75	0	25		
PHF	.000	.000	.000	.250	.250	.000	.250	.000	.000	.250	.000	.000	.000	.500	.500	.000	.750	.000	.250	1.00	.667

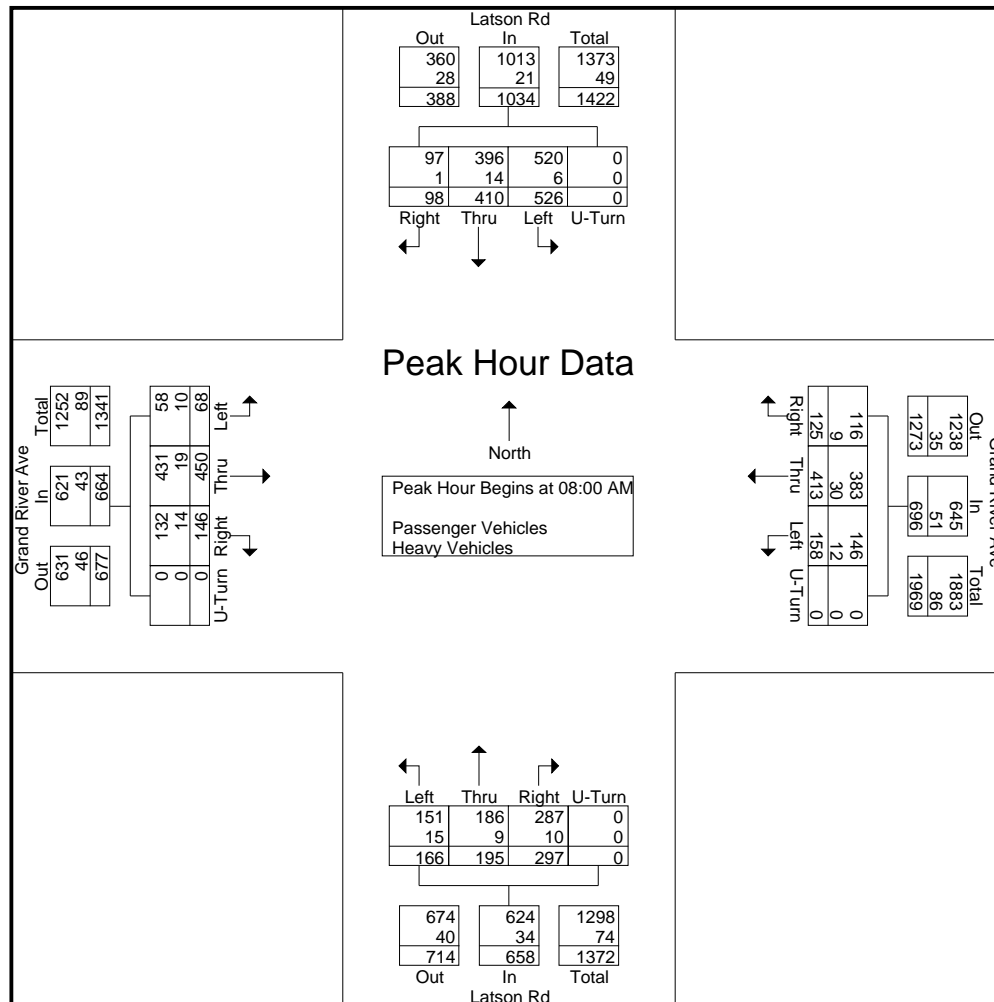


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	24	96	111	0	231	23	54	26	0	103	33	28	19	0	80	24	66	2	0	92	506
07:15 AM	31	93	115	0	239	19	57	20	0	96	59	62	35	0	156	36	111	14	0	161	652
07:30 AM	22	111	134	0	267	26	74	35	0	135	66	62	35	0	163	43	94	11	0	148	713
07:45 AM	40	95	116	0	251	19	79	36	0	134	72	42	37	0	151	30	122	13	0	165	701
Total	117	395	476	0	988	87	264	117	0	468	230	194	126	0	550	133	393	40	0	566	2572
08:00 AM	19	93	129	0	241	35	84	28	0	147	79	41	39	0	159	33	113	16	0	162	709
08:15 AM	28	108	137	0	273	24	91	42	0	157	74	38	31	0	143	38	106	18	0	162	735
08:30 AM	31	118	136	0	285	38	121	41	0	200	62	53	35	0	150	30	103	10	0	143	778
08:45 AM	20	91	124	0	235	28	117	47	0	192	82	63	61	0	206	45	128	24	0	197	830
Total	98	410	526	0	1034	125	413	158	0	696	297	195	166	0	658	146	450	68	0	664	3052
Grand Total	215	805	1002	0	2022	212	677	275	0	1164	527	389	292	0	1208	279	843	108	0	1230	5624
Apprch %	10.6	39.8	49.6	0		18.2	58.2	23.6	0		43.6	32.2	24.2	0		22.7	68.5	8.8	0		
Total %	3.8	14.3	17.8	0	36	3.8	12	4.9	0	20.7	9.4	6.9	5.2	0	21.5	5	15	1.9	0	21.9	
Passenger Vehicles	213	776	991	0	1980	199	635	259	0	1093	499	366	266	0	1131	258	808	94	0	1160	5364
% Passenger Vehicles	99.1	96.4	98.9	0	97.9	93.9	93.8	94.2	0	93.9	94.7	94.1	91.1	0	93.6	92.5	95.8	87	0	94.3	95.4
Heavy Vehicles	2	29	11	0	42	13	42	16	0	71	28	23	26	0	77	21	35	14	0	70	260
% Heavy Vehicles	0.9	3.6	1.1	0	2.1	6.1	6.2	5.8	0	6.1	5.3	5.9	8.9	0	6.4	7.5	4.2	13	0	5.7	4.6

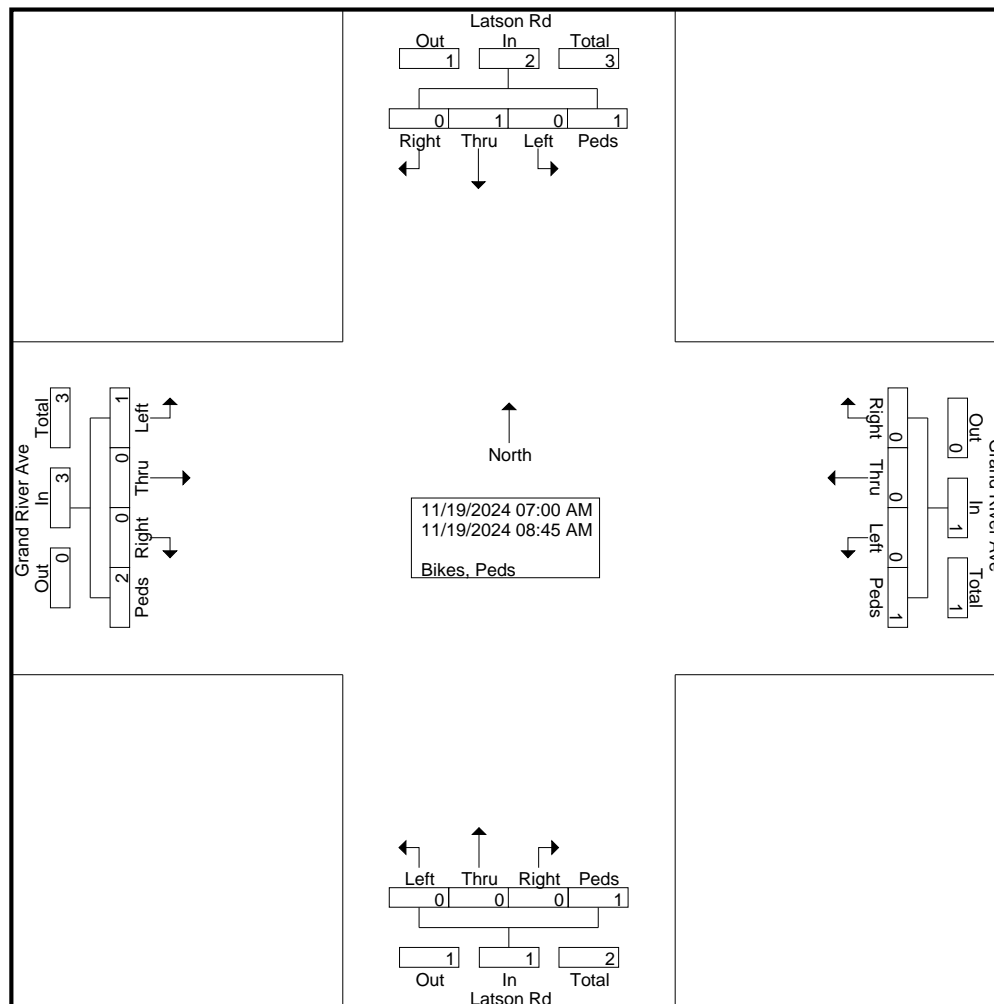


	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	19	93	129	0	241	35	84	28	0	147	79	41	39	0	159	33	113	16	0	162	709
08:15 AM	28	108	137	0	273	24	91	42	0	157	74	38	31	0	143	38	106	18	0	162	735
08:30 AM	31	118	136	0	285	38	121	41	0	200	62	53	35	0	150	30	103	10	0	143	778
08:45 AM	20	91	124	0	235	28	117	47	0	192	82	63	61	0	206	45	128	24	0	197	830
Total Volume	98	410	526	0	1034	125	413	158	0	696	297	195	166	0	658	146	450	68	0	664	3052
% App. Total	9.5	39.7	50.9	0		18	59.3	22.7	0		45.1	29.6	25.2	0		22	67.8	10.2	0		
PHF	.790	.869	.960	.000	.907	.822	.853	.840	.000	.870	.905	.774	.680	.000	.799	.811	.879	.708	.000	.843	.919
Passenger Vehicles	97	396	520	0	1013	116	383	146	0	645	287	186	151	0	624	132	431	58	0	621	2903
% Passenger Vehicles	99.0	96.6	98.9	0	98.0	92.8	92.7	92.4	0	92.7	96.6	95.4	91.0	0	94.8	90.4	95.8	85.3	0	93.5	95.1
Heavy Vehicles	1	14	6	0	21	9	30	12	0	51	10	9	15	0	34	14	19	10	0	43	149
% Heavy Vehicles	1.0	3.4	1.1	0	2.0	7.2	7.3	7.6	0	7.3	3.4	4.6	9.0	0	5.2	9.6	4.2	14.7	0	6.5	4.9

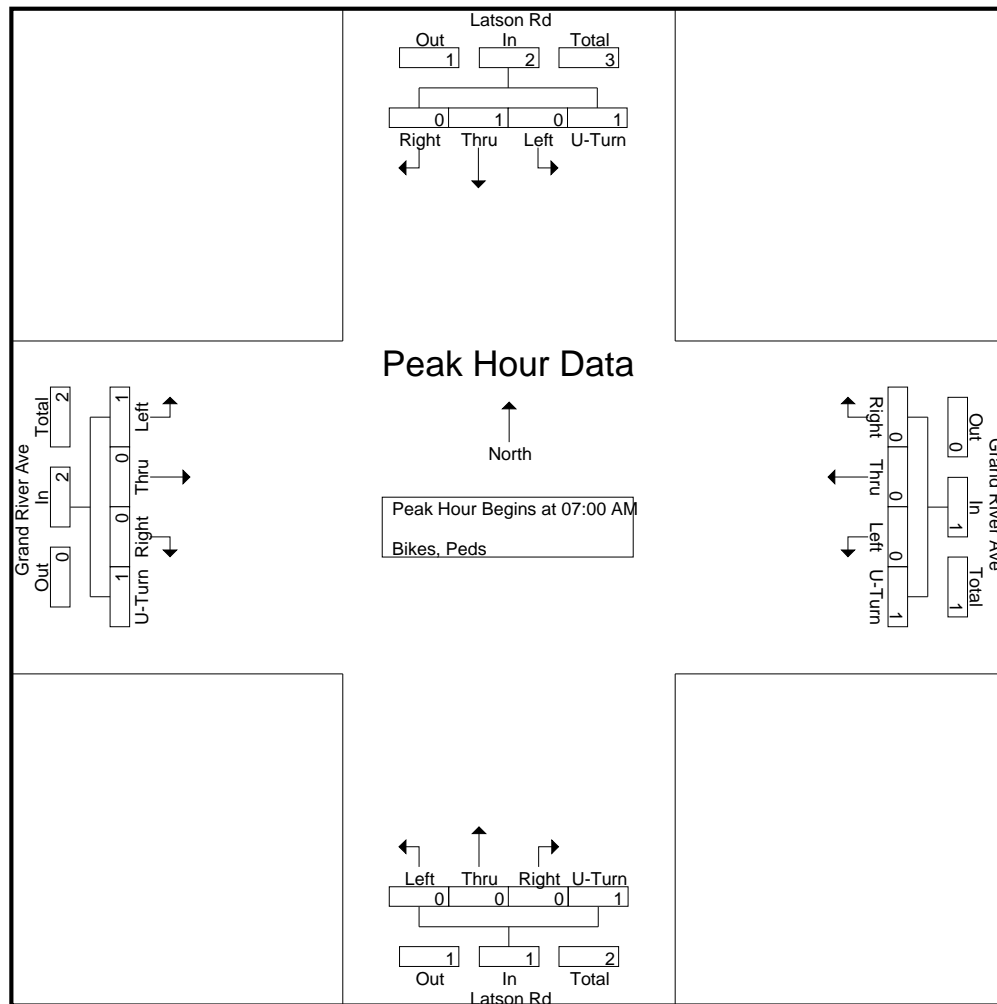


Groups Printed- Bikes, Peds

	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	3
Total	0	1	0	1	2	0	0	0	1	1	0	0	0	1	1	0	0	1	1	2	6
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Grand Total	0	1	0	1	2	0	0	0	1	1	0	0	0	1	1	0	0	1	2	3	7
Apprch %	0	50	0	50		0	0	0	100		0	0	0	100		0	0	33.3	66.7		
Total %	0	14.3	0	14.3	28.6	0	0	0	14.3	14.3	0	0	0	14.3	14.3	0	0	14.3	28.6	42.9	

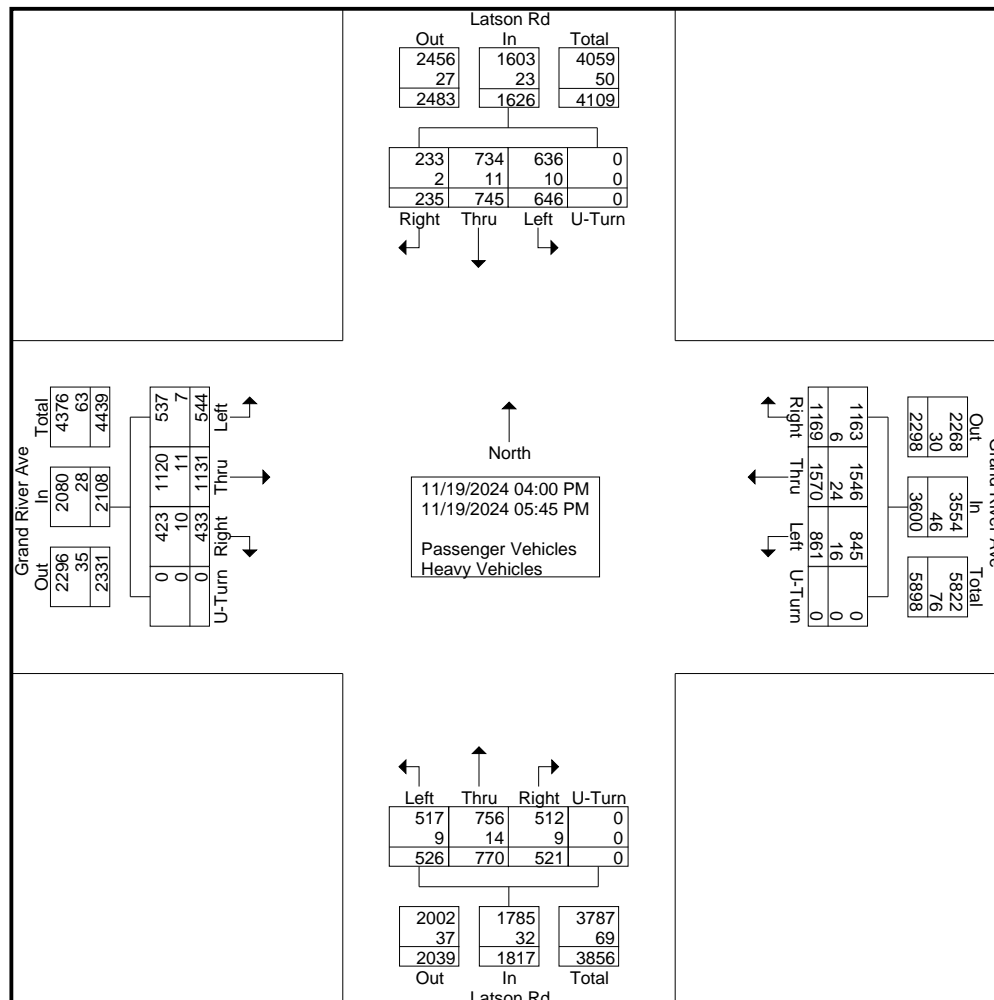


	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	3
Total Volume	0	1	0	1	2	0	0	0	1	1	0	0	0	1	1	0	0	1	1	2	6
% App. Total	0	50	0	50		0	0	0	100		0	0	0	100		0	0	50	50		
PHF	.000	.250	.000	.250	.500	.000	.000	.000	.250	.250	.000	.000	.000	.250	.250	.000	.000	.250	.250	.500	.500

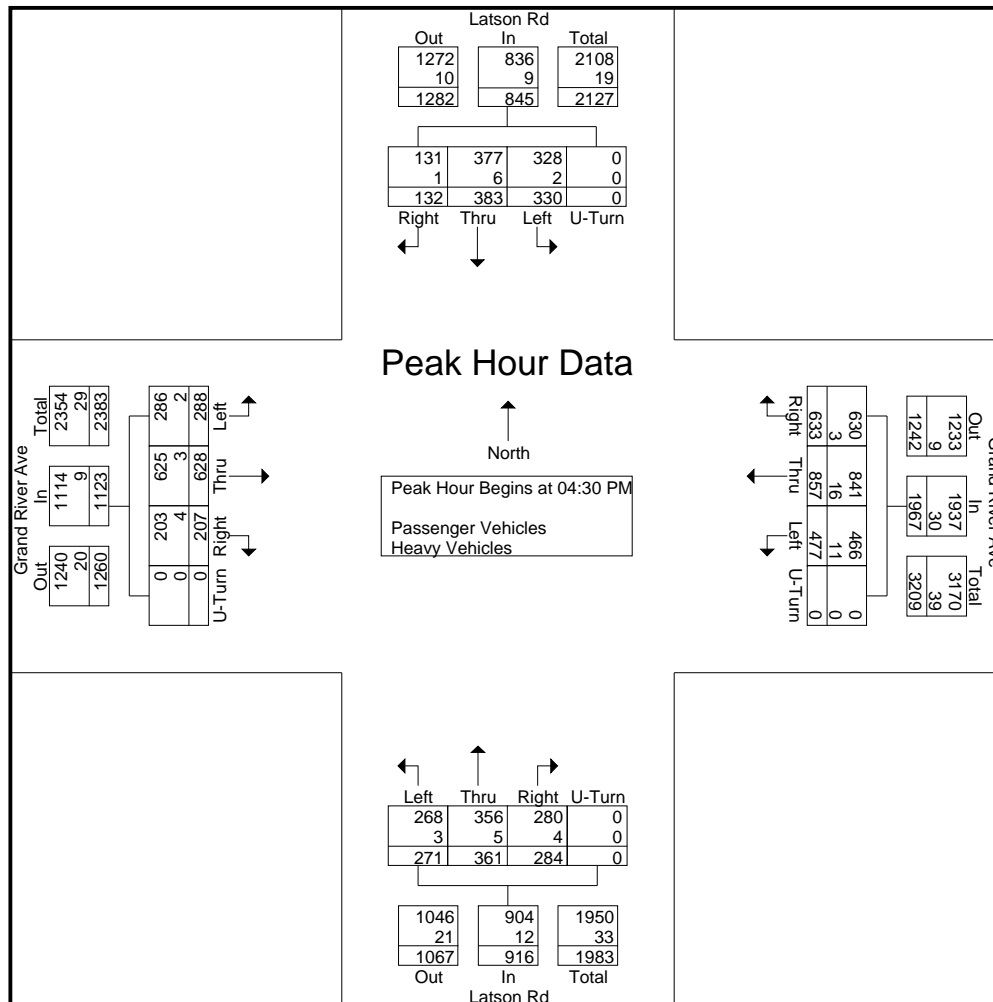


Groups Printed- Passenger Vehicles - Heavy Vehicles

	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	16	102	75	0	193	106	201	99	0	406	68	106	72	0	246	65	154	73	0	292	1137
04:15 PM	29	85	93	0	207	146	194	103	0	443	59	92	60	0	211	52	146	65	0	263	1124
04:30 PM	33	93	92	0	218	150	199	124	0	473	61	74	69	0	204	51	161	73	0	285	1180
04:45 PM	39	109	90	0	238	165	230	117	0	512	94	90	70	0	254	45	170	57	0	272	1276
Total	117	389	350	0	856	567	824	443	0	1834	282	362	271	0	915	213	631	268	0	1112	4717
05:00 PM	32	77	73	0	182	162	233	117	0	512	74	102	64	0	240	59	164	79	0	302	1236
05:15 PM	28	104	75	0	207	156	195	119	0	470	55	95	68	0	218	52	133	79	0	264	1159
05:30 PM	25	91	57	0	173	165	170	102	0	437	54	98	59	0	211	54	103	59	0	216	1037
05:45 PM	33	84	91	0	208	119	148	80	0	347	56	113	64	0	233	55	100	59	0	214	1002
Total	118	356	296	0	770	602	746	418	0	1766	239	408	255	0	902	220	500	276	0	996	4434
Grand Total	235	745	646	0	1626	1169	1570	861	0	3600	521	770	526	0	1817	433	1131	544	0	2108	9151
Apprch %	14.5	45.8	39.7	0		32.5	43.6	23.9	0		28.7	42.4	28.9	0		20.5	53.7	25.8	0		
Total %	2.6	8.1	7.1	0	17.8	12.8	17.2	9.4	0	39.3	5.7	8.4	5.7	0	19.9	4.7	12.4	5.9	0	23	
Passenger Vehicles	233	734	636	0	1603	1163	1546	845	0	3554	512	756	517	0	1785	423	1120	537	0	2080	9022
% Passenger Vehicles	99.1	98.5	98.5	0	98.6	99.5	98.5	98.1	0	98.7	98.3	98.2	98.3	0	98.2	97.7	99	98.7	0	98.7	98.6
Heavy Vehicles	2	11	10	0	23	6	24	16	0	46	9	14	9	0	32	10	11	7	0	28	129
% Heavy Vehicles	0.9	1.5	1.5	0	1.4	0.5	1.5	1.9	0	1.3	1.7	1.8	1.7	0	1.8	2.3	1	1.3	0	1.3	1.4

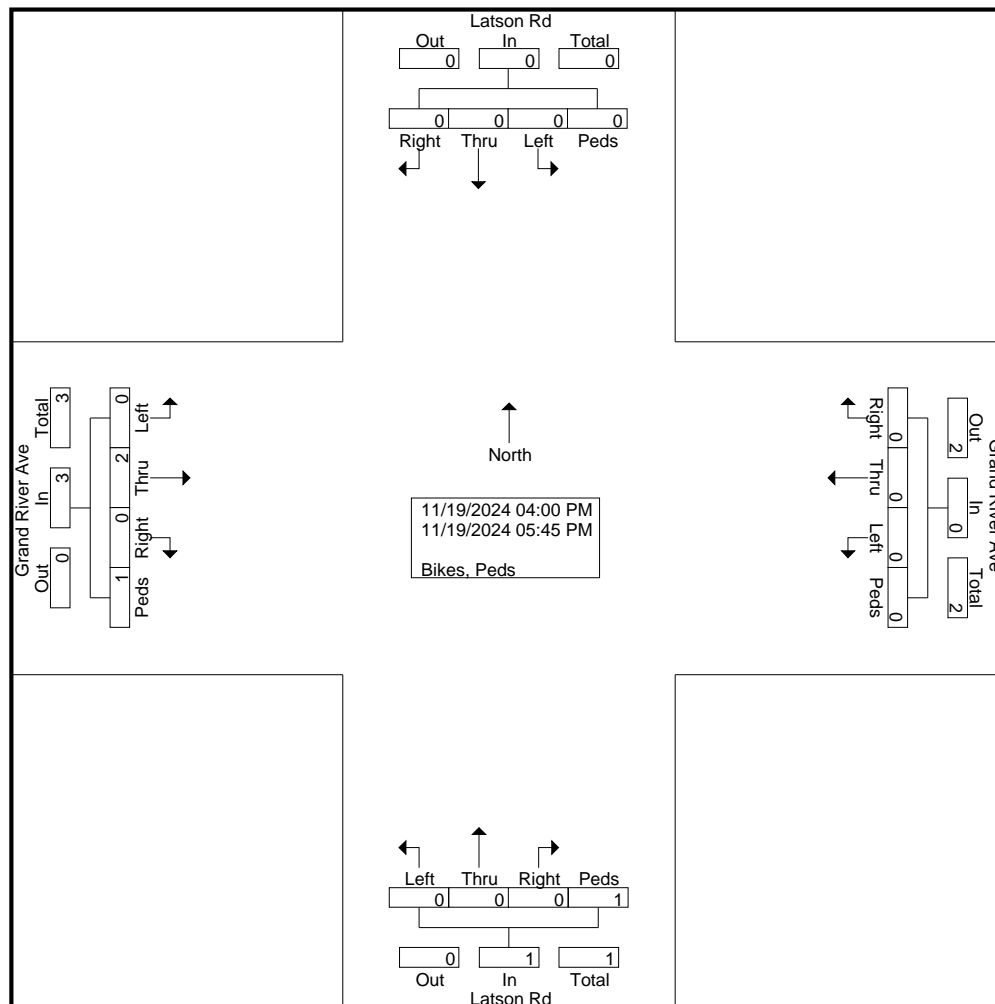


	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	33	93	92	0	218	150	199	124	0	473	61	74	69	0	204	51	161	73	0	285	1180
04:45 PM	39	109	90	0	238	165	230	117	0	512	94	90	70	0	254	45	170	57	0	272	1276
05:00 PM	32	77	73	0	182	162	233	117	0	512	74	102	64	0	240	59	164	79	0	302	1236
05:15 PM	28	104	75	0	207	156	195	119	0	470	55	95	68	0	218	52	133	79	0	264	1159
Total Volume	132	383	330	0	845	633	857	477	0	1967	284	361	271	0	916	207	628	288	0	1123	4851
% App. Total	15.6	45.3	39.1	0		32.2	43.6	24.3	0		31	39.4	29.6	0		18.4	55.9	25.6	0		
PHF	.846	.878	.897	.000	.888	.959	.920	.962	.000	.960	.755	.885	.968	.000	.902	.877	.924	.911	.000	.930	.950
Passenger Vehicles	131	377	328	0	836	630	841	466	0	1937	280	356	268	0	904	203	625	286	0	1114	4791
% Passenger Vehicles	99.2	98.4	99.4	0	98.9	99.5	98.1	97.7	0	98.5	98.6	98.6	98.9	0	98.7	98.1	99.5	99.3	0	99.2	98.8
Heavy Vehicles	1	6	2	0	9	3	16	11	0	30	4	5	3	0	12	4	3	2	0	9	60
% Heavy Vehicles	0.8	1.6	0.6	0	1.1	0.5	1.9	2.3	0	1.5	1.4	1.4	1.1	0	1.3	1.9	0.5	0.7	0	0.8	1.2

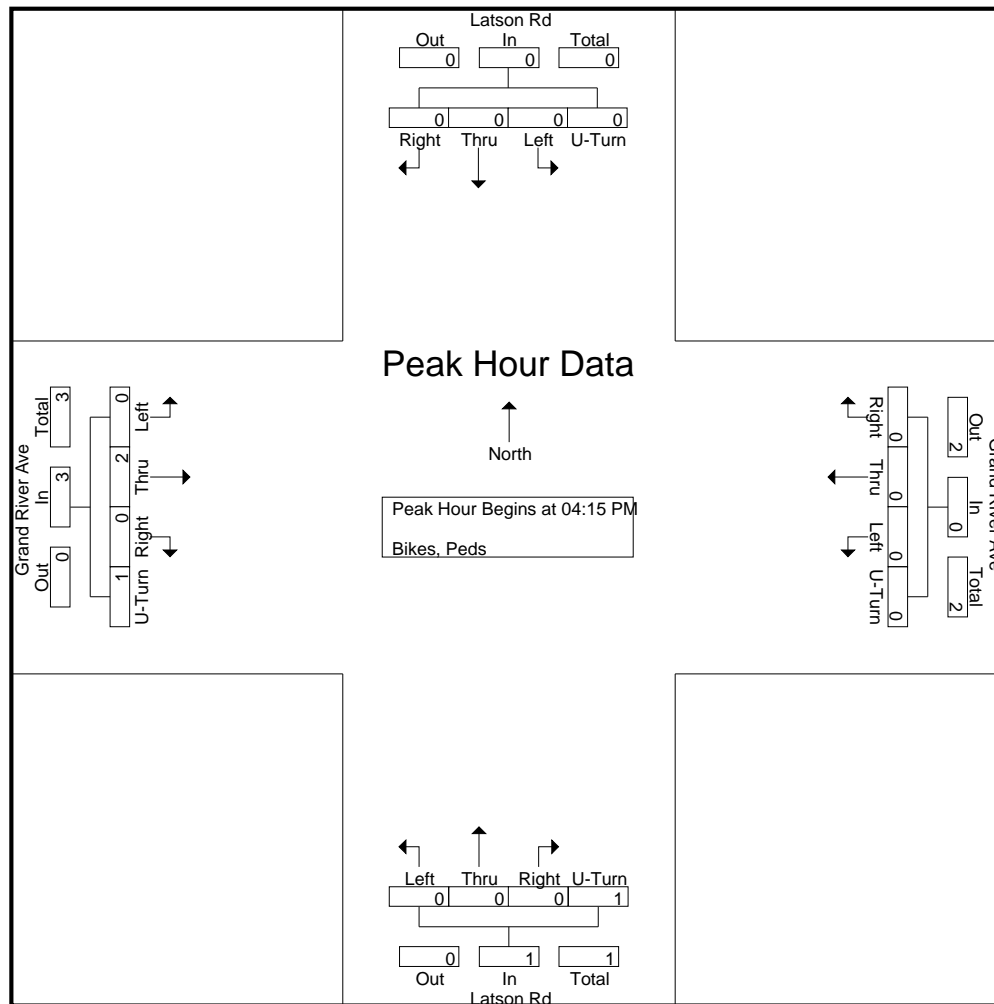


Groups Printed- Bikes, Peds

	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	3
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	1	3	4
Apprch %	0	0	0	0		0	0	0	0		0	0	0	100		0	66.7	0	33.3		
Total %	0	0	0	0		0	0	0	0		0	0	0	25	25	0	50	0	25	75	



	Latson Rd Southbound					Grand River Ave Westbound					Latson Rd Northbound					Grand River Ave Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	1	3	4
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	100		0	66.7	0	33.3		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.500	.000	.250	.750	1.00



Appendix B | Existing Conditions Data

Level of Service Criteria for Signalized Intersections

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio	
	≤ 1.0	> 1.0
≤ 10	A	F
>10-20	B	F
>20-35	C	F
>35-55	D	F
>55-80	E	F
>80	F	F

LOS A describes operations with a control delay of 10 s/veh or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

LOS B describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

LOS C describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

A lane group can incur a delay less than 80 s/veh when the volume-to-capacity ratio exceeds 1.0. This condition typically occurs when the cycle length is short, the signal progression is favorable, or both. As a result, both the delay and volume-to-capacity ratio are considered when lane group LOS is established. A ratio of 1.0 or more indicates cycle capacity is fully utilized and represents failure from a capacity perspective (just as delay in excess of 80 s/veh represents failure from a delay perspective).

Source: Highway Capacity Manual, 7th Edition. Transportation Research Board, National Research Council.

Level of Service Criteria for Two-Way-Stop-Controlled Intersections

Control Delay (s/veh)	<u>LOS by Volume-to-Capacity Ratio</u>	
	<u>≤ 1.0</u>	<u>> 1.0</u>
≤10	A	F
>10-15	B	F
>15-25	C	F
>25-35	D	F
>35-50	E	F
>50	F	F

























LOS for TWSC intersection is determined by the computed or measured control delay. For motor vehicles, LOS is determined for each minor-street movement (or shared movement), as well as the major-street left turns. LOS is not defined for the intersection as a whole or for major-street approaches for three primary reasons: (a) major street through vehicles are assumed to experience zero delay; (b) the disproportionate number of major-street through vehicles at a typical TWSC intersection skews the weighted average of all movements, resulting in very low overall average delay for all vehicles; and (c) the resulting low delay can mask LOS deficiencies of minor movements. LOS F is assigned to a movement if its volume-to-capacity ratio exceeds 1.0, regardless of the control delay.

The LOS criteria for TWSC intersections differ somewhat from the criteria used for signalized intersections, primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users, as delays are less predictable than they are at signals.

Source: Highway Capacity Manual, 7th Edition. Transportation Research Board, National Research Council.

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

Existing Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	450	146	158	413	125	166	195	297	526	410	98
Future Volume (veh/h)	68	450	146	158	413	125	166	195	297	526	410	98
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1891	1891	1891	1891	1891	1891	1922	1922	1922	1969	1969	1969
Adj Flow Rate, veh/h	81	536	174	182	475	144	208	244	371	578	451	108
Peak Hour Factor	0.84	0.84	0.84	0.87	0.87	0.87	0.80	0.80	0.80	0.91	0.91	0.91
Percent Heavy Veh, %	7	7	7	7	7	7	5	5	5	2	2	2
Cap, veh/h	168	999	591	254	1087	798	323	527	354	713	933	497
Arrive On Green	0.03	0.19	0.19	0.07	0.30	0.30	0.09	0.14	0.14	0.20	0.25	0.25
Sat Flow, veh/h	3493	3593	1601	3493	3593	1601	3551	3652	1629	3638	3741	1668
Grp Volume(v), veh/h	81	536	174	182	475	144	208	244	371	578	451	108
Grp Sat Flow(s),veh/h/ln	1747	1796	1601	1747	1796	1601	1776	1826	1629	1819	1870	1668
Q Serve(g_s), s	2.1	12.1	7.5	4.6	9.6	4.5	5.1	5.5	13.0	13.7	9.3	4.4
Cycle Q Clear(g_c), s	2.1	12.1	7.5	4.6	9.6	4.5	5.1	5.5	13.0	13.7	9.3	4.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	168	999	591	254	1087	798	323	527	354	713	933	497
V/C Ratio(X)	0.48	0.54	0.29	0.72	0.44	0.18	0.64	0.46	1.05	0.81	0.48	0.22
Avail Cap(c_a), veh/h	276	999	591	276	1087	798	829	527	354	849	933	497
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.4	31.4	22.9	40.8	25.2	12.4	39.5	35.3	35.2	34.6	28.8	23.7
Incr Delay (d2), s/veh	2.1	2.1	1.3	7.9	1.3	0.5	4.5	0.6	61.2	6.6	0.4	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	5.5	2.9	2.1	3.9	1.5	2.3	2.3	13.1	6.3	3.9	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	44.6	33.4	24.1	48.7	26.5	12.9	44.0	35.9	96.4	41.2	29.2	24.0
LnGrp LOS	D	C	C	D	C	B	D	D	F	D	C	C
Approach Vol, veh/h		791			801			823			1137	
Approach Delay, s/veh		32.5			29.1			65.3			34.8	
Approach LOS		C			C			E			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.2	34.1	15.2	29.4	13.4	31.9	24.6	20.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 7.1	* 21	21.0	13.0	* 7.1	* 21	21.0	13.0				
Max Q Clear Time (g_c+I1), s	4.1	11.6	7.1	11.3	6.6	14.1	15.7	15.0				
Green Ext Time (p_c), s	0.0	0.4	1.1	0.5	0.0	0.4	2.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 40.1
HCM 7th LOS D

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Existing Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗	↘	↰	↗	↘	↰	↗	↘	↰	↗	↘
Traffic Volume (veh/h)	74	679	59	11	616	50	47	3	12	40	0	67
Future Volume (veh/h)	74	679	59	11	616	50	47	3	12	40	0	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2000	1891	2000	1891	1891	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	92	849	74	13	733	60	55	3	14	43	0	73
Peak Hour Factor	0.80	0.80	0.80	0.84	0.84	0.84	0.86	0.86	0.86	0.92	0.92	0.92
Percent Heavy Veh, %	0	7	0	7	7	0	2	2	2	4	4	4
Cap, veh/h	604	2708	1277	406	2708	1277	163	32	147	211	0	171
Arrive On Green	0.25	0.25	0.25	1.00	1.00	1.00	0.10	0.10	0.10	0.10	0.00	0.10
Sat Flow, veh/h	695	3593	1694	582	3593	1694	1327	303	1412	1374	0	1642
Grp Volume(v), veh/h	92	849	74	13	733	60	55	0	17	43	0	73
Grp Sat Flow(s),veh/h/ln	695	1796	1694	582	1796	1694	1327	0	1715	1374	0	1642
Q Serve(g_s), s	9.4	17.3	3.0	0.5	0.0	0.0	3.6	0.0	0.8	2.6	0.0	3.8
Cycle Q Clear(g_c), s	9.4	17.3	3.0	17.9	0.0	0.0	7.4	0.0	0.8	3.4	0.0	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.82	1.00		1.00
Lane Grp Cap(c), veh/h	604	2708	1277	406	2708	1277	163	0	179	211	0	171
V/C Ratio(X)	0.15	0.31	0.06	0.03	0.27	0.05	0.34	0.00	0.10	0.20	0.00	0.43
Avail Cap(c_a), veh/h	604	2708	1277	406	2708	1277	224	0	257	274	0	246
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.8	14.8	9.5	2.3	0.0	0.0	41.3	0.0	36.5	38.0	0.0	37.8
Incr Delay (d2), s/veh	0.5	0.3	0.1	0.1	0.2	0.1	1.2	0.0	0.2	0.5	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	8.2	0.7	0.0	0.1	0.0	1.2	0.0	0.4	0.9	0.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	12.4	15.1	9.5	2.4	0.2	0.1	42.5	0.0	36.7	38.5	0.0	39.5
LnGrp LOS	B	B	A	A	A	A	D		D	D		D
Approach Vol, veh/h	1015			806			72			116		
Approach Delay, s/veh	14.5			0.3			41.1			39.1		
Approach LOS	B			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	74.1			15.9			74.1			15.9		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 64			13.5			* 64			13.5		
Max Q Clear Time (g_c+I1), s	19.3			5.8			19.9			9.4		
Green Ext Time (p_c), s	7.5			0.3			5.4			0.1		

Intersection Summary

HCM 7th Control Delay, s/veh 11.2
HCM 7th LOS B













Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Existing Conditions
AM Peak Hour











Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	767	11	17	661	18	27	0	48	9	1	4
Future Volume (veh/h)	1	767	11	17	661	18	27	0	48	9	1	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1906	1906	1906	1891	1891	1891	1922	1922	1922	2000	2000	2000
Adj Flow Rate, veh/h	1	971	14	19	751	20	29	0	51	13	1	6
Peak Hour Factor	0.79	0.79	0.79	0.88	0.88	0.88	0.94	0.94	0.94	0.70	0.70	0.70
Percent Heavy Veh, %	6	6	6	7	7	7	5	5	5	0	0	0
Cap, veh/h	617	2877	1282	516	2853	1272	173	0	116	137	18	106
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.07	0.00	0.07	0.07	0.07	0.07
Sat Flow, veh/h	676	3622	1615	549	3593	1601	1375	0	1629	1375	248	1485
Grp Volume(v), veh/h	1	971	14	19	751	20	29	0	51	13	0	7
Grp Sat Flow(s),veh/h/ln	676	1811	1615	549	1796	1601	1375	0	1629	1375	0	1733
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	2.7	0.8	0.0	0.3
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	2.7	3.5	0.0	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.86
Lane Grp Cap(c), veh/h	617	2877	1282	516	2853	1272	173	0	116	137	0	124
V/C Ratio(X)	0.00	0.34	0.01	0.04	0.26	0.02	0.17	0.00	0.44	0.09	0.00	0.06
Avail Cap(c_a), veh/h	617	2877	1282	516	2853	1272	182	0	127	146	0	135
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	40.1	41.7	0.0	39.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.1	0.2	0.0	0.5	0.0	2.6	0.3	0.0	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.0	0.1	0.0	0.6	0.0	1.2	0.3	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.3	0.0	0.1	0.2	0.0	40.4	0.0	42.6	42.0	0.0	39.2
LnGrp LOS	A	A	A	A	A	A	D		D	D		D
Approach Vol, veh/h	986			790			80			20		
Approach Delay, s/veh	0.3			0.2			41.8			41.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	77.6			12.4			77.6			12.4		
Change Period (Y+Rc), s	6.1			6.0			6.1			6.0		
Max Green Setting (Gmax), s	70.9			7.0			70.9			7.0		
Max Q Clear Time (g_c+I1), s	2.0			5.5			2.0			4.7		
Green Ext Time (p_c), s	7.6			0.0			5.7			0.1		
Intersection Summary												
HCM 7th Control Delay, s/veh	2.5											
HCM 7th LOS	A											

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)











Existing Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	736	84	31	651	10	70	0	43	5	0	5
Future Volume (veh/h)	9	736	84	31	651	10	70	0	43	5	0	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1938	1938	1938	1891	1891	1891	1813	1813	1813	2000	2000	2000
Adj Flow Rate, veh/h	11	932	106	36	766	12	81	0	50	8	0	8
Peak Hour Factor	0.79	0.79	0.79	0.85	0.85	0.85	0.86	0.86	0.86	0.63	0.63	0.63
Percent Heavy Veh, %	4	4	4	7	7	7	12	12	12	0	0	0
Cap, veh/h	616	2891	1287	452	2843	45	192	0	116	94	18	52
Arrive On Green	0.79	0.79	0.79	1.00	1.00	1.00	0.08	0.00	0.08	0.08	0.00	0.08
Sat Flow, veh/h	682	3681	1639	522	3620	57	1296	0	1536	448	244	692
Grp Volume(v), veh/h	11	932	106	36	380	398	81	0	50	16	0	0
Grp Sat Flow(s),veh/h/ln	682	1841	1639	522	1796	1880	1296	0	1536	1383	0	0
Q Serve(g_s), s	0.3	6.5	1.3	0.6	0.0	0.0	1.7	0.0	2.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	6.5	1.3	7.2	0.0	0.0	4.6	0.0	2.8	2.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	0.50		0.50
Lane Grp Cap(c), veh/h	616	2891	1287	452	1411	1477	192	0	116	165	0	0
V/C Ratio(X)	0.02	0.32	0.08	0.08	0.27	0.27	0.42	0.00	0.43	0.10	0.00	0.00
Avail Cap(c_a), veh/h	616	2891	1287	452	1411	1477	291	0	234	281	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.1	2.8	2.2	0.3	0.0	0.0	40.4	0.0	39.7	38.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.3	0.1	0.3	0.5	0.4	1.5	0.0	2.5	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.1	0.2	0.0	0.2	0.2	1.8	0.0	1.1	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	2.2	3.1	2.3	0.7	0.5	0.4	41.9	0.0	42.2	39.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1049			814			131			16		
Approach Delay, s/veh	3.0			0.5			42.0			39.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	76.9			13.1			76.9			13.1		
Change Period (Y+Rc), s	6.2			6.3			6.2			6.3		
Max Green Setting (Gmax), s	63.8			13.7			63.8			13.7		
Max Q Clear Time (g_c+I1), s	8.5			4.8			9.2			6.6		
Green Ext Time (p_c), s	7.6			0.0			5.3			0.2		
Intersection Summary												
HCM 7th Control Delay, s/veh	4.8											
HCM 7th LOS	A											

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	779	0	0	689	3	0	0	0	0	0	3
Future Vol, veh/h	5	779	0	0	689	3	0	0	0	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	200	-	125	25	-	-	0	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	87	87	87	92	92	92	70	70	70
Heavy Vehicles, %	0	5	0	0	7	0	0	0	0	0	0	0
Mvmt Flow	6	986	0	0	792	3	0	0	0	0	0	4








Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	795	0	0	986	0	0	1395	1794	493	1298	1791	396
Stage 1	-	-	-	-	-	-	999	999	-	792	792	-
Stage 2	-	-	-	-	-	-	396	795	-	506	999	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	835	-	-	709	-	-	103	81	527	121	82	609
Stage 1	-	-	-	-	-	-	265	324	-	353	404	-
Stage 2	-	-	-	-	-	-	606	402	-	523	324	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	835	-	-	709	-	-	101	81	527	120	81	609
Mov Cap-2 Maneuver	-	-	-	-	-	-	101	81	-	120	81	-
Stage 1	-	-	-	-	-	-	263	322	-	353	404	-
Stage 2	-	-	-	-	-	-	602	402	-	519	322	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.06	0	0	10.95
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	835	-	-	709	-	-	-	609
HCM Lane V/C Ratio	-	-	0.008	-	-	-	-	-	-	0.007
HCM Ctrl Dly (s/v)	0	0	9.3	-	-	0	-	-	0	11
HCM Lane LOS	A	A	A	-	-	A	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0	-	-	0	-	-	-	0

HCM 7th TWSC
6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Existing Conditions
AM Peak Hour

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	805	18	31	693	6	3	0	5	2	0	0
Future Vol, veh/h	1	805	18	31	693	6	3	0	5	2	0	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	100	-	-	0	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	90	90	90	67	67	67	70	70	70
Heavy Vehicles, %	0	5	0	0	7	0	0	0	0	2	2	2
Mvmt Flow	1	1006	23	34	770	7	4	0	7	3	0	0

























Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	777	0	0	1030	0	0	1475	1867	515	1348	1874	388
Stage 1	-	-	-	-	-	-	1021	1021	-	842	842	-
Stage 2	-	-	-	-	-	-	454	846	-	506	1032	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	849	-	-	682	-	-	90	73	510	109	71	610
Stage 1	-	-	-	-	-	-	257	316	-	325	378	-
Stage 2	-	-	-	-	-	-	561	381	-	517	308	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	849	-	-	682	-	-	85	70	509	102	67	610
Mov Cap-2 Maneuver	-	-	-	-	-	-	85	70	-	102	67	-
Stage 1	-	-	-	-	-	-	256	316	-	309	359	-
Stage 2	-	-	-	-	-	-	532	362	-	509	307	-

Approach	EB			WB			NB			SB		
HCM Ctrl Dly, s/v	0.01	-	-	0.45	-	-	26.26	-	-	41.24	-	-
HCM LOS	-	-	-	-	-	-	D	-	-	E	-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	85	509	849	-	-	682	-	-	102
HCM Lane V/C Ratio	0.053	0.015	0.001	-	-	0.051	-	-	0.028
HCM Ctrl Dly (s/v)	49.7	12.2	9.2	-	-	10.6	-	-	41.2
HCM Lane LOS	E	B	A	-	-	B	-	-	E
HCM 95th %tile Q(veh)	0.2	0	0	-	-	0.2	-	-	0.1

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

Existing Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	288	628	207	477	857	633	271	361	284	330	383	132
Future Volume (veh/h)	288	628	207	477	857	633	271	361	284	330	383	132
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	310	675	223	502	902	666	301	401	316	371	430	148
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.90	0.90	0.90	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	391	980	604	529	1118	665	367	700	557	367	700	491
Arrive On Green	0.21	0.52	0.52	0.15	0.30	0.30	0.10	0.19	0.19	0.10	0.19	0.19
Sat Flow, veh/h	3666	3770	1678	3638	3741	1665	3666	3770	1679	3666	3770	1679
Grp Volume(v), veh/h	310	675	223	502	902	666	301	401	316	371	430	148
Grp Sat Flow(s),veh/h/ln	1833	1885	1678	1819	1870	1665	1833	1885	1679	1833	1885	1679
Q Serve(g_s), s	7.2	12.1	6.8	12.3	20.0	26.9	7.2	8.7	14.0	9.0	9.4	6.2
Cycle Q Clear(g_c), s	7.2	12.1	6.8	12.3	20.0	26.9	7.2	8.7	14.0	9.0	9.4	6.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	391	980	604	529	1118	665	367	700	557	367	700	491
V/C Ratio(X)	0.79	0.69	0.37	0.95	0.81	1.00	0.82	0.57	0.57	1.01	0.61	0.30
Avail Cap(c_a), veh/h	534	980	604	529	1118	665	367	754	581	367	754	515
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.5	18.9	13.4	38.1	29.1	27.1	39.7	33.4	24.8	40.5	33.7	24.7
Incr Delay (d2), s/veh	5.7	4.0	1.7	26.6	6.3	35.4	15.3	0.9	1.2	50.0	1.3	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.2	2.2	7.1	9.1	19.0	3.8	3.8	5.2	6.4	4.1	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	40.2	22.8	15.1	64.8	35.4	62.5	55.0	34.3	26.0	90.5	35.0	25.1
LnGrp LOS	D	C	B	E	D	F	D	C	C	F	D	C
Approach Vol, veh/h		1208			2070			1018			949	
Approach Delay, s/veh		25.9			51.2			37.8			55.2	
Approach LOS		C			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.5	33.8	16.0	23.7	20.0	30.3	16.0	23.7				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 13	* 22	9.0	18.0	* 13	* 22	9.0	18.0				
Max Q Clear Time (g_c+I1), s	9.2	28.9	9.2	11.4	14.3	14.1	11.0	16.0				
Green Ext Time (p_c), s	0.4	0.0	0.0	1.6	0.0	0.5	0.0	0.8				

Intersection Summary

HCM 7th Control Delay, s/veh 43.5
HCM 7th LOS D

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Existing Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	924	162	48	1017	88	202	2	60	60	1	183
Future Volume (veh/h)	154	924	162	48	1017	88	202	2	60	60	1	183
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	162	973	171	53	1130	98	235	2	70	67	1	203
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	2	2	2	0	0	0	1	1	1
Cap, veh/h	353	2250	1000	262	2232	992	270	12	432	386	2	437
Arrive On Green	0.20	0.20	0.20	1.00	1.00	1.00	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	457	3770	1676	492	3741	1663	1196	47	1653	1337	8	1673
Grp Volume(v), veh/h	162	973	171	53	1130	98	235	0	72	67	0	204
Grp Sat Flow(s),veh/h/ln	457	1885	1676	492	1870	1663	1196	0	1700	1337	0	1681
Q Serve(g_s), s	29.0	20.4	7.6	4.5	0.0	0.0	14.3	0.0	2.9	3.7	0.0	9.2
Cycle Q Clear(g_c), s	29.0	20.4	7.6	24.9	0.0	0.0	23.5	0.0	2.9	6.6	0.0	9.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Lane Grp Cap(c), veh/h	353	2250	1000	262	2232	992	270	0	444	386	0	439
V/C Ratio(X)	0.46	0.43	0.17	0.20	0.51	0.10	0.87	0.00	0.16	0.17	0.00	0.46
Avail Cap(c_a), veh/h	353	2250	1000	262	2232	992	270	0	444	386	0	439
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.2	22.8	17.6	4.7	0.0	0.0	39.2	0.0	25.7	28.2	0.0	28.0
Incr Delay (d2), s/veh	4.3	0.6	0.4	1.7	0.8	0.2	24.8	0.0	0.2	0.2	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	10.2	2.8	0.3	0.3	0.1	7.1	0.0	1.2	1.2	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	30.5	23.4	18.0	6.5	0.8	0.2	64.0	0.0	25.8	28.4	0.0	28.7
LnGrp LOS	C	C	B	A	A	A	E		C	C		C
Approach Vol, veh/h	1306			1281			307			271		
Approach Delay, s/veh	23.6			1.0			55.1			28.7		
Approach LOS	C			A			E			C		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	60.0			30.0			60.0			30.0		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 54			23.5			* 54			23.5		
Max Q Clear Time (g_c+I1), s	31.0			11.2			26.9			25.5		
Green Ext Time (p_c), s	9.6			1.2			9.4			0.0		

Intersection Summary

HCM 7th Control Delay, s/veh 17.9
HCM 7th LOS B













Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Existing Conditions
PM Peak Hour















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	1069	14	50	1240	102	45	2	56	80	0	46
Future Volume (veh/h)	21	1069	14	50	1240	102	45	2	56	80	0	46
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	22	1125	15	55	1363	112	56	2	69	91	0	52
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.81	0.81	0.81	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	258	2780	1240	444	2758	1230	217	6	211	201	0	216
Arrive On Green	1.00	1.00	1.00	0.49	0.49	0.49	0.13	0.13	0.13	0.13	0.00	0.13
Sat Flow, veh/h	361	3770	1682	494	3741	1668	1363	48	1641	1340	0	1682
Grp Volume(v), veh/h	22	1125	15	55	1363	112	56	0	71	91	0	52
Grp Sat Flow(s),veh/h/ln	361	1885	1682	494	1870	1668	1363	0	1689	1340	0	1682
Q Serve(g_s), s	2.0	0.0	0.0	5.5	22.0	3.2	3.5	0.0	3.4	6.0	0.0	2.5
Cycle Q Clear(g_c), s	23.9	0.0	0.0	5.5	22.0	3.2	6.0	0.0	3.4	9.4	0.0	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Lane Grp Cap(c), veh/h	258	2780	1240	444	2758	1230	217	0	217	201	0	216
V/C Ratio(X)	0.09	0.40	0.01	0.12	0.49	0.09	0.26	0.00	0.33	0.45	0.00	0.24
Avail Cap(c_a), veh/h	258	2780	1240	444	2758	1230	269	0	281	252	0	280
HCM Platoon Ratio	2.00	2.00	2.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.0	0.0	0.0	7.4	11.5	6.8	38.0	0.0	35.7	40.0	0.0	35.3
Incr Delay (d2), s/veh	0.6	0.4	0.0	0.6	0.6	0.1	0.6	0.0	0.9	1.6	0.0	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.1	0.2	0.0	0.0	0.4	9.4	0.7	1.2	0.0	1.5	2.0	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	4.6	0.4	0.0	7.9	12.2	6.9	38.6	0.0	36.6	41.6	0.0	35.9
LnGrp LOS	A	A	A	A	B	A	D		D	D		D
Approach Vol, veh/h	1162					1530		127		143		
Approach Delay, s/veh	0.5					11.6		37.5		39.5		
Approach LOS	A					B		D		D		
Timer - Assigned Phs	2		4			6		8				
Phs Duration (G+Y+Rc), s	72.5		17.5			72.5		17.5				
Change Period (Y+Rc), s	6.1		6.0			6.1		6.0				
Max Green Setting (Gmax), s	62.9		15.0			62.9		15.0				
Max Q Clear Time (g_c+I1), s	25.9		11.4			24.0		8.0				
Green Ext Time (p_c), s	9.5		0.2			13.7		0.3				
Intersection Summary												
HCM 7th Control Delay, s/veh			9.7									
HCM 7th LOS			A									

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)











Existing Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1023	64	39	1303	3	134	3	77	13	3	10
Future Volume (veh/h)	5	1023	64	39	1303	3	134	3	77	13	3	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1969	1969	1969	2000	2000	2000
Adj Flow Rate, veh/h	5	1077	67	42	1416	3	151	3	87	16	4	12
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.81	0.81	0.81
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	0	0	0
Cap, veh/h	361	2779	1238	391	2822	6	267	7	200	116	39	57
Arrive On Green	0.74	0.74	0.74	1.00	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	381	3770	1681	492	3830	8	1392	56	1613	451	318	461
Grp Volume(v), veh/h	5	1077	67	42	692	727	151	0	90	32	0	0
Grp Sat Flow(s),veh/h/ln	381	1885	1681	492	1870	1967	1392	0	1669	1230	0	0
Q Serve(g_s), s	0.3	9.5	1.0	1.2	0.0	0.0	4.0	0.0	4.5	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.3	9.5	1.0	10.7	0.0	0.0	8.5	0.0	4.5	4.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.97	0.50		0.37
Lane Grp Cap(c), veh/h	361	2779	1238	391	1378	1450	267	0	207	213	0	0
V/C Ratio(X)	0.01	0.39	0.05	0.11	0.50	0.50	0.56	0.00	0.43	0.15	0.00	0.00
Avail Cap(c_a), veh/h	361	2779	1238	391	1378	1450	415	0	384	372	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.2	4.4	3.2	0.8	0.0	0.0	38.1	0.0	36.5	35.2	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.1	0.6	1.3	1.2	1.9	0.0	1.4	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	0.2	0.1	0.5	0.5	3.3	0.0	1.9	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	3.2	4.8	3.3	1.3	1.3	1.2	39.9	0.0	37.9	35.5	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1149				1461		241				32	
Approach Delay, s/veh	4.7				1.3		39.2				35.5	
Approach LOS	A				A		D				D	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	72.5		17.5		72.5		17.5					
Change Period (Y+Rc), s	6.2		6.3		6.2		6.3					
Max Green Setting (Gmax), s	56.8		20.7		56.8		20.7					
Max Q Clear Time (g_c+I1), s	11.5		6.5		12.7		10.5					
Green Ext Time (p_c), s	9.0		0.1		12.6		0.7					
Intersection Summary												
HCM 7th Control Delay, s/veh			6.2									
HCM 7th LOS			A									

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	1100	0	0	1325	6	0	0	0	4	0	20
Future Vol, veh/h	13	1100	0	0	1325	6	0	0	0	4	0	20
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	200	-	125	25	-	-	0	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	90	90	90	92	92	92	75	75	75
Heavy Vehicles, %	0	1	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	14	1158	0	0	1472	7	0	0	0	5	0	27








Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1480	0	0	1159	0	0	1922	2666	580	2080	2659	737
Stage 1	-	-	-	-	-	-	1186	1186	-	1473	1473	-
Stage 2	-	-	-	-	-	-	736	1480	-	606	1186	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	461	-	-	610	-	-	41	23	463	31	23	365
Stage 1	-	-	-	-	-	-	204	264	-	135	193	-
Stage 2	-	-	-	-	-	-	381	191	-	456	264	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	460	-	-	610	-	-	37	22	462	31	22	365
Mov Cap-2 Maneuver	-	-	-	-	-	-	37	22	-	31	22	-
Stage 1	-	-	-	-	-	-	197	256	-	135	192	-
Stage 2	-	-	-	-	-	-	353	191	-	442	256	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.15	0	0	37.44
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	460	-	-	610	-	-	31	365
HCM Lane V/C Ratio	-	-	0.03	-	-	-	-	-	0.175	0.073
HCM Ctrl Dly (s/v)	0	0	13.1	-	-	0	-	-	146.4	15.6
HCM Lane LOS	A	A	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	-	-	0.1	-	-	0	-	-	0.5	0.2

Intersection

Int Delay, s/veh 1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1196	2	9	1374	19	2	0	36	8	0	16
Future Vol, veh/h	7	1196	2	9	1374	19	2	0	36	8	0	16
Conflicting Peds, #/hr	2	0	2	2	0	2	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	100	-	-	0	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	63	63	63	75	75	75
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	2	2	2
Mvmt Flow	7	1259	2	10	1477	20	3	0	57	11	0	21

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	1500	0	0	1263	0	0	2036	2796	634	2154	2787	752
Stage 1	-	-	-	-	-	-	1277	1277	-	1509	1509	-
Stage 2	-	-	-	-	-	-	759	1519	-	645	1278	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.21	-	-	2.22	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	448	-	-	546	-	-	34	19	427	27	18	353
Stage 1	-	-	-	-	-	-	179	240	-	126	182	-
Stage 2	-	-	-	-	-	-	369	183	-	427	235	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	447	-	-	545	-	-	31	18	426	22	18	352
Mov Cap-2 Maneuver	-	-	-	-	-	-	31	18	-	22	18	-
Stage 1	-	-	-	-	-	-	176	235	-	124	178	-
Stage 2	-	-	-	-	-	-	340	179	-	363	231	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.08	0.08	21.09	120.28
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	31	426	447	-	-	545	-	-	60
HCM Lane V/C Ratio	0.103	0.134	0.016	-	-	0.018	-	-	0.536
HCM Ctrl Dly (s/v)	135.1	14.8	13.2	-	-	11.7	-	-	120.3
HCM Lane LOS	F	B	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.5	0.1	-	-	0.1	-	-	2.1

1: Latson Road & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Exited	78	525	171	171	458	141	185	235	344	566	444	107
Hourly Exit Rate	78	525	171	171	458	141	185	235	344	566	444	107
Input Volume	78	529	167	176	460	139	198	232	352	565	441	106
% of Volume	100	99	102	97	100	101	94	101	98	100	101	101

1: Latson Road & I-96 BL (Grand River Avenue) Performance by movement

Movement	All
Vehicles Exited	3425
Hourly Exit Rate	3425
Input Volume	3442
% of Volume	100

2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Vehicles Exited	97	825	66	10	692	60	55	3	15	34	65	1922
Hourly Exit Rate	97	825	66	10	692	60	55	3	15	34	65	1922
Input Volume	88	815	70	12	708	58	53	3	14	42	72	1934
% of Volume	110	101	94	80	98	104	104	100	111	80	91	99

3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	All
Vehicles Exited	0	946	13	14	711	19	27	51	13	1	8	1803
Hourly Exit Rate	0	946	13	14	711	19	27	51	13	1	8	1803
Input Volume	1	930	13	18	729	20	28	50	12	1	6	1808
% of Volume	0	102	98	76	98	97	95	101	108	100	145	100

4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Vehicles Exited	11	896	100	32	723	9	76	48	7	7	1909
Hourly Exit Rate	11	896	100	32	723	9	76	48	7	7	1909
Input Volume	10	883	100	35	738	12	78	48	7	7	1919
% of Volume	105	101	100	92	98	78	97	99	97	97	99

5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	WBT	WBR	SBR	All
Vehicles Exited	5	953	747	3	4	1712
Hourly Exit Rate	5	953	747	3	4	1712
Input Volume	6	938	766	3	4	1718
% of Volume	87	102	97	100	107	100

6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	All
Vehicles Exited	1	979	24	35	766	7	3	6	2	1823
Hourly Exit Rate	1	979	24	35	766	7	3	6	2	1823
Input Volume	1	966	22	33	789	7	4	6	3	1830
% of Volume	100	101	110	105	97	104	80	92	73	100

9001: Dummy Node A & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBT	EBR	WBT	All
Vehicles Exited	784	82	758	1624
Hourly Exit Rate	784	82	758	1624
Input Volume	786	78	773	1637
% of Volume	100	105	98	99

Total Network Performance

Vehicles Exited		4161	
Hourly Exit Rate		4161	
Input Volume		18366	
% of Volume		23	

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	59	75	122	120	38	118	137	166	160	60	93	146
Average Queue (ft)	12	23	59	50	5	33	64	87	70	10	21	67
95th Queue (ft)	38	59	106	103	22	88	119	148	141	37	63	124
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	360	557	436	241	264	186	204	115
Average Queue (ft)	98	151	231	134	183	100	106	47
95th Queue (ft)	321	467	412	231	256	167	171	99
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			275	250	250		275	
Storage Blk Time (%)		1	15	0	0			
Queuing Penalty (veh)		3	18	0	1			

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	74	107	135	44	42	107	125	32	91	40	90	62
Average Queue (ft)	31	33	46	10	7	33	43	7	32	12	28	26
95th Queue (ft)	65	87	109	35	27	83	92	26	73	35	68	49
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)		0									0	
Queuing Penalty (veh)		0									0	

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	123	88	28	30	36	59	14	97	56	39	24
Average Queue (ft)	30	28	2	6	4	13	1	26	33	11	5
95th Queue (ft)	84	71	16	23	23	43	8	69	61	34	21
Link Distance (ft)	440	440			522	522		275		304	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)			25	250			100		25		75
Storage Blk Time (%)		5	0					26	9	0	
Queuing Penalty (veh)		1	1					13	3	0	

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	30	118	104	51	56	95	110	142	56	64
Average Queue (ft)	5	41	36	11	19	22	34	57	19	13
95th Queue (ft)	21	90	87	37	47	69	84	112	45	43
Link Distance (ft)		1068	1068			471	471		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)								0		
Queuing Penalty (veh)								0		

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	SB
Directions Served	L	TR
Maximum Queue (ft)	22	19
Average Queue (ft)	2	2
95th Queue (ft)	12	13
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	200	50
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	L	L	TR	LTR
Maximum Queue (ft)	8	4	48	31	31	28
Average Queue (ft)	0	0	14	3	6	2
95th Queue (ft)	4	3	39	19	26	15
Link Distance (ft)		522		348		339
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250		100		75	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 39

1: Latson Road & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Exited	295	649	219	500	891	644	290	392	307	360	416	150
Hourly Exit Rate	295	649	219	500	891	644	290	392	307	360	416	150
Input Volume	304	663	219	496	891	658	294	391	308	361	418	144
% of Volume	97	98	100	101	100	98	99	100	100	100	99	104

1: Latson Road & I-96 BL (Grand River Avenue) Performance by movement

Movement	All
Vehicles Exited	5113
Hourly Exit Rate	5113
Input Volume	5146
% of Volume	99

2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Exited	160	962	165	51	1100	94	231	2	71	61	1	199
Hourly Exit Rate	160	962	165	51	1100	94	231	2	71	61	1	199
Input Volume	160	978	169	52	1102	96	227	2	68	65	1	198
% of Volume	100	98	98	99	100	98	102	100	105	93	100	101

2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	All
Vehicles Exited	3097
Hourly Exit Rate	3097
Input Volume	3116
% of Volume	99

3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Vehicles Exited	18	1101	15	50	1332	116	57	1	63	86	56	2895
Hourly Exit Rate	18	1101	15	50	1332	116	57	1	63	86	56	2895
Input Volume	22	1112	15	54	1332	110	53	2	66	88	50	2904
% of Volume	83	99	102	93	100	106	107	50	96	97	111	100

4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Exited	5	1055	64	41	1420	2	134	3	82	15	4	15
Hourly Exit Rate	5	1055	64	41	1420	2	134	3	82	15	4	15
Input Volume	5	1064	66	41	1416	3	147	3	84	15	4	12
% of Volume	100	99	97	99	100	67	91	100	97	98	107	130

4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	All
Vehicles Exited	2840
Hourly Exit Rate	2840
Input Volume	2860
% of Volume	99

5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Vehicles Exited	15	1138	1442	8	4	24	2631
Hourly Exit Rate	15	1138	1442	8	4	24	2631
Input Volume	14	1150	1436	7	5	25	2636
% of Volume	109	99	100	119	84	95	100

6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Vehicles Exited	6	1240	2	10	1503	19	2	48	9	20	2859
Hourly Exit Rate	6	1240	2	10	1503	19	2	48	9	20	2859
Input Volume	7	1256	2	10	1502	20	3	52	10	20	2881
% of Volume	86	99	100	103	100	96	73	93	88	101	99

9001: Dummy Node A & I-96 BL (Grand River Avenue) Performance by movement

Movement	EBT	WBT	WBR	NBR	All
Vehicles Exited	1076	1215	120	79	2490
Hourly Exit Rate	1076	1215	120	79	2490
Input Volume	1094	1220	113	84	2511
% of Volume	98	100	106	95	99

Total Network Performance

Vehicles Exited	6411
Hourly Exit Rate	6411
Input Volume	28393
% of Volume	23

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	138	158	170	173	79	310	369	844	924	375	179	206
Average Queue (ft)	75	78	76	79	13	177	217	342	400	282	74	126
95th Queue (ft)	121	135	137	140	48	299	393	791	917	440	164	192
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)						0	0	4	15	18		
Queuing Penalty (veh)						0	1	21	99	81		

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	168	165	245	229	249	171	157	131
Average Queue (ft)	101	85	120	130	168	102	90	63
95th Queue (ft)	157	148	203	217	239	168	149	113
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			275	250	250			275
Storage Blk Time (%)			0	0	0			
Queuing Penalty (veh)			0	0	1			

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	135	174	168	68	82	230	227	67	242	70	106	144
Average Queue (ft)	72	87	88	26	32	138	144	24	119	30	39	59
95th Queue (ft)	132	149	146	57	67	216	216	52	202	58	81	110
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)	1	1	0			0			6		0	1
Queuing Penalty (veh)	6	2	0			0			4		0	1

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	47	151	150	22	77	159	160	83	132	50	139	98
Average Queue (ft)	12	60	51	1	25	57	70	21	50	34	60	31
95th Queue (ft)	36	123	114	15	57	130	139	63	105	62	111	75
Link Distance (ft)		440	440			522	522		275		304	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			25	250			100		25		75
Storage Blk Time (%)		0	11	0			2		38	11	6	0
Queuing Penalty (veh)		0	2	1			2		26	6	3	0

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	24	168	127	48	68	136	141	160	89	73
Average Queue (ft)	4	73	51	11	23	65	76	83	28	25
95th Queue (ft)	17	136	110	35	56	121	130	150	65	58
Link Distance (ft)		1068	1068			472	472		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)			0					0		
Queuing Penalty (veh)			0					0		

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	SB	SB
Directions Served	L	L	TR
Maximum Queue (ft)	47	24	32
Average Queue (ft)	10	3	11
95th Queue (ft)	32	16	28
Link Distance (ft)		306	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		50
Storage Blk Time (%)		0	0
Queuing Penalty (veh)		0	0

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LTR
Maximum Queue (ft)	23	25	16	36	37	38	30	68	87
Average Queue (ft)	3	1	1	7	2	3	3	27	27
95th Queue (ft)	16	14	9	27	15	24	18	54	65
Link Distance (ft)		522	522		231	231	348		339
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	250			100				75	
Storage Blk Time (%)								0	
Queuing Penalty (veh)								0	

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement	NB
Directions Served	R
Maximum Queue (ft)	71
Average Queue (ft)	30
95th Queue (ft)	56
Link Distance (ft)	318
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

























Network Summary

Network wide Queuing Penalty: 256

Appendix C | No-Build Conditions Data

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

No-Build Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	509	249	245	506	143	246	250	366	553	536	127
Future Volume (veh/h)	85	509	249	245	506	143	246	250	366	553	536	127
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1891	1891	1891	1891	1891	1891	1922	1922	1922	1969	1969	1969
Adj Flow Rate, veh/h	101	606	296	282	582	164	308	312	458	608	589	140
Peak Hour Factor	0.84	0.84	0.84	0.87	0.87	0.87	0.80	0.80	0.80	0.91	0.91	0.91
Percent Heavy Veh, %	7	7	7	7	7	7	5	5	5	2	2	2
Cap, veh/h	179	953	623	276	1052	794	439	527	364	737	835	458
Arrive On Green	0.03	0.18	0.18	0.08	0.29	0.29	0.12	0.14	0.14	0.20	0.22	0.22
Sat Flow, veh/h	3493	3593	1601	3493	3593	1601	3551	3652	1629	3638	3741	1668
Grp Volume(v), veh/h	101	606	296	282	582	164	308	312	458	608	589	140
Grp Sat Flow(s),veh/h/ln	1747	1796	1601	1747	1796	1601	1776	1826	1629	1819	1870	1668
Q Serve(g_s), s	2.6	14.1	13.0	7.1	12.3	5.2	7.5	7.2	13.0	14.4	13.1	6.0
Cycle Q Clear(g_c), s	2.6	14.1	13.0	7.1	12.3	5.2	7.5	7.2	13.0	14.4	13.1	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	953	623	276	1052	794	439	527	364	737	835	458
V/C Ratio(X)	0.57	0.64	0.48	1.02	0.55	0.21	0.70	0.59	1.26	0.82	0.71	0.31
Avail Cap(c_a), veh/h	276	953	623	276	1052	794	829	527	364	849	835	458
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	33.0	23.2	41.4	26.8	12.8	37.8	36.0	34.9	34.4	32.2	25.9
Incr Delay (d2), s/veh	2.8	3.2	2.6	60.3	2.1	0.6	4.3	1.8	137.0	7.3	2.7	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	6.5	5.2	5.2	5.1	1.7	3.3	3.1	21.2	6.6	5.8	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	45.3	36.2	25.8	101.8	28.9	13.3	42.1	37.8	172.0	41.7	34.9	26.2
LnGrp LOS	D	D	C	F	C	B	D	D	F	D	C	C
Approach Vol, veh/h		1003			1028			1078			1337	
Approach Delay, s/veh		34.1			46.4			96.0			37.1	
Approach LOS		C			D			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.5	33.3	18.1	27.1	14.0	30.8	25.2	20.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 7.1	* 21	21.0	13.0	* 7.1	* 21	21.0	13.0				
Max Q Clear Time (g_c+I1), s	4.6	14.3	9.5	15.1	9.1	16.1	16.4	15.0				
Green Ext Time (p_c), s	0.1	0.4	1.7	0.0	0.0	0.4	1.8	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 52.9
HCM 7th LOS D

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗	↘	↰	↗	↘	↰	↗	↘	↰	↗	↘
Traffic Volume (veh/h)	75	858	60	11	817	51	48	3	12	41	0	67
Future Volume (veh/h)	75	858	60	11	817	51	48	3	12	41	0	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2000	1891	2000	1891	1891	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	94	1072	75	13	973	61	56	3	14	45	0	73
Peak Hour Factor	0.80	0.80	0.80	0.84	0.84	0.84	0.86	0.86	0.86	0.92	0.92	0.92
Percent Heavy Veh, %	0	7	0	7	7	0	2	2	2	4	4	4
Cap, veh/h	497	2705	1275	317	2705	1275	164	32	148	212	0	172
Arrive On Green	0.25	0.25	0.25	1.00	1.00	1.00	0.10	0.10	0.10	0.10	0.00	0.10
Sat Flow, veh/h	554	3593	1694	471	3593	1694	1327	303	1412	1374	0	1642
Grp Volume(v), veh/h	94	1072	75	13	973	61	56	0	17	45	0	73
Grp Sat Flow(s),veh/h/ln	554	1796	1694	471	1796	1694	1327	0	1715	1374	0	1642
Q Serve(g_s), s	12.2	22.4	3.0	0.9	0.0	0.0	3.7	0.0	0.8	2.8	0.0	3.7
Cycle Q Clear(g_c), s	12.2	22.4	3.0	23.2	0.0	0.0	7.5	0.0	0.8	3.6	0.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.82	1.00		1.00
Lane Grp Cap(c), veh/h	497	2705	1275	317	2705	1275	164	0	180	212	0	172
V/C Ratio(X)	0.19	0.40	0.06	0.04	0.36	0.05	0.34	0.00	0.09	0.21	0.00	0.42
Avail Cap(c_a), veh/h	497	2705	1275	317	2705	1275	224	0	257	274	0	246
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.9	16.8	9.5	3.8	0.0	0.0	41.2	0.0	36.4	38.0	0.0	37.7
Incr Delay (d2), s/veh	0.8	0.4	0.1	0.2	0.4	0.1	1.2	0.0	0.2	0.5	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln/1.5	10.6	10.6	0.7	0.1	0.1	0.0	1.3	0.0	0.3	1.0	0.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	13.8	17.2	9.6	4.1	0.4	0.1	42.5	0.0	36.6	38.5	0.0	39.4
LnGrp LOS	B	B	A	A	A	A	D		D	D		D
Approach Vol, veh/h	1241			1047			73			118		
Approach Delay, s/veh	16.5			0.4			41.1			39.1		
Approach LOS	B			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	74.1			15.9			74.1			15.9		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 64			13.5			* 64			13.5		
Max Q Clear Time (g_c+I1), s	24.4			5.7			25.2			9.5		
Green Ext Time (p_c), s	10.3			0.3			7.8			0.1		

Intersection Summary

HCM 7th Control Delay, s/veh 11.5
HCM 7th LOS B













Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
AM Peak Hour











Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	822	12	17	711	148	27	0	49	128	1	57
Future Volume (veh/h)	44	822	12	17	711	148	27	0	49	128	1	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1906	1906	1906	1891	1891	1891	1922	1922	1922	2000	2000	2000
Adj Flow Rate, veh/h	56	1041	15	19	808	168	29	0	52	183	1	81
Peak Hour Factor	0.79	0.79	0.79	0.88	0.88	0.88	0.94	0.94	0.94	0.70	0.70	0.70
Percent Heavy Veh, %	6	6	6	7	7	7	5	5	5	0	0	0
Cap, veh/h	519	2853	1272	484	2830	1262	120	0	127	145	2	130
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.08	0.00	0.08	0.08	0.08	0.08
Sat Flow, veh/h	558	3622	1615	513	3593	1601	1285	0	1629	1374	21	1677
Grp Volume(v), veh/h	56	1041	15	19	808	168	29	0	52	183	0	82
Grp Sat Flow(s),veh/h/ln	558	1811	1615	513	1796	1601	1285	0	1629	1374	0	1698
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.7	4.3	0.0	4.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	2.7	7.0	0.0	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	519	2853	1272	484	2830	1262	120	0	127	145	0	132
V/C Ratio(X)	0.11	0.36	0.01	0.04	0.29	0.13	0.24	0.00	0.41	1.26	0.00	0.62
Avail Cap(c_a), veh/h	519	2853	1272	484	2830	1262	120	0	127	145	0	132
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	43.2	0.0	39.5	44.0	0.0	40.2
Incr Delay (d2), s/veh	0.4	0.4	0.0	0.2	0.3	0.2	1.0	0.0	2.1	161.3	0.0	8.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.1		0.1	0.0	0.0	0.1	0.1	0.7	0.0	1.2	9.7	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.4	0.4	0.0	0.2	0.3	0.2	44.3	0.0	41.7	205.3	0.0	48.8
LnGrp LOS	A	A	A	A	A	A	D		D	F		D
Approach Vol, veh/h	1112			995			81			265		
Approach Delay, s/veh	0.4			0.2			42.6			156.9		
Approach LOS	A			A			D			F		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	77.0			13.0			77.0			13.0		
Change Period (Y+Rc), s	6.1			6.0			6.1			6.0		
Max Green Setting (Gmax), s	70.9			7.0			70.9			7.0		
Max Q Clear Time (g_c+I1), s	2.0			9.0			2.0			8.2		
Green Ext Time (p_c), s	9.5			0.0			6.9			0.0		
Intersection Summary												
HCM 7th Control Delay, s/veh	18.6											
HCM 7th LOS	B											

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)










No-Build Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations						WBR			NBR	SBL		SBR
Traffic Volume (veh/h)	9	892	85	31	772	10	71	0	44	5	0	5
Future Volume (veh/h)	9	892	85	31	772	10	71	0	44	5	0	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1938	1938	1938	1891	1891	1891	1813	1813	1813	2000	2000	2000
Adj Flow Rate, veh/h	11	1129	108	36	908	12	83	0	51	8	0	8
Peak Hour Factor	0.79	0.79	0.79	0.85	0.85	0.85	0.86	0.86	0.86	0.63	0.63	0.63
Percent Heavy Veh, %	4	4	4	7	7	7	12	12	12	0	0	0
Cap, veh/h	549	2891	1287	378	2850	38	192	0	117	94	18	52
Arrive On Green	0.79	0.79	0.79	1.00	1.00	1.00	0.08	0.00	0.08	0.08	0.00	0.08
Sat Flow, veh/h	597	3681	1639	432	3630	48	1296	0	1536	442	243	685
Grp Volume(v), veh/h	11	1129	108	36	449	471	83	0	51	16	0	0
Grp Sat Flow(s),veh/h/ln	597	1841	1639	432	1796	1882	1296	0	1536	1371	0	0
Q Serve(g_s), s	0.4	8.6	1.4	1.0	0.0	0.0	1.8	0.0	2.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.4	8.6	1.4	9.6	0.0	0.0	4.7	0.0	2.9	2.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	0.50		0.50
Lane Grp Cap(c), veh/h	549	2891	1287	378	1410	1478	192	0	117	164	0	0
V/C Ratio(X)	0.02	0.39	0.08	0.10	0.32	0.32	0.43	0.00	0.44	0.10	0.00	0.00
Avail Cap(c_a), veh/h	549	2891	1287	378	1410	1478	291	0	234	280	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.1	3.0	2.2	0.6	0.0	0.0	40.4	0.0	39.7	38.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.1	0.5	0.6	0.6	1.5	0.0	2.6	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.4	0.2	0.1	0.2	0.2	1.9	0.0	1.1	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	2.2	3.4	2.4	1.1	0.6	0.6	42.0	0.0	42.3	39.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1248			956			134			16		
Approach Delay, s/veh	3.3			0.6			42.1			39.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	76.9			13.1			76.9			13.1		
Change Period (Y+Rc), s	6.2			6.3			6.2			6.3		
Max Green Setting (Gmax), s	63.8			13.7			63.8			13.7		
Max Q Clear Time (g_c+I1), s	10.6			4.9			11.6			6.7		
Green Ext Time (p_c), s	10.1			0.0			6.7			0.2		
Intersection Summary												
HCM 7th Control Delay, s/veh	4.7											
HCM 7th LOS	A											

HCM 7th TWSC
5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
AM Peak Hour

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	871	0	0	784	11	0	0	0	7	0	29
Future Vol, veh/h	70	871	0	0	784	11	0	0	0	7	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	200	-	125	25	-	-	0	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	87	87	87	92	92	92	60	60	60
Heavy Vehicles, %	0	5	0	0	7	0	0	0	0	0	0	0
Mvmt Flow	89	1103	0	0	901	13	0	0	0	12	0	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	914	0	0	1103	0	0	1730	2194	551	1630	2181	451
Stage 1	-	-	-	-	-	-	1280	1280	-	901	901	-
Stage 2	-	-	-	-	-	-	451	914	-	728	1280	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	754	-	-	641	-	-	58	46	483	69	47	561
Stage 1	-	-	-	-	-	-	178	239	-	303	360	-
Stage 2	-	-	-	-	-	-	563	355	-	385	239	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	754	-	-	641	-	-	47	40	483	61	41	561
Mov Cap-2 Maneuver	-	-	-	-	-	-	47	40	-	61	41	-
Stage 1	-	-	-	-	-	-	157	211	-	303	360	-
Stage 2	-	-	-	-	-	-	515	355	-	340	211	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.77	0	0	24.83
HCM LOS			A	C








Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	754	-	-	641	-	-	61	561
HCM Lane V/C Ratio	-	-	0.117	-	-	-	-	-	0.192	0.086
HCM Ctrl Dly (s/v)	0	0	10.4	-	-	0	-	-	77.9	12
HCM Lane LOS	A	A	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	-	0.4	-	-	0	-	-	0.6	0.3

HCM 7th TWSC
6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
AM Peak Hour

Intersection

Int Delay, s/veh 0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	980	18	31	870	31	3	0	5	8	0	3
Future Vol, veh/h	1	980	18	31	870	31	3	0	5	8	0	3
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	100	-	-	0	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	90	90	90	67	67	67	70	70	70
Heavy Vehicles, %	0	5	0	0	7	0	0	0	0	2	2	2
Mvmt Flow	1	1225	23	34	967	34	4	0	7	11	0	4

























Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1001	0	0	1249	0	0	1792	2310	625	1668	2304	501
Stage 1	-	-	-	-	-	-	1240	1240	-	1053	1053	-
Stage 2	-	-	-	-	-	-	552	1070	-	615	1251	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	700	-	-	564	-	-	52	39	433	63	38	516
Stage 1	-	-	-	-	-	-	189	249	-	242	301	-
Stage 2	-	-	-	-	-	-	490	300	-	445	242	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	700	-	-	564	-	-	48	36	432	58	36	516
Mov Cap-2 Maneuver	-	-	-	-	-	-	48	36	-	58	36	-
Stage 1	-	-	-	-	-	-	188	249	-	227	283	-
Stage 2	-	-	-	-	-	-	457	282	-	437	242	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.01	0.39	41.09	63.72
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	48	432	700	-	-	564	-	-	77
HCM Lane V/C Ratio	0.093	0.017	0.002	-	-	0.061	-	-	0.205
HCM Ctrl Dly (s/v)	87.1	13.5	10.2	-	-	11.8	-	-	63.7
HCM Lane LOS	F	B	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.1	0	-	-	0.2	-	-	0.7

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

No-Build Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	326	742	305	550	968	683	400	475	381	360	453	163
Future Volume (veh/h)	326	742	305	550	968	683	400	475	381	360	453	163
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	351	798	328	579	1019	719	444	528	423	404	509	183
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.90	0.90	0.90	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	429	926	580	529	1026	623	367	754	581	367	754	532
Arrive On Green	0.23	0.49	0.49	0.15	0.27	0.27	0.10	0.20	0.20	0.10	0.20	0.20
Sat Flow, veh/h	3666	3770	1678	3638	3741	1665	3666	3770	1679	3666	3770	1679
Grp Volume(v), veh/h	351	798	328	579	1019	719	444	528	423	404	509	183
Grp Sat Flow(s),veh/h/ln	1833	1885	1678	1819	1870	1665	1833	1885	1679	1833	1885	1679
Q Serve(g_s), s	8.2	16.8	12.8	13.1	24.5	24.7	9.0	11.7	18.0	9.0	11.2	7.5
Cycle Q Clear(g_c), s	8.2	16.8	12.8	13.1	24.5	24.7	9.0	11.7	18.0	9.0	11.2	7.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	429	926	580	529	1026	623	367	754	581	367	754	532
V/C Ratio(X)	0.82	0.86	0.57	1.09	0.99	1.15	1.21	0.70	0.73	1.10	0.68	0.34
Avail Cap(c_a), veh/h	534	926	580	529	1026	623	367	754	581	367	754	532
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.6	21.6	15.8	38.5	32.6	28.2	40.5	33.5	25.8	40.5	33.3	23.6
Incr Delay (d2), s/veh	8.0	10.4	4.0	67.0	26.6	86.4	117.7	2.9	4.6	77.3	2.4	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	6.1	0.6	10.4	13.8	26.8	9.8	5.3	7.9	7.7	5.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	41.6	32.0	19.8	105.5	59.2	114.6	158.2	36.4	30.4	117.8	35.7	23.9
LnGrp LOS	D	C	B	F	E	F	F	D	C	F	D	C
Approach Vol, veh/h		1477			2317			1395			1096	
Approach Delay, s/veh		31.5			87.9			73.3			64.0	
Approach LOS		C			F			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.4	31.6	16.0	25.0	20.0	29.0	16.0	25.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 13	* 22	9.0	18.0	* 13	* 22	9.0	18.0				
Max Q Clear Time (g_c+I1), s	10.2	26.7	11.0	13.2	15.1	18.8	11.0	20.0				
Green Ext Time (p_c), s	0.4	0.0	0.0	1.6	0.0	0.4	0.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 67.3
HCM 7th LOS E

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	156	1171	164	49	1284	89	205	2	61	61	1	186
Future Volume (veh/h)	156	1171	164	49	1284	89	205	2	61	61	1	186
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	164	1233	173	54	1427	99	238	2	71	68	1	207
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	2	2	2	0	0	0	1	1	1
Cap, veh/h	285	2250	1000	196	2232	992	267	12	432	385	2	437
Arrive On Green	0.20	0.20	0.20	1.00	1.00	1.00	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	344	3770	1676	383	3741	1663	1192	47	1654	1336	8	1673
Grp Volume(v), veh/h	164	1233	173	54	1427	99	238	0	73	68	0	208
Grp Sat Flow(s),veh/h/ln	344	1885	1676	383	1870	1663	1192	0	1700	1336	0	1681
Q Serve(g_s), s	40.9	26.5	7.7	8.2	0.0	0.0	14.1	0.0	3.0	3.7	0.0	9.4
Cycle Q Clear(g_c), s	40.9	26.5	7.7	34.7	0.0	0.0	23.5	0.0	3.0	6.7	0.0	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Lane Grp Cap(c), veh/h	285	2250	1000	196	2232	992	267	0	444	385	0	439
V/C Ratio(X)	0.58	0.55	0.17	0.28	0.64	0.10	0.89	0.00	0.16	0.18	0.00	0.47
Avail Cap(c_a), veh/h	285	2250	1000	196	2232	992	267	0	444	385	0	439
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.0	25.2	17.7	8.6	0.0	0.0	39.5	0.0	25.7	28.3	0.0	28.0
Incr Delay (d2), s/veh	8.2	1.0	0.4	3.5	1.4	0.2	29.0	0.0	0.2	0.2	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	13.3	2.8	0.6	0.4	0.1	7.5	0.0	1.2	1.2	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	39.2	26.2	18.1	12.0	1.4	0.2	68.5	0.0	25.8	28.5	0.0	28.8
LnGrp LOS	D	C	B	B	A	A	E		C	C		C
Approach Vol, veh/h	1570			1580			311			276		
Approach Delay, s/veh	26.6			1.7			58.5			28.7		
Approach LOS	C			A			E			C		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	60.0			30.0			60.0			30.0		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 54			23.5			* 54			23.5		
Max Q Clear Time (g_c+I1), s	42.9			11.4			36.7			25.5		
Green Ext Time (p_c), s	7.5			1.2			9.9			0.0		

Intersection Summary

HCM 7th Control Delay, s/veh 18.9
HCM 7th LOS B

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
PM Peak Hour











Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗	↘	↰	↗	↘	↰	↗	↘	↰	↗	
Traffic Volume (veh/h)	93	1074	14	51	1282	302	46	2	57	312	0	163
Future Volume (veh/h)	93	1074	14	51	1282	302	46	2	57	312	0	163
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	98	1131	15	56	1409	332	57	2	70	355	0	185
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.81	0.81	0.81	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	183	2635	1175	423	2614	1166	157	8	274	253	0	280
Arrive On Green	1.00	1.00	1.00	0.23	0.23	0.23	0.17	0.17	0.17	0.17	0.00	0.17
Sat Flow, veh/h	279	3770	1682	491	3741	1668	1208	47	1642	1339	0	1682
Grp Volume(v), veh/h	98	1131	15	56	1409	332	57	0	72	355	0	185
Grp Sat Flow(s),veh/h/ln	279	1885	1682	491	1870	1668	1208	0	1689	1339	0	1682
Q Serve(g_s), s	30.0	0.0	0.0	8.2	29.8	14.7	4.2	0.0	3.3	11.7	0.0	9.3
Cycle Q Clear(g_c), s	59.8	0.0	0.0	8.2	29.8	14.7	13.4	0.0	3.3	15.0	0.0	9.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Lane Grp Cap(c), veh/h	183	2635	1175	423	2614	1166	157	0	281	253	0	280
V/C Ratio(X)	0.54	0.43	0.01	0.13	0.54	0.28	0.36	0.00	0.26	1.40	0.00	0.66
Avail Cap(c_a), veh/h	183	2635	1175	423	2614	1166	157	0	281	253	0	280
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.2	0.0	0.0	13.6	21.9	16.1	41.4	0.0	32.6	41.0	0.0	35.1
Incr Delay (d2), s/veh	10.8	0.5	0.0	0.6	0.8	0.6	1.4	0.0	0.5	202.4	0.0	5.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.2	0.0	0.8	14.8	6.6	1.3	0.0	1.4	19.9	0.0	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	25.0	0.5	0.0	14.2	22.7	16.7	42.8	0.0	33.1	243.5	0.0	40.7
LnGrp LOS	C	A	A	B	C	B	D		C	F		D
Approach Vol, veh/h	1244				1797		129				540	
Approach Delay, s/veh	2.4				21.3		37.4				174.0	
Approach LOS	A				C		D				F	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	69.0		21.0		69.0		21.0					
Change Period (Y+Rc), s	6.1		6.0		6.1		6.0					
Max Green Setting (Gmax), s	62.9		15.0		62.9		15.0					
Max Q Clear Time (g_c+I1), s	61.8		17.0		31.8		15.4					
Green Ext Time (p_c), s	0.9		0.0		14.5		0.0					
Intersection Summary												
HCM 7th Control Delay, s/veh		37.8										
HCM 7th LOS		D										

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)












No-Build Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations						WBR			NBR	SBL		SBR
Traffic Volume (veh/h)	5	1195	65	40	1505	3	136	3	78	13	3	10
Future Volume (veh/h)	5	1195	65	40	1505	3	136	3	78	13	3	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1969	1969	1969	2000	2000	2000
Adj Flow Rate, veh/h	5	1258	68	43	1636	3	153	3	88	16	4	12
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.81	0.81	0.81
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	0	0	0
Cap, veh/h	307	2772	1236	329	2817	5	269	7	203	117	40	58
Arrive On Green	0.74	0.74	0.74	1.00	1.00	1.00	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	308	3770	1681	413	3831	7	1392	55	1614	452	315	460
Grp Volume(v), veh/h	5	1258	68	43	799	840	153	0	91	32	0	0
Grp Sat Flow(s),veh/h/ln	308	1885	1681	413	1870	1968	1392	0	1669	1228	0	0
Q Serve(g_s), s	0.4	11.9	1.0	2.0	0.0	0.0	4.1	0.0	4.5	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.4	11.9	1.0	13.9	0.0	0.0	8.7	0.0	4.5	4.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.97	0.50		0.37
Lane Grp Cap(c), veh/h	307	2772	1236	329	1375	1447	269	0	210	215	0	0
V/C Ratio(X)	0.02	0.45	0.06	0.13	0.58	0.58	0.57	0.00	0.43	0.15	0.00	0.00
Avail Cap(c_a), veh/h	307	2772	1236	329	1375	1447	414	0	384	372	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.2	4.7	3.3	1.3	0.0	0.0	38.0	0.0	36.4	35.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.1	0.8	1.8	1.7	1.9	0.0	1.4	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.9	0.2	0.1	0.7	0.7	3.4	0.0	1.9	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	3.3	5.3	3.4	2.1	1.8	1.7	39.9	0.0	37.8	35.3	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1331					1682		244		32		
Approach Delay, s/veh	5.2					1.8		39.1		35.3		
Approach LOS	A					A		D		D		
Timer - Assigned Phs	2		4			6		8				
Phs Duration (G+Y+Rc), s	72.4		17.6			72.4		17.6				
Change Period (Y+Rc), s	6.2		6.3			6.2		6.3				
Max Green Setting (Gmax), s	56.8		20.7			56.8		20.7				
Max Q Clear Time (g_c+I1), s	13.9		6.6			15.9		10.7				
Green Ext Time (p_c), s	11.3		0.1			16.2		0.7				
Intersection Summary												
HCM 7th Control Delay, s/veh			6.2									
HCM 7th LOS			A									

Intersection

Int Delay, s/veh 10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	1165	0	0	1474	17	0	0	0	16	0	74
Future Vol, veh/h	121	1165	0	0	1474	17	0	0	0	16	0	74
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	200	-	125	25	-	-	0	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	90	90	90	92	92	92	75	75	75
Heavy Vehicles, %	0	1	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	127	1226	0	0	1638	19	0	0	0	21	0	99

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1658	0	0	1227	0	0	2301	3140	614	2507	3121	820
Stage 1	-	-	-	-	-	-	1482	1482	-	1639	1639	-
Stage 2	-	-	-	-	-	-	819	1658	-	868	1482	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	394	-	-	575	-	-	21	11	440	~ 15	12	322
Stage 1	-	-	-	-	-	-	134	191	-	107	160	-
Stage 2	-	-	-	-	-	-	340	157	-	318	191	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	394	-	-	574	-	-	10	8	439	~ 10	8	322
Mov Cap-2 Maneuver	-	-	-	-	-	-	10	8	-	~ 10	8	-
Stage 1	-	-	-	-	-	-	90	129	-	107	160	-
Stage 2	-	-	-	-	-	-	236	156	-	215	129	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	1.74	0	0	241.02
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	394	-	-	574	-	-	10	322
HCM Lane V/C Ratio	-	-	0.324	-	-	-	-	-	2.13	0.306
HCM Ctrl Dly (s/v)	0	0	18.5	-	-	0	-	-	\$ 1258.4	21
HCM Lane LOS	A	A	C	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	-	-	1.4	-	-	0	-	-	3.6	1.3

Notes








~: Volume exceeds capacity \$: Delay exceeds 300s
 *: Computation Not Defined *: All major volume in platoon

HCM 7th TWSC
6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

No-Build Conditions
PM Peak Hour

Intersection

Int Delay, s/veh 21

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1434	2	9	1609	57	2	0	36	21	0	24
Future Vol, veh/h	7	1434	2	9	1609	57	2	0	36	21	0	24
Conflicting Peds, #/hr	2	0	2	2	0	2	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	100	-	-	0	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	63	63	63	75	75	75
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	2	2	2
Mvmt Flow	7	1509	2	10	1730	61	3	0	57	28	0	32

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	1793	0	0	1514	0	0	2413	3340	759	2553	3310	899
Stage 1	-	-	-	-	-	-	1527	1527	-	1782	1782	-
Stage 2	-	-	-	-	-	-	885	1813	-	770	1528	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.21	-	-	2.22	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	345	-	-	438	-	-	18	8	354	~ 13	8	282
Stage 1	-	-	-	-	-	-	125	181	-	85	133	-
Stage 2	-	-	-	-	-	-	310	131	-	359	178	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	344	-	-	437	-	-	15	8	353	~ 11	8	281
Mov Cap-2 Maneuver	-	-	-	-	-	-	15	8	-	~ 11	8	-
Stage 1	-	-	-	-	-	-	122	177	-	83	130	-
Stage 2	-	-	-	-	-	-	269	128	-	294	174	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.08	0.07	32.34	\$ 1165.94
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	15	353	344	-	-	437	-	-	22
HCM Lane V/C Ratio	0.214	0.162	0.021	-	-	0.022	-	-	2.755
HCM Ctrl Dly (s/v)	\$ 305.2	17.2	15.7	-	-	13.4	-	-	\$ 1165.9
HCM Lane LOS	F	C	C	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0.6	0.1	-	-	0.1	-	-	7.7

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s
*: Computation Not Defined *: All major volume in platoon

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	74	83	128	141	112	245	262	185	206	82	153	530
Average Queue (ft)	19	27	68	61	21	102	127	106	107	18	42	116
95th Queue (ft)	52	62	120	118	67	210	225	170	183	59	121	304
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)									0			
Queuing Penalty (veh)									0			

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	1148	1178	475	248	331	334	321	140
Average Queue (ft)	475	601	381	143	190	158	163	63
95th Queue (ft)	1221	1328	591	231	270	257	255	121
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)	2	4						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)			275	250	250			275
Storage Blk Time (%)	0	1	61	0	1	2	1	
Queuing Penalty (veh)	0	6	92	0	4	12	2	

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	95	148	189	50	37	133	143	38	90	48	87	66
Average Queue (ft)	36	50	77	12	9	46	62	10	26	11	32	26
95th Queue (ft)	71	115	155	39	31	105	119	31	62	35	71	50
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)			0									
Queuing Penalty (veh)			0									
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)		0	0								0	
Queuing Penalty (veh)		0	0								0	

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	73	105	114	44	42	84	94	56	90	57	313	125
Average Queue (ft)	26	37	40	3	9	16	34	16	24	32	255	94
95th Queue (ft)	57	80	86	22	31	55	75	45	67	60	396	173
Link Distance (ft)		440	440			522	522		275		304	
Upstream Blk Time (%)											47	
Queuing Penalty (veh)											0	
Storage Bay Dist (ft)	225			25	250			100		25		75
Storage Blk Time (%)			7	0			0		24	11	82	1
Queuing Penalty (veh)			1	1			0		12	3	62	3

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	33	122	132	33	70	98	112	142	62	46
Average Queue (ft)	4	47	39	10	20	27	44	59	19	13
95th Queue (ft)	19	100	98	31	53	74	96	116	48	39
Link Distance (ft)		1068	1068			471	471		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)			0					0		
Queuing Penalty (veh)			0					0		

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	WB	SB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	78	4	41	51
Average Queue (ft)	30	0	9	18
95th Queue (ft)	62	3	30	38
Link Distance (ft)			306	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200	125		50
Storage Blk Time (%)			1	0
Queuing Penalty (veh)			0	0

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	NB	NB	SB
Directions Served	L	T	TR	L	L	TR	LTR
Maximum Queue (ft)	4	5	4	57	24	34	50
Average Queue (ft)	0	0	0	18	3	7	12
95th Queue (ft)	3	4	3	45	17	29	38
Link Distance (ft)		522	522		348		339
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	250			100		75	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 198

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	204	220	288	283	130	470	550	2011	2007	375	525	578
Average Queue (ft)	90	88	128	128	35	324	490	1623	1653	375	324	374
95th Queue (ft)	152	159	235	242	93	545	685	2512	2491	377	518	587
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)								23	31			
Queuing Penalty (veh)								0	0			
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)			0			23	34	30	67	31	3	9
Queuing Penalty (veh)			0			118	170	174	477	155	7	24

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	757	571	322	300	314	334	277	142
Average Queue (ft)	266	206	180	162	195	143	119	69
95th Queue (ft)	715	595	280	269	298	257	202	123
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)	0							
Queuing Penalty (veh)	0							
Storage Bay Dist (ft)			275	250	250			275
Storage Blk Time (%)	1	0	1	2	6	0	0	
Queuing Penalty (veh)	2	1	2	4	16	1	0	

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	149	231	229	129	130	252	283	58	268	210	108	131
Average Queue (ft)	91	127	136	31	40	173	197	21	141	47	44	64
95th Queue (ft)	151	210	206	80	94	241	263	47	259	148	85	116
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)		1	0	0								
Queuing Penalty (veh)		11	1	0								
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)	8	3	1			0			12		0	1
Queuing Penalty (veh)	48	5	1			0			8		0	1

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	168	212	188	20	69	208	200	169	110	54	348	125
Average Queue (ft)	74	88	79	2	26	100	102	61	39	38	322	105
95th Queue (ft)	143	171	157	10	56	177	178	128	84	62	336	169
Link Distance (ft)		440	440			522	522		275		304	
Upstream Blk Time (%)		0									88	
Queuing Penalty (veh)		1									0	
Storage Bay Dist (ft)	225			25	250			100		25		75
Storage Blk Time (%)	1	0	17	0		0	6	0	34	17	85	10
Queuing Penalty (veh)	6	0	3	1		0	20	2	23	9	152	34

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	29	195	146	36	77	131	156	170	113	60
Average Queue (ft)	3	96	63	12	28	71	88	86	36	20
95th Queue (ft)	16	167	122	35	59	126	148	148	85	51
Link Distance (ft)		1068	1068			472	472		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)		0	0					1	0	
Queuing Penalty (veh)		0	0					1	0	

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	TR	R	L	TR
Maximum Queue (ft)	148	31	29	4	82	70
Average Queue (ft)	54	1	1	0	17	33
95th Queue (ft)	102	18	21	3	55	65
Link Distance (ft)		472	472		306	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200			125		50
Storage Blk Time (%)	0				3	3
Queuing Penalty (veh)	0				3	1

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LTR
Maximum Queue (ft)	26	90	62	32	27	32	104	99	308
Average Queue (ft)	4	7	3	7	1	2	12	38	131
95th Queue (ft)	17	51	28	27	13	16	61	79	329
Link Distance (ft)		522	522		231	231	348		339
Upstream Blk Time (%)									11
Queuing Penalty (veh)									0
Storage Bay Dist (ft)	250			100				75	
Storage Blk Time (%)							0	4	
Queuing Penalty (veh)							0	0	

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement	NB
Directions Served	R
Maximum Queue (ft)	67
Average Queue (ft)	36
95th Queue (ft)	62
Link Distance (ft)	318
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

























Network Summary

Network wide Queuing Penalty: 1484

Appendix D | Build Conditions Data

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

Build Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	533	258	245	539	143	258	250	366	553	536	135
Future Volume (veh/h)	91	533	258	245	539	143	258	250	366	553	536	135
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1891	1891	1891	1891	1891	1891	1922	1922	1922	1969	1969	1969
Adj Flow Rate, veh/h	108	635	307	282	620	164	322	312	458	608	589	148
Peak Hour Factor	0.84	0.84	0.84	0.87	0.87	0.87	0.80	0.80	0.80	0.91	0.91	0.91
Percent Heavy Veh, %	7	7	7	7	7	7	5	5	5	2	2	2
Cap, veh/h	181	953	630	276	1050	792	455	527	364	737	819	452
Arrive On Green	0.03	0.18	0.18	0.08	0.29	0.29	0.13	0.14	0.14	0.20	0.22	0.22
Sat Flow, veh/h	3493	3593	1601	3493	3593	1601	3551	3652	1629	3638	3741	1668
Grp Volume(v), veh/h	108	635	307	282	620	164	322	312	458	608	589	148
Grp Sat Flow(s),veh/h/ln	1747	1796	1601	1747	1796	1601	1776	1826	1629	1819	1870	1668
Q Serve(g_s), s	2.7	14.8	13.4	7.1	13.3	5.2	7.8	7.2	13.0	14.4	13.1	6.4
Cycle Q Clear(g_c), s	2.7	14.8	13.4	7.1	13.3	5.2	7.8	7.2	13.0	14.4	13.1	6.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	181	953	630	276	1050	792	455	527	364	737	819	452
V/C Ratio(X)	0.60	0.67	0.49	1.02	0.59	0.21	0.71	0.59	1.26	0.82	0.72	0.33
Avail Cap(c_a), veh/h	276	953	630	276	1050	792	829	527	364	849	819	452
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	33.3	23.1	41.4	27.2	12.8	37.6	36.0	34.9	34.4	32.6	26.3
Incr Delay (d2), s/veh	3.1	3.7	2.7	60.3	2.4	0.6	4.3	1.8	137.0	7.3	3.1	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	6.9	5.5	5.2	5.6	1.7	3.5	3.1	21.2	6.6	5.8	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	45.6	37.0	25.8	101.8	29.7	13.4	41.9	37.8	172.0	41.7	35.7	26.7
LnGrp LOS	D	D	C	F	C	B	D	D	F	D	D	C
Approach Vol, veh/h		1050			1066			1092			1345	
Approach Delay, s/veh		34.6			46.2			95.3			37.4	
Approach LOS		C			D			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.6	33.2	18.5	26.7	14.0	30.8	25.2	20.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 7.1	* 21	21.0	13.0	* 7.1	* 21	21.0	13.0				
Max Q Clear Time (g_c+I1), s	4.7	15.3	9.8	15.1	9.1	16.8	16.4	15.0				
Green Ext Time (p_c), s	0.1	0.4	1.7	0.0	0.0	0.4	1.8	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 52.7
HCM 7th LOS D

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Build Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	75	897	60	11	870	51	48	3	12	41	0	67
Future Volume (veh/h)	75	897	60	11	870	51	48	3	12	41	0	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2000	1891	2000	1891	1891	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	94	1121	75	13	1036	61	56	3	14	45	0	73
Peak Hour Factor	0.80	0.80	0.80	0.84	0.84	0.84	0.86	0.86	0.86	0.92	0.92	0.92
Percent Heavy Veh, %	0	7	0	7	7	0	2	2	2	4	4	4
Cap, veh/h	473	2705	1275	301	2705	1275	164	32	148	212	0	172
Arrive On Green	0.25	0.25	0.25	1.00	1.00	1.00	0.10	0.10	0.10	0.10	0.00	0.10
Sat Flow, veh/h	522	3593	1694	449	3593	1694	1327	303	1412	1374	0	1642
Grp Volume(v), veh/h	94	1121	75	13	1036	61	56	0	17	45	0	73
Grp Sat Flow(s),veh/h/ln	522	1796	1694	449	1796	1694	1327	0	1715	1374	0	1642
Q Serve(g_s), s	12.9	23.5	3.0	0.9	0.0	0.0	3.7	0.0	0.8	2.8	0.0	3.7
Cycle Q Clear(g_c), s	12.9	23.5	3.0	24.5	0.0	0.0	7.5	0.0	0.8	3.6	0.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.82	1.00		1.00
Lane Grp Cap(c), veh/h	473	2705	1275	301	2705	1275	164	0	180	212	0	172
V/C Ratio(X)	0.20	0.41	0.06	0.04	0.38	0.05	0.34	0.00	0.09	0.21	0.00	0.42
Avail Cap(c_a), veh/h	473	2705	1275	301	2705	1275	224	0	257	274	0	246
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.2	17.2	9.5	4.2	0.0	0.0	41.2	0.0	36.4	38.0	0.0	37.7
Incr Delay (d2), s/veh	0.9	0.5	0.1	0.3	0.4	0.1	1.2	0.0	0.2	0.5	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	11.2	0.7	0.1	0.2	0.0	1.3	0.0	0.3	1.0	0.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	14.2	17.7	9.6	4.5	0.4	0.1	42.5	0.0	36.6	38.5	0.0	39.4
LnGrp LOS	B	B	A	A	A	A	D		D	D		D
Approach Vol, veh/h	1290			1110			73			118		
Approach Delay, s/veh	16.9			0.4			41.1			39.1		
Approach LOS	B			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	74.1			15.9			74.1			15.9		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 64			13.5			* 64			13.5		
Max Q Clear Time (g_c+I1), s	25.5			5.7			26.5			9.5		
Green Ext Time (p_c), s	11.0			0.3			8.4			0.1		

Intersection Summary

HCM 7th Control Delay, s/veh 11.6
HCM 7th LOS B













Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Build Conditions
AM Peak Hour











Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	834	12	50	731	148	38	0	76	128	1	57
Future Volume (veh/h)	44	834	12	50	731	148	38	0	76	128	1	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1906	1906	1906	1891	1891	1891	1922	1922	1922	2000	2000	2000
Adj Flow Rate, veh/h	56	1056	15	57	831	168	40	0	81	183	1	81
Peak Hour Factor	0.79	0.79	0.79	0.88	0.88	0.88	0.94	0.94	0.94	0.70	0.70	0.70
Percent Heavy Veh, %	6	6	6	7	7	7	5	5	5	0	0	0
Cap, veh/h	510	2853	1272	479	2830	1262	120	0	127	120	2	130
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.08	0.00	0.08	0.08	0.08	0.08
Sat Flow, veh/h	546	3622	1615	506	3593	1601	1285	0	1629	1338	21	1677
Grp Volume(v), veh/h	56	1056	15	57	831	168	40	0	81	183	0	82
Grp Sat Flow(s),veh/h/ln	546	1811	1615	506	1796	1601	1285	0	1629	1338	0	1698
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	4.3	2.7	0.0	4.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0	4.3	7.0	0.0	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	510	2853	1272	479	2830	1262	120	0	127	120	0	132
V/C Ratio(X)	0.11	0.37	0.01	0.12	0.29	0.13	0.33	0.00	0.64	1.53	0.00	0.62
Avail Cap(c_a), veh/h	510	2853	1272	479	2830	1262	120	0	127	120	0	132
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	43.6	0.0	40.3	44.6	0.0	40.2
Incr Delay (d2), s/veh	0.4	0.4	0.0	0.5	0.3	0.2	1.6	0.0	10.3	276.6	0.0	8.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.0	0.1	0.1	0.1	0.9	0.0	2.1	11.8	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.4	0.4	0.0	0.5	0.3	0.2	45.2	0.0	50.6	321.2	0.0	48.8
LnGrp LOS	A	A	A	A	A	A	D		D	F		D
Approach Vol, veh/h	1127				1056				121		265	
Approach Delay, s/veh	0.4				0.3				48.8		236.9	
Approach LOS	A				A				D		F	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	77.0		13.0		77.0		13.0					
Change Period (Y+Rc), s	6.1		6.0		6.1		6.0					
Max Green Setting (Gmax), s	70.9		7.0		70.9		7.0					
Max Q Clear Time (g_c+l1), s	2.0		9.0		2.0		9.0					
Green Ext Time (p_c), s	9.7		0.0		7.9		0.0					
Intersection Summary												
HCM 7th Control Delay, s/veh	27.0											
HCM 7th LOS	C											

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)













Build Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	921	85	31	793	10	71	0	44	5	0	5
Future Volume (veh/h)	9	921	85	31	793	10	71	0	44	5	0	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1938	1938	1938	1891	1891	1891	1813	1813	1813	2000	2000	2000
Adj Flow Rate, veh/h	11	1166	108	36	933	12	83	0	51	8	0	8
Peak Hour Factor	0.79	0.79	0.79	0.85	0.85	0.85	0.86	0.86	0.86	0.63	0.63	0.63
Percent Heavy Veh, %	4	4	4	7	7	7	12	12	12	0	0	0
Cap, veh/h	538	2891	1287	366	2852	37	192	0	117	94	18	52
Arrive On Green	0.79	0.79	0.79	1.00	1.00	1.00	0.08	0.00	0.08	0.08	0.00	0.08
Sat Flow, veh/h	584	3681	1639	417	3632	47	1296	0	1536	442	243	685
Grp Volume(v), veh/h	11	1166	108	36	461	484	83	0	51	16	0	0
Grp Sat Flow(s),veh/h/ln	584	1841	1639	417	1796	1882	1296	0	1536	1371	0	0
Q Serve(g_s), s	0.4	9.0	1.4	1.1	0.0	0.0	1.8	0.0	2.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.4	9.0	1.4	10.1	0.0	0.0	4.7	0.0	2.9	2.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.02	1.00		1.00	0.50		0.50
Lane Grp Cap(c), veh/h	538	2891	1287	366	1410	1478	192	0	117	164	0	0
V/C Ratio(X)	0.02	0.40	0.08	0.10	0.33	0.33	0.43	0.00	0.44	0.10	0.00	0.00
Avail Cap(c_a), veh/h	538	2891	1287	366	1410	1478	291	0	234	280	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.1	3.0	2.2	0.6	0.0	0.0	40.4	0.0	39.7	38.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.1	0.5	0.6	0.6	1.5	0.0	2.6	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	0.2	0.1	0.2	0.2	1.9	0.0	1.1	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	2.2	3.5	2.4	1.2	0.6	0.6	42.0	0.0	42.3	39.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1285			981			134			16		
Approach Delay, s/veh	3.4			0.6			42.1			39.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	76.9			13.1			76.9			13.1		
Change Period (Y+Rc), s	6.2			6.3			6.2			6.3		
Max Green Setting (Gmax), s	63.8			13.7			63.8			13.7		
Max Q Clear Time (g_c+I1), s	11.0			4.9			12.1			6.7		
Green Ext Time (p_c), s	10.6			0.0			7.0			0.2		
Intersection Summary												
HCM 7th Control Delay, s/veh	4.6											
HCM 7th LOS	A											

Intersection

Int Delay, s/veh 3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	855	45	32	783	11	22	0	28	7	0	29
Future Vol, veh/h	70	855	45	32	783	11	22	0	28	7	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	75	200	-	125	25	-	-	0	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	87	87	87	92	92	92	60	60	60
Heavy Vehicles, %	0	5	0	0	7	0	0	0	0	0	0	0
Mvmt Flow	89	1082	57	37	900	13	24	0	30	12	0	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	913	0	0	1139	0	0	1783	2246	541	1692	2290	450
Stage 1	-	-	-	-	-	-	1259	1259	-	974	974	-
Stage 2	-	-	-	-	-	-	524	986	-	718	1316	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	755	-	-	621	-	-	53	42	490	62	40	562
Stage 1	-	-	-	-	-	-	184	244	-	274	333	-
Stage 2	-	-	-	-	-	-	510	328	-	391	229	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	755	-	-	621	-	-	40	35	490	48	33	562
Mov Cap-2 Maneuver	-	-	-	-	-	-	40	35	-	48	33	-
Stage 1	-	-	-	-	-	-	162	215	-	258	313	-
Stage 2	-	-	-	-	-	-	438	309	-	323	202	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.75	0.43	88.23	29.57
HCM LOS			F	D








Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	40	490	755	-	-	621	-	-	48	562
HCM Lane V/C Ratio	0.597	0.062	0.117	-	-	0.059	-	-	0.243	0.086
HCM Ctrl Dly (s/v)	184.2	12.8	10.4	-	-	11.2	-	-	102.3	12
HCM Lane LOS	F	B	B	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	2.2	0.2	0.4	-	-	0.2	-	-	0.8	0.3

HCM 7th TWSC
6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Build Conditions
AM Peak Hour

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1019	18	31	923	31	3	0	5	8	0	3
Future Vol, veh/h	1	1019	18	31	923	31	3	0	5	8	0	3
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	100	-	-	0	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	90	90	90	67	67	67	70	70	70
Heavy Vehicles, %	0	5	0	0	7	0	0	0	0	2	2	2
Mvmt Flow	1	1274	23	34	1026	34	4	0	7	11	0	4

























Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1060	0	0	1297	0	0	1870	2417	649	1751	2411	530
Stage 1	-	-	-	-	-	-	1289	1289	-	1112	1112	-
Stage 2	-	-	-	-	-	-	582	1129	-	639	1300	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	665	-	-	541	-	-	45	33	417	55	32	493
Stage 1	-	-	-	-	-	-	176	236	-	223	283	-
Stage 2	-	-	-	-	-	-	471	282	-	431	230	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	665	-	-	540	-	-	42	31	417	50	30	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	42	31	-	50	30	-
Stage 1	-	-	-	-	-	-	176	236	-	208	265	-
Stage 2	-	-	-	-	-	-	437	264	-	422	229	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.01	0.38	46.4	75.35
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	42	417	665	-	-	540	-	-	66
HCM Lane V/C Ratio	0.107	0.018	0.002	-	-	0.064	-	-	0.237
HCM Ctrl Dly (s/v)	100.7	13.8	10.4	-	-	12.1	-	-	75.4
HCM Lane LOS	F	B	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.1	0	-	-	0.2	-	-	0.8

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

Build Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	335	777	319	550	1005	683	414	475	381	360	453	172
Future Volume (veh/h)	335	777	319	550	1005	683	414	475	381	360	453	172
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	360	835	343	579	1058	719	460	528	423	404	509	193
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.90	0.90	0.90	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	437	926	580	529	1017	620	367	754	581	367	754	536
Arrive On Green	0.24	0.49	0.49	0.15	0.27	0.27	0.10	0.20	0.20	0.10	0.20	0.20
Sat Flow, veh/h	3666	3770	1678	3638	3741	1665	3666	3770	1679	3666	3770	1679
Grp Volume(v), veh/h	360	835	343	579	1058	719	460	528	423	404	509	193
Grp Sat Flow(s),veh/h/ln	1833	1885	1678	1819	1870	1665	1833	1885	1679	1833	1885	1679
Q Serve(g_s), s	8.4	18.2	13.7	13.1	24.5	24.5	9.0	11.7	18.0	9.0	11.2	8.0
Cycle Q Clear(g_c), s	8.4	18.2	13.7	13.1	24.5	24.5	9.0	11.7	18.0	9.0	11.2	8.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	437	926	580	529	1017	620	367	754	581	367	754	536
V/C Ratio(X)	0.82	0.90	0.59	1.09	1.04	1.16	1.25	0.70	0.73	1.10	0.68	0.36
Avail Cap(c_a), veh/h	534	926	580	529	1017	620	367	754	581	367	754	536
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	21.9	16.0	38.5	32.8	28.3	40.5	33.5	25.8	40.5	33.3	23.6
Incr Delay (d2), s/veh	8.5	13.7	4.4	67.0	39.2	89.2	135.1	2.9	4.6	77.3	2.4	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	6.7	4.1	10.4	15.6	27.1	10.7	5.3	7.9	7.7	5.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	41.9	35.6	20.4	105.5	71.9	117.5	175.6	36.4	30.4	117.8	35.7	24.0
LnGrp LOS	D	D	C	F	F	F	F	D	C	F	D	C
Approach Vol, veh/h		1538			2356			1411			1106	
Approach Delay, s/veh		33.7			94.1			80.0			63.6	
Approach LOS		C			F			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.6	31.4	16.0	25.0	20.0	29.0	16.0	25.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 13	* 22	9.0	18.0	* 13	* 22	9.0	18.0				
Max Q Clear Time (g_c+I1), s	10.4	26.5	11.0	13.2	15.1	20.2	11.0	20.0				
Green Ext Time (p_c), s	0.3	0.0	0.0	1.6	0.0	0.3	0.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 71.2
HCM 7th LOS E

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Build Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗	↘	↰	↗	↘	↰	↗	↘	↰	↗	↘
Traffic Volume (veh/h)	156	1229	164	49	1344	89	205	2	61	61	1	186
Future Volume (veh/h)	156	1229	164	49	1344	89	205	2	61	61	1	186
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	164	1294	173	54	1493	99	238	2	71	68	1	207
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	2	2	2	0	0	0	1	1	1
Cap, veh/h	273	2250	1000	183	2232	992	267	12	432	385	2	437
Arrive On Green	0.20	0.20	0.20	1.00	1.00	1.00	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	323	3770	1676	361	3741	1663	1192	47	1654	1336	8	1673
Grp Volume(v), veh/h	164	1294	173	54	1493	99	238	0	73	68	0	208
Grp Sat Flow(s),veh/h/ln	323	1885	1676	361	1870	1663	1192	0	1700	1336	0	1681
Q Serve(g_s), s	44.1	28.0	7.7	9.4	0.0	0.0	14.1	0.0	3.0	3.7	0.0	9.4
Cycle Q Clear(g_c), s	44.1	28.0	7.7	37.3	0.0	0.0	23.5	0.0	3.0	6.7	0.0	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Lane Grp Cap(c), veh/h	273	2250	1000	183	2232	992	267	0	444	385	0	439
V/C Ratio(X)	0.60	0.58	0.17	0.29	0.67	0.10	0.89	0.00	0.16	0.18	0.00	0.47
Avail Cap(c_a), veh/h	273	2250	1000	183	2232	992	267	0	444	385	0	439
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.3	25.8	17.7	9.7	0.0	0.0	39.5	0.0	25.7	28.3	0.0	28.0
Incr Delay (d2), s/veh	9.5	1.1	0.4	4.1	1.6	0.2	29.0	0.0	0.2	0.2	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	14.1	2.8	0.7	0.5	0.1	7.5	0.0	1.2	1.2	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	41.8	26.9	18.1	13.8	1.6	0.2	68.5	0.0	25.8	28.5	0.0	28.8
LnGrp LOS	D	C	B	B	A	A	E		C	C		C
Approach Vol, veh/h	1631			1646			311			276		
Approach Delay, s/veh	27.4			1.9			58.5			28.7		
Approach LOS	C			A			E			C		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	60.0			30.0			60.0			30.0		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 54			23.5			* 54			23.5		
Max Q Clear Time (g_c+I1), s	46.1			11.4			39.3			25.5		
Green Ext Time (p_c), s	5.8			1.2			9.2			0.0		

Intersection Summary

HCM 7th Control Delay, s/veh 19.2
HCM 7th LOS B













Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Build Conditions
PM Peak Hour











Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	93	1085	14	96	1297	302	69	2	104	312	0	163
Future Volume (veh/h)	93	1085	14	96	1297	302	69	2	104	312	0	163
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	98	1142	15	105	1425	332	85	2	128	355	0	185
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.81	0.81	0.81	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	180	2635	1175	419	2614	1166	157	4	277	203	0	280
Arrive On Green	1.00	1.00	1.00	0.23	0.23	0.23	0.17	0.17	0.17	0.17	0.00	0.17
Sat Flow, veh/h	275	3770	1682	486	3741	1668	1208	26	1660	1270	0	1682
Grp Volume(v), veh/h	98	1142	15	105	1425	332	85	0	130	355	0	185
Grp Sat Flow(s),veh/h/ln	275	1885	1682	486	1870	1668	1208	0	1686	1270	0	1682
Q Serve(g_s), s	31.4	0.0	0.0	16.1	30.2	14.7	5.7	0.0	6.3	8.7	0.0	9.3
Cycle Q Clear(g_c), s	61.5	0.0	0.0	16.1	30.2	14.7	15.0	0.0	6.3	15.0	0.0	9.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Lane Grp Cap(c), veh/h	180	2635	1175	419	2614	1166	157	0	281	203	0	280
V/C Ratio(X)	0.54	0.43	0.01	0.25	0.55	0.28	0.54	0.00	0.46	1.75	0.00	0.66
Avail Cap(c_a), veh/h	180	2635	1175	419	2614	1166	157	0	281	203	0	280
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.8	0.0	0.0	16.6	22.0	16.1	42.4	0.0	33.9	42.4	0.0	35.1
Incr Delay (d2), s/veh	11.3	0.5	0.0	1.4	0.8	0.6	3.7	0.0	1.2	355.6	0.0	5.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.2	0.0	2.2	15.0	6.6	2.1	0.0	2.6	24.6	0.0	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	26.1	0.5	0.0	18.1	22.9	16.7	46.2	0.0	35.0	398.0	0.0	40.7
LnGrp LOS	C	A	A	B	C	B	D		D	F		D
Approach Vol, veh/h	1255				1862		215				540	
Approach Delay, s/veh	2.5				21.5		39.4				275.6	
Approach LOS	A				C		D				F	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	69.0		21.0		69.0		21.0					
Change Period (Y+Rc), s	6.1		6.0		6.1		6.0					
Max Green Setting (Gmax), s	62.9		15.0		62.9		15.0					
Max Q Clear Time (g_c+I1), s	63.5		17.0		32.2		17.0					
Green Ext Time (p_c), s	0.0		0.0		15.6		0.0					
Intersection Summary												
HCM 7th Control Delay, s/veh	51.8											
HCM 7th LOS	D											

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)













Build Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations						WBR			NBR	SBL		SBR
Traffic Volume (veh/h)	5	1228	65	40	1537	3	136	3	78	13	3	10
Future Volume (veh/h)	5	1228	65	40	1537	3	136	3	78	13	3	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1969	1969	1969	2000	2000	2000
Adj Flow Rate, veh/h	5	1293	68	43	1671	3	153	3	88	16	4	12
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.81	0.81	0.81
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	0	0	0
Cap, veh/h	299	2772	1236	319	2817	5	269	7	203	117	40	58
Arrive On Green	0.74	0.74	0.74	1.00	1.00	1.00	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	298	3770	1681	400	3831	7	1392	55	1614	452	315	460
Grp Volume(v), veh/h	5	1293	68	43	816	858	153	0	91	32	0	0
Grp Sat Flow(s),veh/h/ln	298	1885	1681	400	1870	1968	1392	0	1669	1228	0	0
Q Serve(g_s), s	0.4	12.4	1.0	2.1	0.0	0.0	4.1	0.0	4.5	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.4	12.4	1.0	14.6	0.0	0.0	8.7	0.0	4.5	4.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.97	0.50		0.37
Lane Grp Cap(c), veh/h	299	2772	1236	319	1375	1447	269	0	210	215	0	0
V/C Ratio(X)	0.02	0.47	0.06	0.13	0.59	0.59	0.57	0.00	0.43	0.15	0.00	0.00
Avail Cap(c_a), veh/h	299	2772	1236	319	1375	1447	414	0	384	372	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.2	4.8	3.3	1.4	0.0	0.0	38.0	0.0	36.4	35.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.1	0.9	1.9	1.8	1.9	0.0	1.4	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.0	0.2	0.1	0.7	0.7	3.4	0.0	1.9	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	3.3	5.4	3.4	2.2	1.9	1.8	39.9	0.0	37.8	35.3	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1366			1717			244			32		
Approach Delay, s/veh	5.3			1.9			39.1			35.3		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	72.4			17.6			72.4			17.6		
Change Period (Y+Rc), s	6.2			6.3			6.2			6.3		
Max Green Setting (Gmax), s	56.8			20.7			56.8			20.7		
Max Q Clear Time (g_c+I1), s	14.4			6.6			16.6			10.7		
Green Ext Time (p_c), s	11.7			0.1			16.7			0.7		
Intersection Summary												
HCM 7th Control Delay, s/veh	6.3											
HCM 7th LOS	A											

Intersection

Int Delay, s/veh 47.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	121	1129	69	44	1468	17	38	0	47	16	0	74
Future Vol, veh/h	121	1129	69	44	1468	17	38	0	47	16	0	74
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	75	200	-	125	25	-	-	0	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	90	90	90	92	92	92	75	75	75
Heavy Vehicles, %	0	1	0	0	2	0	0	0	0	0	0	0
Mvmt Flow	127	1188	73	49	1631	19	41	0	51	21	0	99

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1651	0	0	1262	0	0	2357	3193	595	2579	3247	817
Stage 1	-	-	-	-	-	-	1444	1444	-	1730	1730	-
Stage 2	-	-	-	-	-	-	913	1749	-	849	1517	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	396	-	-	558	-	-	~ 19	10	452	~ 13	9	324
Stage 1	-	-	-	-	-	-	141	199	-	94	144	-
Stage 2	-	-	-	-	-	-	298	141	-	326	183	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	396	-	-	557	-	-	~ 8	6	452	~ 7	6	324
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 8	6	-	~ 7	6	-
Stage 1	-	-	-	-	-	-	96	135	-	85	131	-
Stage 2	-	-	-	-	-	-	189	129	-	196	124	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	1.68	0.35	\$ 1199.28	\$ 353.44
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	8	452	396	-	-	557	-	-	7	324
HCM Lane V/C Ratio	4.978	0.113	0.322	-	-	0.088	-	-	2.985	0.305
HCM Ctrl Dly (s/v)	\$ 2665.3	14	18.3	-	-	12.1	-	-	\$ 1891.3	20.9
HCM Lane LOS	F	B	C	-	-	B	-	-	F	C
HCM 95th %tile Q(veh)	6.5	0.4	1.4	-	-	0.3	-	-	3.9	1.3

Notes








~: Volume exceeds capacity \$: Delay exceeds 300s
 *: Computation Not Defined *: All major volume in platoon

HCM 7th TWSC
6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Build Conditions
PM Peak Hour

Intersection

Int Delay, s/veh 25.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	1492	2	9	1669	57	2	0	36	21	0	24
Future Vol, veh/h	7	1492	2	9	1669	57	2	0	36	21	0	24
Conflicting Peds, #/hr	2	0	2	2	0	2	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	100	-	-	0	-	75	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	63	63	63	75	75	75
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	2	2	2
Mvmt Flow	7	1571	2	10	1795	61	3	0	57	28	0	32

Major/Minor	Major1			Major2			Minor1		Minor2			
Conflicting Flow All	1858	0	0	1575	0	0	2506	3466	789	2648	3436	931
Stage 1	-	-	-	-	-	-	1588	1588	-	1847	1847	-
Stage 2	-	-	-	-	-	-	918	1877	-	801	1589	-
Critical Hdwy	4.12	-	-	4.14	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.21	-	-	2.22	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	326	-	-	414	-	-	15	7	338	~ 11	7	268
Stage 1	-	-	-	-	-	-	115	169	-	77	123	-
Stage 2	-	-	-	-	-	-	297	122	-	344	166	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	325	-	-	414	-	-	12	6	337	~ 9	6	268
Mov Cap-2 Maneuver	-	-	-	-	-	-	12	6	-	~ 9	6	-
Stage 1	-	-	-	-	-	-	112	165	-	75	120	-
Stage 2	-	-	-	-	-	-	255	119	-	279	162	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.08	0.07	36.64	\$ 1463.74
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	12	337	325	-	-	414	-	-	18
HCM Lane V/C Ratio	0.255	0.17	0.023	-	-	0.023	-	-	3.289
HCM Ctrl Dly (s/v)	\$ 374.6	17.9	16.3	-	-	13.9	-	-	\$ 1463.7
HCM Lane LOS	F	C	C	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.7	0.6	0.1	-	-	0.1	-	-	8

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s
*: Computation Not Defined *: All major volume in platoon

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	57	70	218	165	145	231	225	202	218	90	146	168
Average Queue (ft)	14	24	82	74	30	102	127	113	109	18	56	98
95th Queue (ft)	39	63	154	140	90	187	206	191	195	59	130	154
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	556	633	475	232	374	390	348	184
Average Queue (ft)	118	308	351	135	201	233	225	86
95th Queue (ft)	296	640	556	207	315	391	365	152
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			275	250	250		275	
Storage Blk Time (%)		2	53	0	0	19	9	
Queuing Penalty (veh)		8	80	0	1	112	14	

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	70	162	197	31	51	197	206	54	142	47	68	90
Average Queue (ft)	37	46	80	10	9	51	66	7	33	16	25	29
95th Queue (ft)	64	115	154	32	32	129	139	28	88	38	54	62
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)		1	0						0			
Queuing Penalty (veh)		1	0						0			

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	69	133	149	48	86	138	89	154	77	319	125
Average Queue (ft)	27	37	47	21	20	37	21	44	42	299	94
95th Queue (ft)	57	82	97	47	60	89	62	113	65	382	175
Link Distance (ft)		440	440		522	522		275		304	
Upstream Blk Time (%)										69	
Queuing Penalty (veh)										0	
Storage Bay Dist (ft)	225			250			100		25		75
Storage Blk Time (%)			10			0	0	32	20	91	4
Queuing Penalty (veh)			1			1	0	26	8	69	8

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	48	136	135	50	50	130	140	128	59	52
Average Queue (ft)	8	45	47	13	18	35	43	54	17	12
95th Queue (ft)	28	94	95	39	44	90	104	103	43	39
Link Distance (ft)		1068	1068			471	471		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)			0							
Queuing Penalty (veh)			0							

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	WB	NB	NB	SB	SB
Directions Served	L	L	L	TR	L	TR
Maximum Queue (ft)	52	51	38	47	43	41
Average Queue (ft)	26	12	12	15	7	14
95th Queue (ft)	52	35	34	36	28	30
Link Distance (ft)				307	306	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200	200	25			50
Storage Blk Time (%)			10	5	0	0
Queuing Penalty (veh)			3	1	0	0

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	WB	NB	NB	SB
Directions Served	L	L	TR	LTR
Maximum Queue (ft)	47	31	30	28
Average Queue (ft)	16	5	7	7
95th Queue (ft)	39	24	28	26
Link Distance (ft)		348		339
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100		75	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 332

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	142	148	398	423	210	472	550	2016	2015	375	549	562
Average Queue (ft)	82	81	169	178	42	224	496	1834	1847	375	327	368
95th Queue (ft)	126	117	331	341	119	379	697	2396	2394	375	502	528
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)								31	46			
Queuing Penalty (veh)								0	0			
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)			0			0	1	51	73	21	1	6
Queuing Penalty (veh)			1			1	3	291	520	112	3	17

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	528	410	318	228	252	190	197	145
Average Queue (ft)	208	154	165	141	180	117	116	77
95th Queue (ft)	416	282	256	217	247	170	181	136
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			275	250	250			275
Storage Blk Time (%)	0	0	1		1			
Queuing Penalty (veh)	0	2	2		2			

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	149	219	237	78	112	259	288	51	193	70	134	110
Average Queue (ft)	100	140	146	31	33	179	206	24	118	32	43	62
95th Queue (ft)	169	224	202	61	73	240	274	49	187	62	96	101
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)		0	0									
Queuing Penalty (veh)		0	1									
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)	2	7	1			0			5		1	0
Queuing Penalty (veh)	16	11	1			0			3		1	0

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	164	178	176	24	114	246	209	165	132	50	356	125
Average Queue (ft)	67	94	75	2	50	110	99	58	66	45	321	115
95th Queue (ft)	135	161	142	12	93	200	179	122	133	54	334	155
Link Distance (ft)		440	440			522	522		275		304	
Upstream Blk Time (%)											88	
Queuing Penalty (veh)											0	
Storage Bay Dist (ft)	225			25	250			100		25		75
Storage Blk Time (%)			18	0		0	6	0	41	31	84	14
Queuing Penalty (veh)			3	2		0	20	3	50	26	152	48

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	24	163	164	30	70	145	164	133	144	74
Average Queue (ft)	2	99	68	12	32	73	89	90	29	24
95th Queue (ft)	12	171	144	33	61	124	135	141	73	58
Link Distance (ft)		1068	1068			472	472		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)			0							
Queuing Penalty (veh)			0							

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	R	L	L	TR	L	TR
Maximum Queue (ft)	104	21	73	50	217	100	75
Average Queue (ft)	56	1	27	29	66	25	43
95th Queue (ft)	93	7	64	59	171	67	75
Link Distance (ft)					325	306	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	75	200	25			50
Storage Blk Time (%)				55	13	8	6
Queuing Penalty (veh)				28	5	8	1

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	T	TR	L	TR	LTR
Maximum Queue (ft)	23	52	28	26	16	113	100	347
Average Queue (ft)	6	3	5	1	0	7	39	148
95th Queue (ft)	21	21	21	10	0	43	77	334
Link Distance (ft)		522		231	231	348		339
Upstream Blk Time (%)								7
Queuing Penalty (veh)								0
Storage Bay Dist (ft)	250		100				75	
Storage Blk Time (%)						0	4	
Queuing Penalty (veh)						0	0	

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

























Movement	NB
Directions Served	R
Maximum Queue (ft)	129
Average Queue (ft)	43
95th Queue (ft)	90
Link Distance (ft)	318
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1331

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	533	258	245	539	143	258	250	366	553	536	135
Future Volume (veh/h)	91	533	258	245	539	143	258	250	366	553	536	135
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1891	1891	1891	1891	1891	1891	1922	1922	1922	1969	1969	1969
Adj Flow Rate, veh/h	108	635	307	282	620	164	322	312	458	608	589	148
Peak Hour Factor	0.84	0.84	0.84	0.87	0.87	0.87	0.80	0.80	0.80	0.91	0.91	0.91
Percent Heavy Veh, %	7	7	7	7	7	7	5	5	5	2	2	2
Cap, veh/h	181	801	561	357	982	757	452	609	438	725	893	485
Arrive On Green	0.02	0.07	0.07	0.10	0.27	0.27	0.13	0.17	0.17	0.20	0.24	0.24
Sat Flow, veh/h	3493	3593	1600	3493	3593	1601	3551	3652	1629	3638	3741	1668
Grp Volume(v), veh/h	108	635	307	282	620	164	322	312	458	608	589	148
Grp Sat Flow(s),veh/h/ln	1747	1796	1600	1747	1796	1601	1776	1826	1629	1819	1870	1668
Q Serve(g_s), s	2.8	15.6	14.3	7.1	13.6	5.4	7.8	7.0	15.0	14.5	12.8	6.2
Cycle Q Clear(g_c), s	2.8	15.6	14.3	7.1	13.6	5.4	7.8	7.0	15.0	14.5	12.8	6.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	181	801	561	357	982	757	452	609	438	725	893	485
V/C Ratio(X)	0.60	0.79	0.55	0.79	0.63	0.22	0.71	0.51	1.05	0.84	0.66	0.31
Avail Cap(c_a), veh/h	392	801	561	392	982	757	789	609	438	808	893	485
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	39.6	28.2	39.5	28.7	13.9	37.7	34.2	32.9	34.6	31.0	24.9
Incr Delay (d2), s/veh	3.1	7.9	3.8	9.7	3.1	0.7	4.4	0.7	55.6	8.5	1.8	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	8.3	6.5	3.3	5.8	1.9	3.5	3.0	15.4	6.8	5.6	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	46.4	47.5	32.0	49.1	31.8	14.6	42.1	34.9	88.5	43.1	32.7	25.2
LnGrp LOS	D	D	C	D	C	B	D	C	F	D	C	C
Approach Vol, veh/h		1050			1066			1092			1345	
Approach Delay, s/veh		42.9			33.7			59.5			36.6	
Approach LOS		D			C			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.6	31.5	18.4	28.5	16.1	27.0	24.9	22.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 10	* 17	20.0	15.0	* 10	* 17	20.0	15.0				
Max Q Clear Time (g_c+I1), s	4.8	15.6	9.8	14.8	9.1	17.6	16.5	17.0				
Green Ext Time (p_c), s	0.1	0.2	1.6	0.1	0.1	0.0	1.5	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 42.9
HCM 7th LOS D

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	75	897	60	11	870	51	48	3	12	41	0	67
Future Volume (veh/h)	75	897	60	11	870	51	48	3	12	41	0	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2000	1891	2000	1891	1891	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	94	1121	75	13	1036	61	56	3	14	45	0	73
Peak Hour Factor	0.80	0.80	0.80	0.84	0.84	0.84	0.86	0.86	0.86	0.92	0.92	0.92
Percent Heavy Veh, %	0	7	0	7	7	0	2	2	2	4	4	4
Cap, veh/h	473	2704	1275	418	2704	1275	164	32	148	212	0	173
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.11	0.11	0.11	0.11	0.00	0.11
Sat Flow, veh/h	522	3593	1694	449	3593	1694	1327	303	1412	1374	0	1642
Grp Volume(v), veh/h	94	1121	75	13	1036	61	56	0	17	45	0	73
Grp Sat Flow(s),veh/h/ln	522	1796	1694	449	1796	1694	1327	0	1715	1374	0	1642
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.8	2.8	0.0	3.7
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.8	3.6	0.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.82	1.00		1.00
Lane Grp Cap(c), veh/h	473	2704	1275	418	2704	1275	164	0	180	212	0	173
V/C Ratio(X)	0.20	0.41	0.06	0.03	0.38	0.05	0.34	0.00	0.09	0.21	0.00	0.42
Avail Cap(c_a), veh/h	473	2704	1275	418	2704	1275	253	0	295	304	0	283
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	41.2	0.0	36.4	38.0	0.0	37.7
Incr Delay (d2), s/veh	0.9	0.5	0.1	0.1	0.4	0.1	1.2	0.0	0.2	0.5	0.0	1.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.1	0.2	0.0	0.0	0.0	0.2	0.0	1.3	0.0	0.3	1.0	0.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.9	0.5	0.1	0.1	0.4	0.1	42.4	0.0	36.6	38.5	0.0	39.4
LnGrp LOS	A	A	A	A	A	A	D		D	D		D
Approach Vol, veh/h	1290			1110			73			118		
Approach Delay, s/veh	0.5			0.4			41.1			39.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	74.0			16.0			74.0			16.0		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 62			15.5			* 62			15.5		
Max Q Clear Time (g_c+I1), s	2.0			5.7			2.0			9.5		
Green Ext Time (p_c), s	11.8			0.3			8.9			0.1		

Intersection Summary

HCM 7th Control Delay, s/veh 3.3
HCM 7th LOS A













Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
AM Peak Hour











Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	834	12	50	731	148	38	0	76	128	1	57
Future Volume (veh/h)	44	834	12	50	731	148	38	0	76	128	1	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1906	1906	1906	1891	1891	1891	1922	1922	1922	2000	2000	2000
Adj Flow Rate, veh/h	56	1056	15	57	831	168	40	0	81	183	1	81
Peak Hour Factor	0.79	0.79	0.79	0.88	0.88	0.88	0.94	0.94	0.94	0.70	0.70	0.70
Percent Heavy Veh, %	6	6	6	7	7	7	5	5	5	0	0	0
Cap, veh/h	444	2414	1076	417	2394	1067	284	0	324	290	4	334
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.20	0.00	0.20	0.20	0.20	0.20
Sat Flow, veh/h	546	3622	1614	506	3593	1601	1285	0	1629	1338	21	1677
Grp Volume(v), veh/h	56	1056	15	57	831	168	40	0	81	183	0	82
Grp Sat Flow(s),veh/h/ln	546	1811	1614	506	1796	1601	1285	0	1629	1338	0	1698
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	3.8	12.0	0.0	3.7
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.0	3.8	15.8	0.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	444	2414	1076	417	2394	1067	284	0	324	290	0	338
V/C Ratio(X)	0.13	0.44	0.01	0.14	0.35	0.16	0.14	0.00	0.25	0.63	0.00	0.24
Avail Cap(c_a), veh/h	444	2414	1076	417	2394	1067	299	0	344	306	0	358
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	32.9	0.0	30.4	37.0	0.0	30.3
Incr Delay (d2), s/veh	0.6	0.6	0.0	0.7	0.4	0.3	0.2	0.0	0.4	3.8	0.0	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.8	0.0	1.5	4.2	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.6	0.6	0.0	0.7	0.4	0.3	33.1	0.0	30.8	40.8	0.0	30.7
LnGrp LOS	A	A	A	A	A	A	C		C	D		C
Approach Vol, veh/h	1127				1056				121		265	
Approach Delay, s/veh	0.6				0.4				31.5		37.7	
Approach LOS	A				A				C		D	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	66.1		23.9		66.1		23.9					
Change Period (Y+Rc), s	6.1		6.0		6.1		6.0					
Max Green Setting (Gmax), s	58.9		19.0		58.9		19.0					
Max Q Clear Time (g_c+I1), s	2.0		17.8		2.0		8.1					
Green Ext Time (p_c), s	9.6		0.1		7.8		0.4					
Intersection Summary												
HCM 7th Control Delay, s/veh	5.8											
HCM 7th LOS	A											

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

























Build Conditions W / IMP
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	921	85	31	793	10	71	0	44	5	0	5
Future Volume (veh/h)	9	921	85	31	793	10	71	0	44	5	0	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1938	1938	1938	1891	1891	1891	1813	1813	1813	2000	2000	2000
Adj Flow Rate, veh/h	11	1166	108	36	933	12	83	0	51	8	0	8
Peak Hour Factor	0.79	0.79	0.79	0.85	0.85	0.85	0.86	0.86	0.86	0.63	0.63	0.63
Percent Heavy Veh, %	4	4	4	7	7	7	12	12	12	0	0	0
Cap, veh/h	538	2891	1287	366	2852	37	192	0	117	94	18	52
Arrive On Green	0.79	0.79	0.79	1.00	1.00	1.00	0.08	0.00	0.08	0.08	0.00	0.08
Sat Flow, veh/h	584	3681	1639	417	3632	47	1296	0	1536	442	243	685
Grp Volume(v), veh/h	11	1166	108	36	461	484	83	0	51	16	0	0
Grp Sat Flow(s),veh/h/ln	584	1841	1639	417	1796	1882	1296	0	1536	1371	0	0
Q Serve(g_s), s	0.4	9.0	1.4	1.1	0.0	0.0	1.8	0.0	2.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.4	9.0	1.4	10.1	0.0	0.0	4.7	0.0	2.9	2.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.02	1.00		1.00	0.50		0.50
Lane Grp Cap(c), veh/h	538	2891	1287	366	1410	1478	192	0	117	164	0	0
V/C Ratio(X)	0.02	0.40	0.08	0.10	0.33	0.33	0.43	0.00	0.44	0.10	0.00	0.00
Avail Cap(c_a), veh/h	538	2891	1287	366	1410	1478	320	0	268	314	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.1	3.0	2.2	0.6	0.0	0.0	40.4	0.0	39.7	38.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.1	0.5	0.6	0.6	1.5	0.0	2.6	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	0.2	0.1	0.2	0.2	1.9	0.0	1.1	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	2.2	3.5	2.4	1.2	0.6	0.6	42.0	0.0	42.3	39.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1285			981			134			16		
Approach Delay, s/veh	3.4			0.6			42.1			39.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	76.9			13.1			76.9			13.1		
Change Period (Y+Rc), s	6.2			6.3			6.2			6.3		
Max Green Setting (Gmax), s	61.8			15.7			61.8			15.7		
Max Q Clear Time (g_c+I1), s	11.0			4.9			12.1			6.7		
Green Ext Time (p_c), s	10.5			0.0			7.0			0.3		
Intersection Summary												
HCM 7th Control Delay, s/veh	4.6											
HCM 7th LOS	A											

HCM 7th Signalized Intersection Summary
1: Latson Road & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	335	777	319	550	1005	683	414	475	381	360	453	172
Future Volume (veh/h)	335	777	319	550	1005	683	414	475	381	360	453	172
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	360	835	343	579	1058	719	460	528	423	404	509	193
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.90	0.90	0.90	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	440	1052	674	570	1180	729	448	503	487	448	503	426
Arrive On Green	0.24	0.56	0.56	0.16	0.32	0.32	0.12	0.13	0.13	0.12	0.13	0.13
Sat Flow, veh/h	3666	3770	1678	3638	3741	1665	3666	3770	1678	3666	3770	1678
Grp Volume(v), veh/h	360	835	343	579	1058	719	460	528	423	404	509	193
Grp Sat Flow(s),veh/h/ln	1833	1885	1678	1819	1870	1665	1833	1885	1678	1833	1885	1678
Q Serve(g_s), s	8.4	15.8	11.4	14.1	24.3	28.4	11.0	12.0	12.0	9.8	12.0	8.7
Cycle Q Clear(g_c), s	8.4	15.8	11.4	14.1	24.3	28.4	11.0	12.0	12.0	9.8	12.0	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	440	1052	674	570	1180	729	448	503	487	448	503	426
V/C Ratio(X)	0.82	0.79	0.51	1.02	0.90	0.99	1.03	1.05	0.87	0.90	1.01	0.45
Avail Cap(c_a), veh/h	574	1052	674	570	1180	729	448	503	487	448	503	426
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.3	17.8	12.0	38.0	29.4	25.0	39.5	39.0	30.3	39.0	39.0	28.3
Incr Delay (d2), s/veh	7.0	6.2	2.7	41.8	10.7	30.1	49.5	54.0	15.3	22.0	43.3	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	5.1	3.2	9.1	11.6	19.1	7.7	9.0	10.0	5.5	8.2	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	40.3	24.0	14.7	79.7	40.1	55.1	89.0	93.0	45.7	60.9	82.3	29.1
LnGrp LOS	D	C	B	F	D	E	F	F	D	E	F	C
Approach Vol, veh/h		1538			2356			1411			1106	
Approach Delay, s/veh		25.8			54.4			77.5			65.2	
Approach LOS		C			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.7	35.3	18.0	19.0	21.0	32.0	18.0	19.0				
Change Period (Y+Rc), s	* 6.9	* 6.9	7.0	7.0	* 6.9	* 6.9	7.0	7.0				
Max Green Setting (Gmax), s	* 14	* 25	11.0	12.0	* 14	* 25	11.0	12.0				
Max Q Clear Time (g_c+I1), s	10.4	30.4	13.0	14.0	16.1	17.8	11.8	14.0				
Green Ext Time (p_c), s	0.5	0.0	0.0	0.0	0.0	0.6	0.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 54.5
HCM 7th LOS D

Notes

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

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗	↘	↰	↗	↘	↰	↗	↘	↰	↗	↘
Traffic Volume (veh/h)	156	1229	164	49	1344	89	205	2	61	61	1	186
Future Volume (veh/h)	156	1229	164	49	1344	89	205	2	61	61	1	186
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	164	1294	173	54	1493	99	238	2	71	68	1	207
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	2	2	2	0	0	0	1	1	1
Cap, veh/h	273	2250	1000	295	2232	992	267	12	432	385	2	437
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	323	3770	1676	361	3741	1663	1192	47	1654	1336	8	1673
Grp Volume(v), veh/h	164	1294	173	54	1493	99	238	0	73	68	0	208
Grp Sat Flow(s),veh/h/ln	323	1885	1676	361	1870	1663	1192	0	1700	1336	0	1681
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	14.1	0.0	3.0	3.7	0.0	9.4
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	23.5	0.0	3.0	6.7	0.0	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Lane Grp Cap(c), veh/h	273	2250	1000	295	2232	992	267	0	444	385	0	439
V/C Ratio(X)	0.60	0.58	0.17	0.18	0.67	0.10	0.89	0.00	0.16	0.18	0.00	0.47
Avail Cap(c_a), veh/h	273	2250	1000	295	2232	992	267	0	444	385	0	439
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	39.5	0.0	25.7	28.3	0.0	28.0
Incr Delay (d2), s/veh	9.5	1.1	0.4	1.4	1.6	0.2	29.0	0.0	0.2	0.2	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.3	0.1	0.1	0.5	0.1	7.5	0.0	1.2	1.2	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	9.5	1.1	0.4	1.4	1.6	0.2	68.5	0.0	25.8	28.5	0.0	28.8
LnGrp LOS	A	A	A	A	A	A	E		C	C		C
Approach Vol, veh/h	1631			1646			311			276		
Approach Delay, s/veh	1.8			1.5			58.5			28.7		
Approach LOS	A			A			E			C		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	60.0			30.0			60.0			30.0		
Change Period (Y+Rc), s	* 6.3			6.5			* 6.3			6.5		
Max Green Setting (Gmax), s	* 54			23.5			* 54			23.5		
Max Q Clear Time (g_c+I1), s	2.0			11.4			2.0			25.5		
Green Ext Time (p_c), s	20.0			1.2			17.6			0.0		

Intersection Summary

HCM 7th Control Delay, s/veh 8.2
HCM 7th LOS A

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 7th Signalized Intersection Summary
3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗	↘	↰	↗	↘	↰	↗	↘	↰	↗	
Traffic Volume (veh/h)	93	1085	14	96	1297	302	69	2	104	312	0	163
Future Volume (veh/h)	93	1085	14	96	1297	302	69	2	104	312	0	163
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	98	1142	15	105	1425	332	85	2	128	355	0	185
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.81	0.81	0.81	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	1	1	1
Cap, veh/h	233	2090	932	349	2074	925	353	8	516	402	0	523
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.31	0.31	0.31	0.31	0.00	0.31
Sat Flow, veh/h	275	3770	1682	486	3741	1668	1208	26	1660	1270	0	1682
Grp Volume(v), veh/h	98	1142	15	105	1425	332	85	0	130	355	0	185
Grp Sat Flow(s),veh/h/ln	275	1885	1682	486	1870	1668	1208	0	1686	1270	0	1682
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	5.2	22.8	0.0	7.7
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	12.9	0.0	5.2	28.0	0.0	7.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Lane Grp Cap(c), veh/h	233	2090	932	349	2074	925	353	0	524	402	0	523
V/C Ratio(X)	0.42	0.55	0.02	0.30	0.69	0.36	0.24	0.00	0.25	0.88	0.00	0.35
Avail Cap(c_a), veh/h	233	2090	932	349	2074	925	353	0	524	402	0	523
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	29.0	0.0	23.1	34.7	0.0	24.0
Incr Delay (d2), s/veh	5.5	1.0	0.0	2.2	1.9	1.1	0.3	0.0	0.2	20.0	0.0	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.3	0.0	0.2	0.5	0.3	1.6	0.0	2.1	10.1	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	5.5	1.0	0.0	2.2	1.9	1.1	29.4	0.0	23.4	54.6	0.0	24.4
LnGrp LOS	A	A	A	A	A	A	C		C	D		C
Approach Vol, veh/h	1255				1862		215				540	
Approach Delay, s/veh	1.4				1.8		25.7				44.3	
Approach LOS	A				A		C				D	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	56.0		34.0		56.0		34.0					
Change Period (Y+Rc), s	6.1		6.0		6.1		6.0					
Max Green Setting (Gmax), s	49.9		28.0		49.9		28.0					
Max Q Clear Time (g_c+I1), s	2.0		30.0		2.0		14.9					
Green Ext Time (p_c), s	14.0		0.0		18.7		0.9					
Intersection Summary												
HCM 7th Control Delay, s/veh	8.9											
HCM 7th LOS	A											

HCM 7th Signalized Intersection Summary
4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Build Conditions W / IMP
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱↱	↰	↰	↱↱		↰	↰			↱↱	
Traffic Volume (veh/h)	5	1228	65	40	1537	3	136	3	78	13	3	10
Future Volume (veh/h)	5	1228	65	40	1537	3	136	3	78	13	3	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1969	1969	1969	2000	2000	2000
Adj Flow Rate, veh/h	5	1293	68	43	1671	3	153	3	88	16	4	12
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.81	0.81	0.81
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	0	0	0
Cap, veh/h	299	2774	1236	319	2818	5	269	7	203	117	40	58
Arrive On Green	0.74	0.74	0.74	1.00	1.00	1.00	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	298	3770	1681	400	3831	7	1392	55	1614	451	316	460
Grp Volume(v), veh/h	5	1293	68	43	816	858	153	0	91	32	0	0
Grp Sat Flow(s),veh/h/ln	298	1885	1681	400	1870	1968	1392	0	1669	1227	0	0
Q Serve(g_s), s	0.4	12.4	1.0	2.1	0.0	0.0	4.1	0.0	4.5	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.4	12.4	1.0	14.5	0.0	0.0	8.7	0.0	4.5	4.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.97	0.50		0.37
Lane Grp Cap(c), veh/h	299	2774	1236	319	1376	1447	269	0	209	214	0	0
V/C Ratio(X)	0.02	0.47	0.06	0.13	0.59	0.59	0.57	0.00	0.43	0.15	0.00	0.00
Avail Cap(c_a), veh/h	299	2774	1236	319	1376	1447	399	0	365	355	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.2	4.8	3.3	1.4	0.0	0.0	38.0	0.0	36.4	35.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.1	0.9	1.9	1.8	1.9	0.0	1.4	0.3	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.0	0.2	0.1	0.7	0.7	3.4	0.0	1.9	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	3.3	5.4	3.4	2.2	1.9	1.8	39.9	0.0	37.8	35.4	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D		D	D		
Approach Vol, veh/h	1366					1717		244		32		
Approach Delay, s/veh	5.2					1.8		39.1		35.4		
Approach LOS	A					A		D		D		
Timer - Assigned Phs	2		4			6		8				
Phs Duration (G+Y+Rc), s	72.4		17.6			72.4		17.6				
Change Period (Y+Rc), s	6.2		6.3			6.2		6.3				
Max Green Setting (Gmax), s	57.8		19.7			57.8		19.7				
Max Q Clear Time (g_c+I1), s	14.4		6.6			16.5		10.7				
Green Ext Time (p_c), s	11.8		0.1			16.9		0.6				
Intersection Summary												
HCM 7th Control Delay, s/veh			6.3									
HCM 7th LOS			A									

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	55	72	218	224	181	192	221	191	170	53	152	159
Average Queue (ft)	9	19	140	128	83	86	97	124	114	16	42	92
95th Queue (ft)	24	52	217	206	154	163	173	192	171	46	108	152
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	718	791	475	292	311	286	317	180
Average Queue (ft)	215	329	316	163	207	155	161	79
95th Queue (ft)	592	767	563	237	271	245	266	148
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			275	250	250			275
Storage Blk Time (%)		0	41		1	2	1	
Queuing Penalty (veh)		1	63		4	10	2	

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	96	108	118	54	31	75	51	28	130	49	108	84
Average Queue (ft)	43	40	64	13	11	12	16	2	36	16	37	41
95th Queue (ft)	84	86	118	39	32	46	43	14	76	43	78	73
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	125			200	250			400		150		125
Storage Blk Time (%)		0									0	
Queuing Penalty (veh)		0									0	

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	113	161	254	23	71	73	109	54	128	53	224	125
Average Queue (ft)	40	72	89	2	24	27	39	19	51	40	109	62
95th Queue (ft)	88	144	181	12	55	64	79	43	115	60	186	135
Link Distance (ft)		440	440			522	522		275		304	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			25	250			100		25		75
Storage Blk Time (%)			18	0			0		34	15	26	0
Queuing Penalty (veh)			3	1			0		27	6	20	0

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	25	132	115	43	51	68	111	158	57	49
Average Queue (ft)	6	53	56	13	17	19	28	73	20	8
95th Queue (ft)	22	105	110	39	44	53	73	136	45	31
Link Distance (ft)		1068	1068			471	471		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)								0		
Queuing Penalty (veh)								0		

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	T	L	TR	L	TR
Maximum Queue (ft)	72	52	47	41	54	24	39
Average Queue (ft)	35	21	2	15	23	7	14
95th Queue (ft)	66	48	16	38	46	24	30
Link Distance (ft)			440		307	306	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		25			50
Storage Blk Time (%)				18	5		0
Queuing Penalty (veh)				5	1		0

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	WB	NB	NB	SB
Directions Served	L	L	TR	LTR
Maximum Queue (ft)	49	31	31	28
Average Queue (ft)	17	4	7	8
95th Queue (ft)	42	21	27	27
Link Distance (ft)		348		339
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100		75	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 142

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	186	179	238	265	151	459	514	558	692	375	286	295
Average Queue (ft)	92	99	144	146	49	235	268	274	293	277	140	172
95th Queue (ft)	155	150	228	238	111	395	429	461	494	429	242	265
Link Distance (ft)			596	596				1963	1963			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	375	375			500	400	400			250	475	475
Storage Blk Time (%)						3	4	1	17	9		
Queuing Penalty (veh)						16	20	7	118	45		

Intersection: 1: Latson Road & I-96 BL (Grand River Avenue)

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (ft)	317	328	376	186	224	297	279	178
Average Queue (ft)	205	200	219	116	155	164	156	86
95th Queue (ft)	298	293	347	185	215	265	242	148
Link Distance (ft)	1456	1456				1018	1018	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			275	250	250			275
Storage Blk Time (%)		2	5			2	0	
Queuing Penalty (veh)		7	13			9	0	

Intersection: 2: Wal-Mart Drive/Meijer Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	225	256	256	101	73	246	236	51	380	250	152	132
Average Queue (ft)	103	129	134	36	37	158	178	22	145	50	45	56
95th Queue (ft)	179	224	213	74	71	226	234	50	292	146	96	106
Link Distance (ft)		231	231			475	475		382		337	
Upstream Blk Time (%)	0	3	1						1			
Queuing Penalty (veh)	0	22	6						0			
Storage Bay Dist (ft)	200			200	250			400		150		125
Storage Blk Time (%)	2	3	1			0			13		0	1
Queuing Penalty (veh)	13	6	2			0			9		0	0

Intersection: 3: Grand River Plaza Middle Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	135	391	368	90	191	179	224	175	208	50	243	125
Average Queue (ft)	72	167	150	7	91	133	142	70	53	44	156	100
95th Queue (ft)	127	275	254	36	171	194	211	150	137	54	287	164
Link Distance (ft)		440	440			522	522		275		304	
Upstream Blk Time (%)											23	
Queuing Penalty (veh)											0	
Storage Bay Dist (ft)	350			25	250			100		25		75
Storage Blk Time (%)		1	34	1			17	0	29	29	57	8
Queuing Penalty (veh)		1	5	4			56	1	36	24	103	28

Intersection: 4: Grand Oaks Drive/Retail Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	LTR
Maximum Queue (ft)	45	193	158	50	120	166	134	162	64	52
Average Queue (ft)	6	96	70	13	31	67	73	98	31	24
95th Queue (ft)	25	180	138	37	71	135	129	146	60	56
Link Distance (ft)		1068	1068			472	472		590	328
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			150	250			175		
Storage Blk Time (%)			0					0		
Queuing Penalty (veh)			0					0		

Intersection: 5: Site Drive/Grand River Plaza W. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	L	TR	L	TR
Maximum Queue (ft)	151	15	22	53	49	91	46	65
Average Queue (ft)	78	1	2	24	31	33	14	29
95th Queue (ft)	134	5	11	54	54	72	38	50
Link Distance (ft)		472				325	306	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	200		75	100	25			50
Storage Blk Time (%)					43	11	1	1
Queuing Penalty (veh)					21	4	1	0

Intersection: 6: Cleary Drive/Grand River Plaza S. Drive & I-96 BL (Grand River Avenue)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LTR
Maximum Queue (ft)	45	256	49	47	27	47	56	79	191
Average Queue (ft)	5	24	3	7	3	3	8	38	77
95th Queue (ft)	22	125	20	28	16	21	31	70	155
Link Distance (ft)		522	522		231	231	348		339
Upstream Blk Time (%)									51
Queuing Penalty (veh)									0
Storage Bay Dist (ft)	250			50				75	
Storage Blk Time (%)		0		3			0	3	
Queuing Penalty (veh)		0		24			0	0	

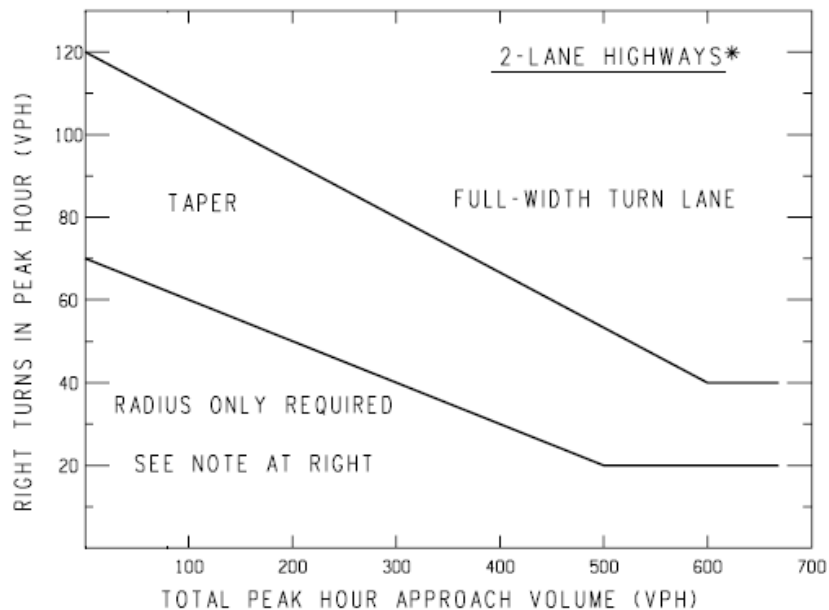
Intersection: 9001: Dummy Node A & I-96 BL (Grand River Avenue)

Movement	NB
Directions Served	R
Maximum Queue (ft)	88
Average Queue (ft)	29
95th Queue (ft)	56
Link Distance (ft)	318
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

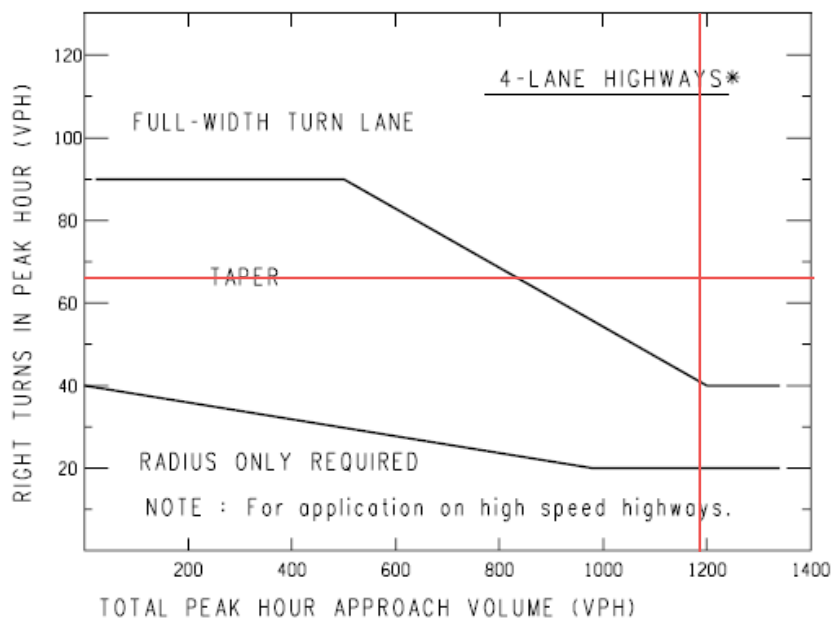
Network wide Queuing Penalty: 604

GRAND RIVER AVENUE & SITE DRIVE RIGHT-TURN LANE WARRANT



NOTE: For posted speeds at or under 45 mph, peak hour right turns greater than 40 vph, and total peak hour approach less than 300 vph, adjust right turn volumes.

Adjust peak hour
Right turns = Peak hour
Right turns – 20



*If a center left-turn lane exists (ie 3 or 5 lane roadway), subtract the number of left turns in approach volume from the total approach volume to get an adjusted total approach volume.

PM: 67

PM: 1,196

Sample Problem: The Design Speed is 55 mph. The Peak Hour Approach Volume is 300 vph. The Number of Right Turns in the Peak Hous is 100 vph. Determine if a right turn lane is recommended.

Solution: Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus, a right-turn lane may be recommended.



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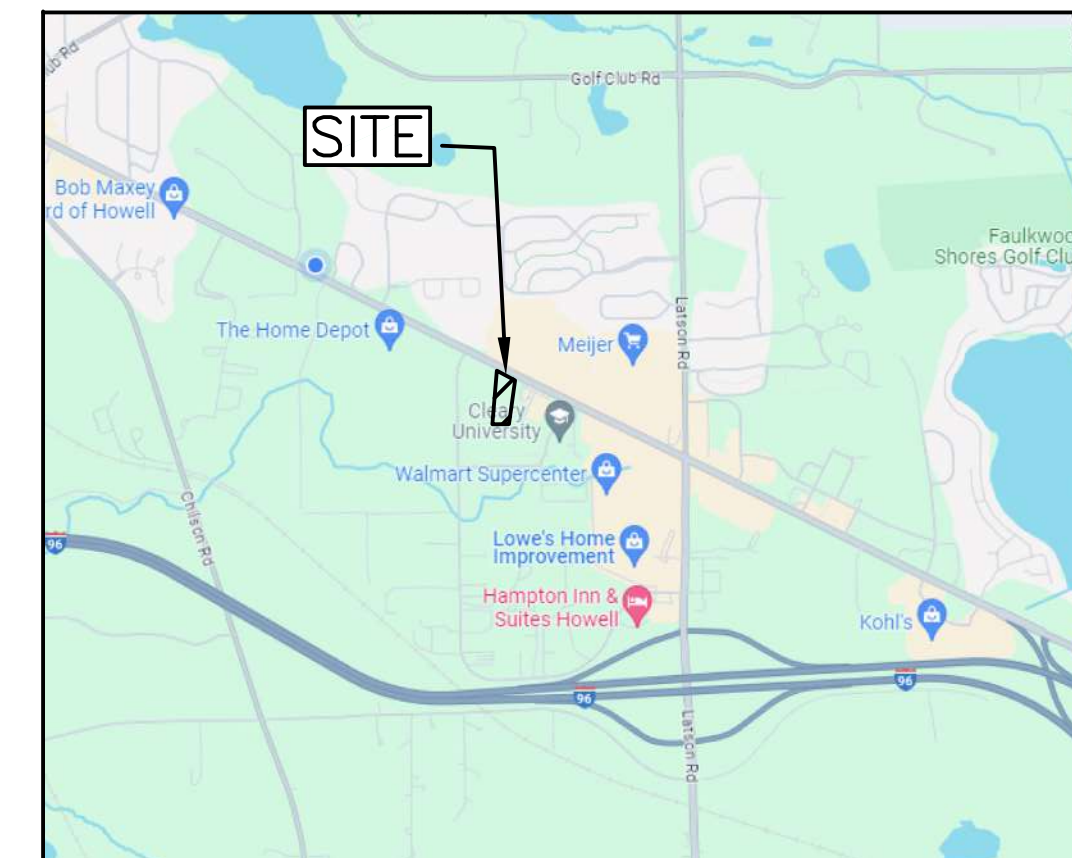


*Civil/Site • Traffic/Transportation • Governmental • Survey/Geospatial
Infrastructure • Geotechnical/Environmental • Telecommunications • Utilities/Energy*

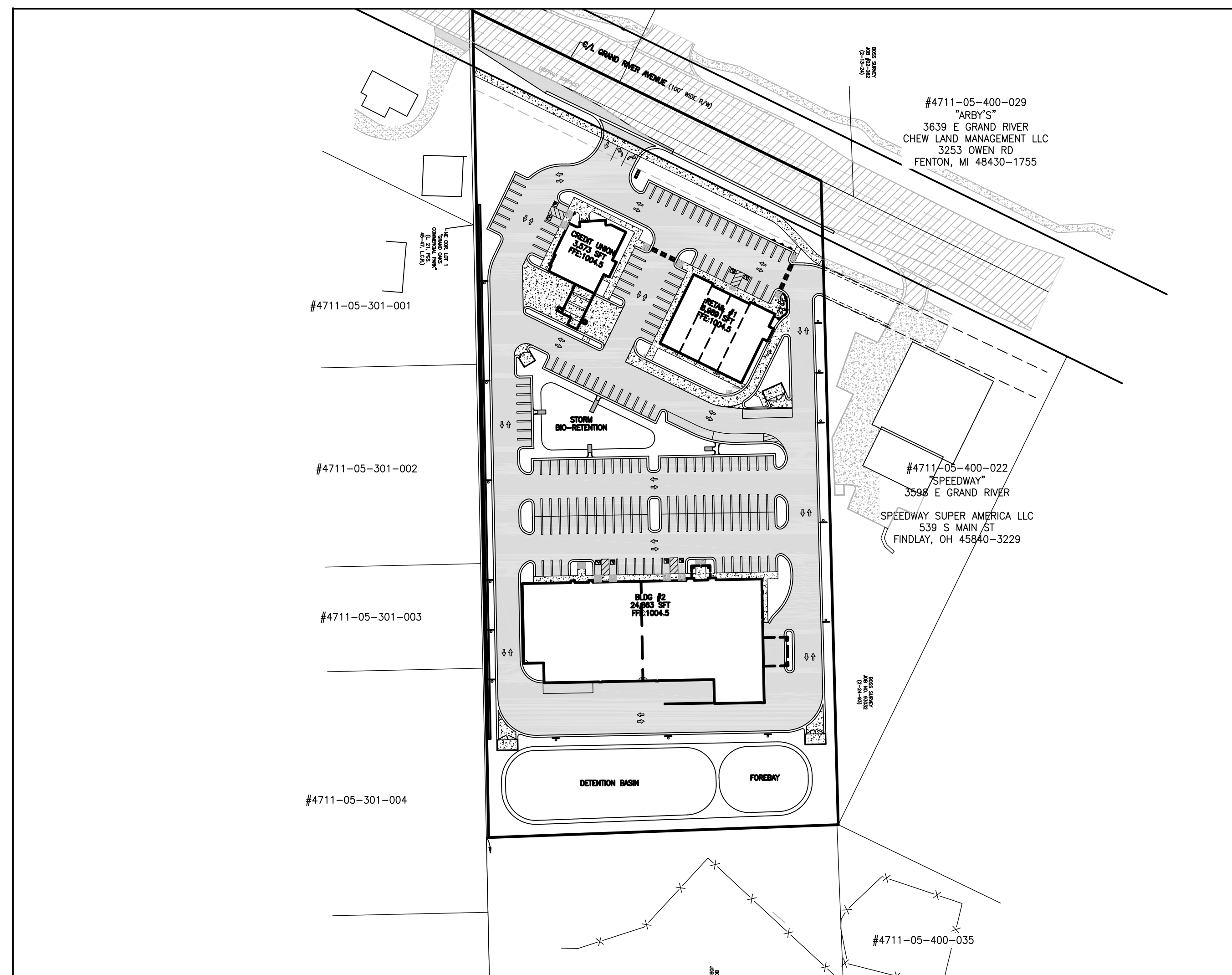
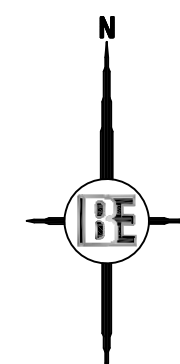
DESCRIPTION OF PROPERTY PER BOSS ENGINEERING SURVEY, JOB NO. 87490,
DATED 12-3-87, AS RECORDED IN LIBER 1268, PAGE 194, LIVINGSTON
COUNTY RECORDS:

Part of the SE 1/4 of Section 5, T2N-R5E, Genoa Township, Livingston County, Michigan,
described as: Commencing at the South 1/4 Corner of said Section 5; thence N 02°03'W
along the North-South 1/4 line of Section 5 and the East line of "Grand Oaks Commercial
Park," a subdivision as recorded in Liber 21 of the Pages 45-67 of "Grand Oaks Commercial
Map No. 1928" as shown on Exhibit A attached hereto, Beginning at the intersection
described; thence N 01°54'S-W, 83.076 feet (recorded as 831.50 feet) to the centerline of
Grand River Avenue (100 feet wide); thence S 64°49'E along said centerline, 391.00 feet;
thence S 02°09'A E, 646.65 feet (recorded as 631.00 feet); thence S 87°05'24"W, W, 351.00
feet to the corner of said Grand River Avenue, more or less and subject to the rights
of the public over existing Grand River Avenue.

(DESCRIPTION DOES NOT FORM A MATHEMATICAL CLOSURE BY 0.05' IN AN EAST-WEST DIRECTION!)



NO SCALE



NO SCALE

AGENCY	DATE SUBMITTED	DATE APPROVED
• TOWNSHIP ENGINEERING APPROVAL	-	-
• LCDC SESC	-	-
• MDOT	-	-
• EGLE - ACT 399	-	-
• EGLE - PART 41	-	-
• NPDES NOC SESC	-	-

THE CONTRACTOR SHALL HOLD HARMLESS THE DESIGN PROFESSIONAL, MUNICIPALITY, COUNTY, STATE AND ALL OF ITS SUB CONSULTANTS, PUBLIC AND PRIVATE UTILITY COMPANIES, AND LANDOWNERS FOR DAMAGES TO INDIVIDUALS AND PROPERTY, REAL OR OTHERWISE, DUE TO THE OPERATIONS OF THE CONTRACTOR AND/OR THEIR SUBCONTRACTORS.

SERENITY ARCHITECTURE COMPANY
5232 GREAT OAKS CT.
WEST BLOOMFIELD, MI 48323
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KN WEST, LLC
29500 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
CONTACT: Mr. DARREN NAIMI
EMAIL: DARRENNAIMI@YAHOO.COM
PHONE: 248-755-7727

SHEET INDEX	
SHEET NO.	DESCRIPTION
1	COVER
2	GENERAL NOTES & LEGEND
3	NATURAL FEATURES PLAN
4	EXISTING CONDITIONS & DEMOLITION PLAN
5	SITE PLAN
6	GRADING & DRAINAGE AREA PLAN
7	SOIL EROSION & SEDIMENTATION PLAN
8	UTILITY PLAN
9	LANDSCAPE PLAN
10	BASIN DETAILS
11	CONSTRUCTION DETAILS
12	MHOG DETAILS
13	MHOG DETAILS
14	MHOG DETAILS
15	MHOG DETAILS
PLANS BY OTHERS	
1 & 2	LIGHTING PLAN (GASSER BUSH)
210-1	ARCHITECTURAL FLOOR PLAN SHEET - BUILDING NO. 1
210-2	ARCHITECTURAL FLOOR PLAN SHEET - BUILDING NO. 2
210-3	ARCHITECTURAL FLOOR PLAN SHEET - BUILDING NO. 3
301-1	ARCHITECTURAL ELEV. PLAN SHEET - BUILDING NO. 1
301-2	ARCHITECTURAL ELEV. PLAN SHEET - BUILDING NO. 2
301-3	ARCHITECTURAL ELEV. PLAN SHEET - BUILDING NO. 3
302	ARCHITECTURAL ELEV. PLAN SHEET - FACADE

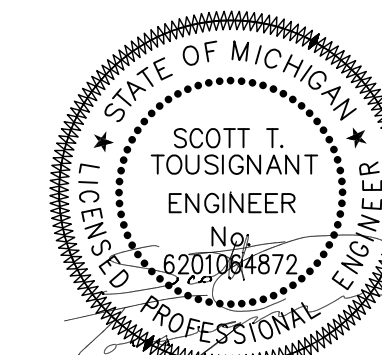
BEBOSS
Engineering
Engineers Surveyors Planners Landscape Architects

3121 E. GRAND RIVER AVE.

HOWELL, MI. 48843

517.546.4836 FAX 517.548.1670

CONTACT:SCOTT TOUSIGNANT
EMAIL:SCOTT@BOSSENG.COM



1	ST			PER TOWNSHIP COMMENTS	3/24/25	ISSUE DATE: 2/18/25
N0	Ry	Ck		REVISION	DATE	JQR NO: 24-075

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED TOWNSHIP, COUNTY, AND STATE OF MICHIGAN PERMITS.
2. A GRADING PERMIT FOR SOIL EROSION-SEDIMENTATION CONTROL SHALL BE OBTAINED FROM THE GOVERNING AGENCY PRIOR TO THE START OF CONSTRUCTION.
3. IF DUST PROBLEM OCCURS DURING CONSTRUCTION, CONTROL WILL BE PROVIDED BY AN APPLICATION OF WATER, EITHER BY SPRINKLER OR TANK TRUCK.
4. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH LOCAL MUNICIPAL STANDARDS AND SPECIFICATIONS.
5. PAVED SURFACES, WALKWAYS, SIGNS, LIGHTING AND OTHER STRUCTURES SHALL BE MAINTAINED IN A SAFE, ATTRACTIVE CONDITION AS ORIGINALLY DESIGNED AND CONSTRUCTED.
6. ALL BARRIER-FREE FEATURES SHALL BE CONSTRUCTED TO MEET ALL LOCAL, STATE AND A.D.A. REQUIREMENTS. WHERE EXISTING CONDITIONS AND/OR THE REQUIREMENTS OF THE PLANS WILL RESULT IN FINISHED CONDITIONS THAT DO NOT MEET ADA REQUIREMENTS, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER PRIOR TO WORK COMMENCING.
7. ANY DISCREPANCY IN THIS PLAN AND ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE DESIGN ENGINEER PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL SETBACKS, EASEMENTS AND DIMENSIONS SHOWN HEREON PRIOR TO BEGINNING CONSTRUCTION.
8. THE CONTRACTOR SHALL CONTACT ALL OWNERS OF EASEMENTS, UTILITIES AND RIGHT-OF-WAY, PUBLIC OR PRIVATE, PRIOR TO THE START OF CONSTRUCTION.
9. THE CONTRACTOR SHALL COORDINATE WITH ALL OWNERS TO DETERMINE THE LOCATION OF EXISTING LANDSCAPING, IRRIGATION LINES & PRIVATE UTILITY LINES. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING LANDSCAPING, IRRIGATION LINES, AND PRIVATE UTILITY LINES.
10. THE CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE UPON COMPLETION OF THE PROJECT.
11. THE CONTRACTOR SHALL MAINTAIN THE SITE IN A MANNER SO THAT WORKMEN AND PUBLIC SHALL BE PROTECTED FROM INJURY, AND ADJOINING PROPERTY PROTECTED FROM DAMAGE.
12. THE CONTRACTOR SHALL KEEP THE AREA OUTSIDE THE "CONSTRUCTION LIMITS" BROOM CLEAN AT ALL TIMES.
13. THE CONTRACTOR SHALL CALL MISS DIG A MINIMUM OF 72 HOURS PRIOR TO THE START OF CONSTRUCTION.
14. ALL PAVEMENT REPLACEMENT AND OTHER WORKS COVERED BY THESE PLANS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWNSHIP, INCLUDING THE LATEST MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
15. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE TO EXISTING UTILITIES.
16. NO ADDITIONAL COMPENSATION WILL BE PAID TO THE CONTRACTOR FOR ANY DELAY OR INCONVENIENCE DUE TO THE MATERIAL SHORTAGES OR RESPONSIBLE DELAYS DUE TO THE OPERATIONS OF SUCH OTHER PARTIES DOING WORK INDICATED OR SHOWN ON THE PLANS OR IN THE SPECIFICATION OR FOR ANY REASONABLE DELAYS IN CONSTRUCTION DUE TO THE ENCOUNTERING OR EXISTING UTILITIES THAT MAY OR MAY NOT BE SHOWN ON THE PLANS.
17. DURING THE CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL NOT PERFORM WORK BY PRIVATE AGREEMENT WITH PROPERTY OWNERS ADJACENT TO THE PROJECT.
18. IF WORK EXTENDS BEYOND NOVEMBER 15, NO COMPENSATION WILL BE DUE TO THE CONTRACTOR FOR ANY WINTER PROTECTION MEASURES THAT MAY BE REQUIRED BY THE ENGINEER.
19. NO TREES ARE TO BE REMOVED UNTIL MARKED IN THE FIELD BY THE ENGINEER.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE PROPERTY BEYOND THE CONSTRUCTION LIMITS INCLUDING BUT NOT LIMITED TO EXISTING FENCE, LAWN, TREES AND SHRUBBERY.
21. TRAFFIC SHALL BE MAINTAINED DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL SIGNS AND TRAFFIC CONTROL DEVICES. FLAG PERSONS SHALL BE PROVIDED BY THE CONTRACTOR IF DETERMINED NECESSARY BY THE ENGINEER. ALL SIGNS SHALL CONFORM TO THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AT NO COST TO THE TOWNSHIP. NO WORK SHALL BE DONE UNLESS THE APPROPRIATE TRAFFIC CONTROL DEVICES ARE IN PLACE.
22. ALL DEMOLISHED MATERIALS AND SOIL SPOILS SHALL BE REMOVED FROM THE SITE AT NO ADDITIONAL COST, AND DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
23. ANY EXISTING APPURTENANCES SUCH AS MANHOLES, GATE VALVES, ETC. SHALL BE ADJUSTED TO THE PROPOSED GRADE AND SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
24. ALL PERMANENT SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST REVISION OF THE MICHIGAN MUTCD MANUAL AND SHALL BE INCIDENTAL TO THE CONTRACT.
25. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL ITEMS REQUIRED FOR CONSTRUCTION OF THE PROJECT ARE INCLUDED IN THE CONTRACT. ANY ITEMS NOT SPECIFICALLY DESIGNATED IN THE PLANS SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
26. THE CONTRACTOR IS RESPONSIBLE FOR HAVING A SET OF APPROVED CONSTRUCTION PLANS, WITH THE LATEST REVISION DATE, ON SITE PRIOR TO THE START OF CONSTRUCTION. IN THE EVENT OF ANY QUESTIONS PERTAINING TO THE INTENT OF THE CONSTRUCTION PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL CONTACT THE DESIGN ENGINEER FOR A FINAL DETERMINATION FROM THE DESIGN ENGINEER.
27. THE CONTRACTOR, NOT THE OWNER OR THE ENGINEER, ARE RESPONSIBLE FOR THE MEANS, METHODS, AND SEQUENCE OF CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR SAFE EXECUTION OF THE PROJECT SCOPE IN ACCORDANCE WITH THE APPROVED CONSTRUCTION PLANS.
28. THE CONTRACTOR IS RESPONSIBLE FOR PRESERVING CONSTRUCTION STAKING AS NECESSARY. CONTRACTOR TO NOTIFY CONSTRUCTION SURVEYOR OF REPLACEMENT STAKES NEEDED WHICH SHALL BE AT THE CONTRACTORS EXPENSE.
29. THE OWNER AND/OR CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING FRANCHISE UTILITY SERVICES (CABLE, ELECTRIC, GAS, ETC.) OWNER AND/OR CONTRACTOR SHALL WORK WITH UTILITY COMPANIES ON FURNISHING SITE UTILITY LAYOUTS AND PROVIDING CONDUIT CROSSINGS AS REQUIRED.
30. DAMAGE TO ANY EXISTING UTILITIES OR INFRASTRUCTURE (INCLUDING PAVEMENT, CURB, SIDEWALK, ETC.) SHALL PROMPTLY BE REPLACED IN KIND AND SHALL BE AT THE CONTRACTORS EXPENSE.
31. COORDINATION OF TESTING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND PER ALL CITY/TOWNSHIP/COUNTY REQUIREMENTS. COPIES OF ALL TEST REPORTS SHALL BE FURNISHED TO THE DESIGN ENGINEER.
32. PRIOR TO THE START OF CONSTRUCTION, PROTECTION FENCING SHALL BE ERECTED AROUND THE TREE DRILINE OF ANY TREES INDICATED TO BE SAVED WITHIN THE LIMITS OF DISTURBANCE.
33. THE CONTRACTOR SHALL MAINTAIN DRAINAGE OF THE PROJECT AREA AND ADJACENT AREAS, WHERE EXISTING DRAINAGE FACILITIES ARE IMPACTED/DISTURBED DUE TO CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE ANY NECESSARY TEMPORARY DRAINAGE PROVISIONS.
34. SOIL BORING LOGS ARE REPRESENTATIVE OF SPECIFIC POINTS ON THE PROJECT SITE, AND IF PROVIDED TO THE CONTRACTOR ARE FOR INFORMATIONAL PURPOSES ONLY.
35. WHERE CITY/TOWNSHIP STANDARD CONSTRUCTION DETAILS/SPECIFICATIONS ARE PROVIDED AND ARE IN CONFLICT WITH NOTES AND SPECIFICATIONS HEREIN, THE CITY/TOWNSHIP STANDARD SHALL GOVERN.

THE CONTRACTOR SHALL HOLD HARMLESS THE DESIGN PROFESSIONAL, MUNICIPALITY, COUNTY, STATE, AND ALL OF ITS SUB CONSULTANTS, PUBLIC AND PRIVATE UTILITY COMPANIES, AND LANDOWNERS FOR DAMAGES TO INDIVIDUALS AND PROPERTY, REAL OR OTHERWISE, DUE TO THE OPERATIONS OF THE CONTRACTOR AND/OR THEIR SUBCONTRACTORS.

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1. THE CONTRACTOR SHALL HAVE IN PLACE ALL REQUIRED EROSION CONTROL METHODS AS INDICATED ON THE CONSTRUCTION PLANS AND AS REQUIRED BY GENERAL PRACTICE. SPECIFIC MEANS, METHODS AND SEQUENCES OF CONSTRUCTION MAY DICTATE ADDITIONAL SOIL EROSION CONTROL MEASURES BE NEEDED. THE CONTRACTOR SHALL COORDINATE WITH THE DESIGN ENGINEER ON THESE ANTICIPATED METHODS. ADDITIONAL SOIL EROSION CONTROL METHODS SHALL BE INCIDENTAL TO THE SCOPE OF WORK.
2. ACTUAL FIELD CONDITIONS MAY DICTATE ADDITIONAL OR ALTERNATE SOIL EROSION CONTROL MEASURES BE UTILIZED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DEFICIENCIES OR FIELD CONDITIONS THAT WARRANT ADDITIONAL AND/OR ALTERNATIVE SESS MEASURES BE UTILIZED.
3. AT THE CLOSE OF EACH DAY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ALL CONSTRUCTION OPERATIONS, MATERIALS, DEBRIS, ETC ARE CONTAINED ON-SITE.
4. AT THE CLOSE OF EACH WORKING DAY, ALL DRAINAGE STRUCTURES SHALL BE FREE OF DIRT AND DEBRIS AT THE FLOW LINE.
5. ALL SOIL EROSION CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE PER MDOT REGULATIONS AND BEST PRACTICES. ALL SOIL EROSION CONTROL MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR.
6. THE SOIL EROSION CONTROL MEASURES SHALL BE KEPT IN PLACE UNTIL SUCH A TIME THAT THE SITE IS DETERMINED TO BE ESTABLISHED WITH ACCEPTABLE AMOUNT OF VEGETATIVE GROUND COVER.
7. ALL AREAS DISTURBED BY THE CONTRACTOR BEYOND THE NORMAL CONSTRUCTION LIMITS OF THE PROJECT SHALL BE SODED OR SEEDED AS SPECIFIED OR DIRECTED BY THE ENGINEER.
8. AFTER REMOVAL OF TOPSOIL, THE SUBGRADE SHALL BE COMPACTED TO 95% OF ITS UNIT WEIGHT.
9. ALL GRADING IN THE PLANS SHALL BE DONE AS PART OF THIS CONTRACT. ALL DELETERIOUS MATERIAL SHALL BE REMOVED FROM THE SUBGRADE PRIOR TO COMPACTING.
10. ALL ROOTS, STUMPS AND OTHER OBJECTIONABLE MATERIALS SHALL BE REMOVED AND THE HOLE BACKFILLED WITH SUITABLE MATERIAL. WHERE GRADE CORRECTION IS REQUIRED, THE SUBGRADE SHALL BE CUT TO CONFORM TO THE CROSS-SECTION AS SHOWN IN THE PLANS.
11. ALL EXCAVATION UNDER OR WITHIN 3 FEET OF PUBLIC PAVEMENT, EXISTING OR PROPOSED SHALL BE BACKFILLED AND COMPACTED WITH SAND (MOOT CLASS II).

2. ALL PLANT MATERIAL SHALL CONFORM TO THE REQUIREMENTS AND SPECIFICATIONS OF THE GOVERNING MUNICIPALITY. ALL STOCK SHALL BE NURSERY GROWN, CONFORMING TO ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK", AND IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICE. STOCK SHALL EXHIBIT NORMAL GROWTH HABIT AND BE FREE OF DISEASE, INSECTS, EGGS, LARVAE, & DEFECTS SUCH AS KNOTS, SUN-SCALD, INJURIES, ABRASIONS OR DISFIGUREMENT. ALL PLANT MATERIAL SHALL BE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT.
3. ALL PLANT MATERIALS SHALL BE BALLED AND BURLAPPED OR CONTAINER STOCK. NO BARE ROOT STOCK IS PERMITTED. ALL PLANT BALLS SHALL BE FIRM, INTACT, AND SECURELY WRAPPED AND BOUND.
4. ALL PLANT BED MATERIALS SHALL BE EXCAVATED OF ALL BUILDING MATERIALS, OTHER EXTRANEOUS OBJECTS AND POOR SOILS TO A MINIMUM DEPTH OF 12-INCHES AND BACKFILLED TO GRADE WITH SPECIFIED PLANTING MIX (SEE BELOW).
5. PLANTING MIXTURE SHALL CONSIST OF 5 PARTS TOPSOIL FROM ON-SITE (AS APPROVED), 4 PARTS COARSE SAND, 1 PART SPHAGNUM PEAT MOSS (OR APPROVED COMPOST), AND 5 LBS OF SUPERPHOSPHATE FERTILIZER PER CU. YD. OF MIX. INGREDIENTS SHALL BE THOROUGHLY BLENDED FOR UNIFORM CONSISTENCY.
6. ALL PLANT BEDS AND INDIVIDUAL PLANTS, NOT OTHERWISE NOTED SHALL BE MULCHED WITH A 4-INCH LAYER OF SHREDDED BARK MULCH. EDGE OF MULCH BEDS AS SHOWN. DECIDUOUS TREES IN LAWN AREAS SHALL RECEIVE A 5-FIT DIAMETER CIRCLE OF MULCH AND CONIFER TREES 8-FIT (PLANTED CROWN OF TREE) UNLESS OTHERWISE NOTED.
7. LANDSCAPE STONE SHALL BE INSTALLED WHERE NOTED OR INDICATED (HATCHED). STONE SHALL BE 3/4"-1-1/4" WASHED RIVER GRAVEL OR AS SELECTED AND SHALL BE INSTALLED TO A MINIMUM DEPTH OF 3-INCHES.
8. ALL LANDSCAPE BEDS, UNLESS OTHERWISE NOTED SHALL BE INSTALLED OVER WEED BARRIER FABRIC - WATER PERMEABLE FILTRATION FABRIC OF NON-WOVEN POLYPROPYLENE OR POLYESTER FABRIC. FABRIC SHALL BE OF SUITABLE THICKNESS FOR APPLICATION.
9. ALL PLANTS AND PLANT BEDS SHALL BE THOROUGHLY WATERED UPON COMPLETION OF PLANTING AND STAKING OPERATIONS.
10. THE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS FOR A PERIOD OF 1 YEAR FROM THE DATE THE WORK IS ACCEPTED, IN WRITING, BY THE LANDSCAPE ARCHITECT. THE CONTRACTOR SHALL REPLACE, WITHOUT COST TO THE OWNER, WITHIN A SPECIFIED PERIOD OF TIME, ALL DEAD PLANTS, AND ALL PLANTS NOT IN A VIGOROUS, THRIVING CONDITION, AS DETERMINED BY THE LANDSCAPE ARCHITECT, DURING AND AT THE END OF THE GUARANTEE PERIOD. REPLACEMENT STOCK SHALL CONFORM TO THE ORIGINAL SPECIFICATIONS.
11. EDGING SHALL BE PROVIDED FOR ALL LANDSCAPE BEDS NOT ADJACENT TO CONCRETE PAVEMENT. EDGING SHALL BE BLACK ALUMINUM EDGING, 3/16-INCH X 4-INCH. INSTALL PER MANUFACTURER'S INSTRUCTIONS. ALL EDGING SHALL BE INSTALLED IN STRAIGHT LINES OR SMOOTH CURVES WITHOUT IRREGULARITIES.
12. SOD SHALL BE DENSE, WELL ROOTED TURF, FREE OF WEEDS. IT SHALL BE COMPRISED OF A BLEND OF AT LEAST TWO KENTUCKY BLUE GRASSES AND ONE FESCUE. IT SHALL HAVE A UNIFORM THICKNESS OF 3/4-INCH AT TIME OF PLANTING, AND CUT IN UNIFORM STRIPS NOT LESS THAN 10-INCHES BY 18-INCHES. SOD SHALL BE KEPT MOIST AND LAID WITHIN 36-HOURS AFTER CUTTING.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH A DENSE LAWN OF PERMANENT GRASSES, FREE OF LUMPS AND DEPRESSIONS. ALL SODDED AREAS THAT BROWN-OUT OR HAVE NOT FIRMLY KNITTED TO THE SOIL BASE WITHIN A PERIOD OF 1 MONTH SHALL BE REPLACED BY THE CONTRACTOR, AT NO COST TO THE OWNER.

13. ALL AREAS OF THE SITE THAT BECAME DISTURBED DURING CONSTRUCTION AND ARE NOT TO BE PAVED, STONE LANDSCAPED, OR SODDED SHALL BE SEEDED AND MULCHED.

SEED MIXTURE SHALL BE AS FOLLOWS:

KENTUCKY BLUEGRASS (CHOOSE 3 VARIETIES -	
ADELPHI, RUGBY, GLADE, OR PARADE)	30%
RUBY RED OR DAWSON RED FINE FESCUE	30%
ATLANTA RED FESCUE	20%
PENNFINE PERENNIAL RYE	20%

1. BEDDING SHALL EXTEND A MINIMUM OF 4" BELOW THE PIPE, UNLESS OTHERWISE NOTED ON THE PLANS. BEDDING SHALL BE OF UNIFORM GRADATION MDOT 6AA STONE OR MDOT CLASS II GRANULAR MATERIAL FOR SANITARY AND STORM PIPE AND MDOT CLASS II GRANULAR MATERIAL ONLY FOR WATERMAIN.
2. WHERE UNSTABLE GROUND CONDITIONS ARE ENCOUNTERED, STONE BEDDING SHALL BE USED AS DIRECTED BY THE ENGINEER.
3. BACKFILL SHALL BE OF A SUITABLE MATERIAL AND SHALL BE FREE OF ANY ORGANIC MATERIALS AND ROCKS.
4. BACFILL ABOVE THE PIPE SHALL BE OF GRANULAR MATERIAL MDOT CLASS II TO A POINT 12" ABOVE THE TOP OF THE PIPE. WHERE THE TRENCH IS NOT WITHIN THE INFLUENCE OF THE ROAD, SUITABLE SITE MATERIAL MAY BE COMPACTED AND UTILIZED FROM A POINT 12" ABOVE THE PIPE TO GRADE. WHERE THE TRENCH IS WITHIN A 1:1 INFLUENCE OF THE ROAD, GRANULAR MATERIAL, MDOT CLASS II OR III, IS TO BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 12" IN THICKNESS. COMPACTION SHALL BE 95% AS DETERMINED BY MSHTO T99.
5. 18" MINIMUM VERTICAL SEPARATION AND 10' HORIZONTAL SEPARATION IS TO BE MAINTAINED BETWEEN WATERMAIN AND SANITARY/STORM SEWER TO THE MAXIMUM EXTENT POSSIBLE.

1. ALL STORM PIPE LENGTHS ARE SHOWN FROM C/L TO C/L OF STRUCTURE OR FROM C/L OF STRUCTURE TO DISCHARGE END OF FLARED END SECTION.
2. STORM PIPE MATERIALS SHALL BE AS FOLLOWS:
 - 2.1. RCP(REINFORCED CONCRETE PIPE): SHALL MEET THE REQUIREMENTS OF ASTM C76 WITH MODIFIED GROOVED TONGUE AND RUBBER GASKETS MEETING THE REQUIREMENTS OF ASTM C443. RCP TO BE EITHER CLASS IV OR V AS CALLED OUT ON THE PLANS.
 - 2.2. HDPE(HIGH DENSITY POLYETHYLENE): SHALL MEET THE REQUIREMENTS OF ASTM F2648.
 - 2.3. PP(POLYPROPYLENE): SHALL MEET THE REQUIREMENTS OF ASTM F2881.
 - 2.4. PVC(POLYVINYL CHLORIDE): SHALL MEET THE REQUIREMENTS OF ASTM D3034.
3. STORM PIPE JOINTS SHALL MEET THE REQUIREMENTS OF ASTM D3212. HDPE AND PP PIPE GASKETS SHALL MEET THE REQUIREMENTS OF ASTM F477.
4. ALL STORM PIPE TO HAVE WATERTIGHT PREMIUM JOINTS, UNLESS OTHERWISE NOTED ON THE PLANS.
5. STORM DRAINAGE STRUCTURES SHALL BE FURNISHED WITH STEPS WHICH SHALL BE STEEL ENCASED WITH POLYPROPYLENE PLASTIC OR EQUIVALENT. STEPS SHALL BE SET AT 16" CENTER TO CENTER.
6. ALL FLARED END SECTIONS 15" AND LARGER SHALL BE FURNISHED WITH AN ANIMAL GRATE.
7. FLARED END SECTIONS DISCHARGING STORM WATER SHALL RECEIVE A MINIMUM OF 10 SQ YDS OF PLAIN COBBLESTONE RIP RAP WITH A MINIMUM STONE SIZE OF 6" AND SHALL BE PLACED ON A GEOTEXTILE FABRIC WRAP.
8. ALL CATCH BASINS WITHIN THE ROADWAY SHALL INCLUDE INSTALLATION OF 6" DIAMETER PERFORATED PIPE SUBDRAIN.
9. STORM DRAINAGE STRUCTURE COVERS SHALL BE OF THE FOLLOWING (OR APPROVED EQUIV):

COVER	USE	FRAME	GRATE/BACK
'A'	MANHOLE	1040	TYPE 'B'
'B'	TYPE B2 CURB	7085	TYPE 'M1'
'C'	VALLEY CURB	7065	7045 TYPE 'M1' GRATE/7060 TYPE 'T1' BACK
'D'	PARKING LOTS	1040/5100	TYPE 'M1' GRATE OR 5105 TYPE 'M1' GRATE
'E'	LAWN	1040	TYPE 'O2' GRATE
'K'	TYPE C & F CURB	7045	TYPE 'M1' GRATE/7050 TYPE 'T1' BACK
10. THE PROPOSED DRAINAGE SYSTEM IS TO BE OWNED AND PROPERLY MAINTAINED BY THE PROPERTY OWNER (LIVINGSTON COUNTY ONLY)

1. ALL SANITARY PIPE LENGTHS ARE SHOWN FROM C/L OF STRUCTURE TO C/L OF STRUCTURE.
2. SANITARY PIPE MATERIALS SHALL BE AS FOLLOWS:
 - 2.1. PVC SDR-26 (SANITARY MAIN)
 - 2.2. PVC SDR-23.5 (SANITARY LEADS)
 - 2.3. HDPE DR-11 (SANITARY FORCEMAIN)
3. ALL PVC SDR SANITARY SEWER PIPE SHALL MEET THE REQUIREMENTS OF ASTM D3034 AND D2241. PVC SCHD 40 PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785. GASKET JOINTS FOR SANITARY PIPE SHALL MEET THE REQUIREMENTS OF ASTM D3139 AND D3212.
4. SANITARY STRUCTURES SHALL BE FURNISHED WITH STEPS WHICH SHALL BE STEEL ENCASED WITH POLYPROPYLENE PLASTIC OR EQUIVALENT. STEPS SHALL BE SET AT 16" CENTER TO CENTER.
5. ALL NEW MANHOLES SHALL BE MINIMUM 4' DIAMETER, PRECAST MANHOLE SECTIONS AND AN ECCENTRIC CONE. PRECAST MANHOLE JOINTS SHALL BE INSTALLED WITH BUTYL ROPE MEETING THE REQUIREMENTS OF ASTM C990.
6. MANHOLES SHALL BE CONSTRUCTED WITH FLOW CHANNEL WALLS THAT ARE FORMER, AT A MINIMUM, TO THE SPRINGLINE OF THE PIPE.
7. ALL NEW MANHOLES SHALL HAVE AN APPROVED FLEXIBLE, WATERTIGHT SEALS WHERE PIPES PASS THROUGH MANHOLE WALLS.
8. WHEREVER AN EXISTING MANHOLE IS TO BE TAPPED, THE STRUCTURE SHALL BE CORED AND A KOR-N-SEAL BOOT UTILIZED FOR THE PIPE CONNECTION.
9. ALL MANHOLES SHALL BE PROVIDED WITH WATERTIGHT COVERS. COVERS TO BE EJCO 1040 TYPE 'A' SOLID COVER.
10. A MAXIMUM OF 12" OF GRADE ADJUSTMENT RINGS SHALL BE USED TO ADJUST THE FRAME ELEVATION. BUTYL ROPE SHALL BE USED BETWEEN EACH ADJUSTMENT RING.
11. SANITARY SEWER LATERALS SHALL HAVE A MINIMUM SLOPE OF 1.0%.
12. CLEANOUTS SHALL BE INSTALLED EVERY 100', AT ALL BENDS AND STUBS.
13. PUBLIC SANITARY SEWER SHALL BE CENTERED WITHIN A 20 FOOT WIDE SANITARY SEWER EASEMENT.

1. WATERMAIN PIPE MATERIALS SHALL BE AS FOLLOWS:
 - 1.1. D.I.P., CL.52 (WATERMAIN)
 - 1.2. TYPE 'K' COPPER (WATER LATERAL - MAIN TO CURB STOP)
 - 1.3. HDPE DR-9 (WATER LATERAL - CURB STOP TO STUB)
2. WATERMAIN FITTINGS SHALL BE OF DUCTILE IRON WITH CEMENT MORTAR LINING AND MECHANICAL JOINTS CONFORMING TO AWWA C110.
3. WATERMAINS SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C651. BAC-T SAMPLES SHALL BE TAKEN IN ACCORDANCE WITH R235.11110 OF THE ADMINISTRATIVE RULES PROMULGATED UNDER MICHIGAN SAFE DRINKING WATER ACT, 1976 PA 399, AS AMENDED.
4. ALLOWABLE LEAKAGE OR HYDROSTATIC PRESSURE TESTING SHALL BE IN ACCORDANCE WITH AWWA C600 AND C605.
5. MAXIMUM DEFLECTION AT PIPE JOINTS SHALL BE IN ACCORDANCE WITH PIPE MANUFACTURERS CURRENT RECOMMENDATIONS AND AWWA SPECIFICATIONS.
6. A FULL STICK OF PIPE SHALL BE LAID CENTERED AT A PIPE CROSSING IN ORDER TO MAINTAIN THE MAXIMUM SEPARATION OF WATERMAIN JOINT TO THE CROSSING PIPE.
7. WATERMAIN SHALL BE INSTALLED WITH A MINIMUM OF 5.5' OF COVER FROM FINISHED GRADE TO TOP OF PIPE AND NO MORE THAN 8' OF COVER, UNLESS SPECIAL CONDITIONS WARRANT.
8. WATERMAIN VALVES SHALL BE IRON BODY RESILIENT WEDGE GATE VALVES, NON-RISING STEMS, COUNTERCLOCKWISE OPEN, AWWA C509.
9. FIRE HYDRANTS SHALL BE INSTALLED WITH AN AUXILIARY VALVE WITH CAST IRON VALVE BOX. THE HYDRANT PUMPER HOSE CONNECTION SHALL FACE THE ROADWAY.
10. THE BREAKAWAY FLANGE AND ALL BELOW GRADE FITTINGS SHALL HAVE STAINLESS STEEL NUTS AND BOLTS.
11. PUBLIC WATERMAIN SHALL BE CENTERED WITHIN A 25 FOOT WIDE WATERMAIN EASEMENT.

<u>PROPOSED</u> (PR)	<u>EXISTING</u>	(EX)	
			CONTOUR
			SPOT ELEVATION

<u>PROPOSED</u> (PR)	<u>EXISTING</u> (EX)	
		DOUBLE FIXTURE LIGHT POLE
		SINGLE FIXTURE LIGHT FIXTURE
		WALL MOUNTED LIGHT FIXTURE
		GROUND LIGHT FIXTURE
		FOOT CANDLES ON SITE
		FOOT CANDLES OFF SITE
		FOOT CANDLES CONTOURS
		CANOPY MOUNTED LIGHT FIXTURE

EXISTING CONIFER TREE

EXISTING DECIDUOUS TREE

PROPOSED CONIFER TREE

PROPOSED DECIDUOUS TREE

PROPOSED TREE PROTECTION

PROPOSED ORNAMENTAL TREE

PROPOSED DECIDUOUS SHRUBS

SOD

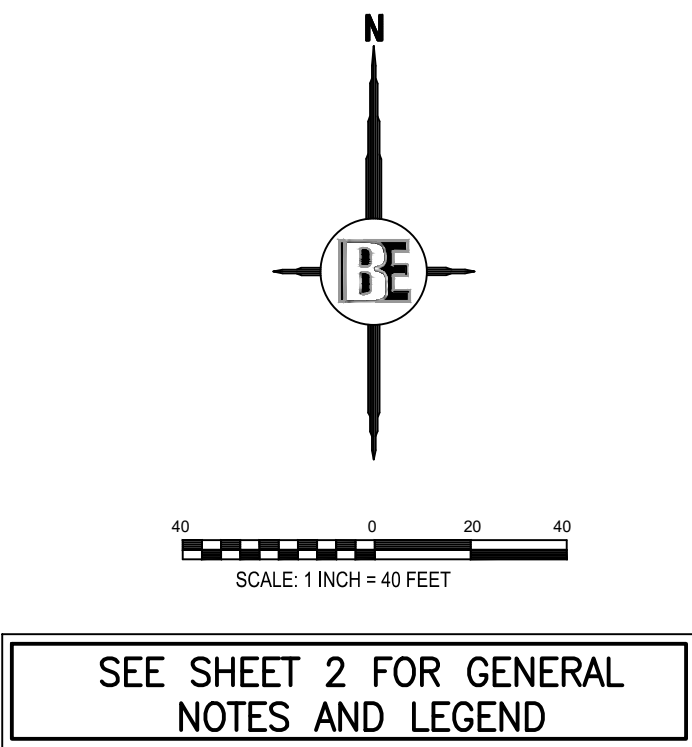
SEED

PROPOSED GRASSES & PERENNIALS

PROPOSED LANDSCAPE BOLLIDER

	STORM DRAINAGE FLOW
	GUY WIRE
	POWER POLE
	TRANSFORMER PAD
	ELECTRICAL RISER
	U.G. ELECTRIC MARKER
	ELECTRICAL METER
	AIR CONDITIONING UNIT
	TELEPHONE RISER
	U.G. TELEPHONE MARKER
	GAS RISER
	U.G. GAS MARKER
	GAS METER
	CABLE TV RISER
	U.G. CABLE TV MARKER
	MAILBOX
	WELL
	WATER MANHOLE
	GATE VALVE (EXISTING)
	GATE VALVE (PROPOSED)
	HYDRANT (EXISTING)
	HYDRANT (PROPOSED)
	CATCH BASIN (EXISTING)
	YARD CATCH BASIN (EXISTING)
	CATCH BASIN (PROPOSED)
	STORM MANHOLE (EXISTING)
	STORM MANHOLE (PROPOSED)
	END SECTION (EXISTING)
	END SECTION (PROPOSED)
	SANITARY MANHOLE (EXISTING)
	SANITARY MANHOLE (PROPOSED)
	PUMP CHAMBER
	TRAFFIC SIGN
	SIGN (EXISTING)
	SIGN (PROPOSED)
	SOIL BORING
	STEEL ROD SET
	STEEL ROD OR PIPE FOUND
	WOOD LATH SET
	HUB SET
	MONUMENT FOUND
	SECTION CORNER
	GAS PUMP
	ANTENNA
	SATELLITE DISH
	NEWSPAPER BOX
	PARKING METER
	PHONE BOOTH
	HANDICAP SYMBOL
	BENCHMARK
	LIGHT POLE

FFE	FINISHED FLOOR ELEVATION
BFE	BASMENT FLOOR ELEVATION
GF	GARAGE FLOOR ELEVATION
FG	FINISHED GRADE
T/A	TOP OF ASPHALT
T/C	TOP OF CURB
T/CO	TOP OF CONCRETE
T/W	TOP OF WALK
T/P	TOP OF PIPE
B/P	BOTTOM OF PIPE
R/L	FLOW LINE
F/M	RIM ELEVATION (AT FLOW LINE)
INV	INVERT
MH	MANHOLE
CB	CATCH BASIN
RY	REAR YARD
YD	YARD DRAIN
RD	ROOF DRAIN
FFS	FLARED END SECTION
CP	COMPACTED METAL PIPE
CPE	CORRUGATED PLASTIC PIPE
RC	REINFORCED CONCRETE PIPE
HDPE	HIGH DENSITY POLYETHYLENE
WY	WYPIPE
DI	DUCTILE IRON PIPE
GP	GRADE VALVE
GW	GATE VALVE IN WELL
GVB	GATE VALVE IN BOX
HYD	HYDRANT
DOC	DRAINAGE DEPARTMENT CONNECTION
UP	UTILITY POLE
NFV	NOT FIELD VERIFIED
NR	NOT TO BE REMOVED
L	LINE
P	PAGE
L.C.R.	LIVINGSTON COUNTY RECORDS
(M&R)	MAINTAINED AND RECORD
L.O.B.	LOT OF BEGINNING



OVERALL: THIS SITE HAS ITS EXISTING DEVELOPMENT CONCENTRATED IN THE NORTHERN HALF OF THE LOT WHILE THE SOUTHERN HALF IS WOODED AND RELATIVELY UNDEVELOPED. HOWEVER, A CONCENTRATION OF INVASIVE PLANTS, CULTIVATED HORTICULTURAL TRADE PLANTS, AND THE REMAINS OF AN ASPHALT PATH SUGGESTS A MORE DEVELOPED USE PREVIOUSLY. GOOGLE EARTH IMAGERY FROM 1992 DEMONSTRATES A MUCH MORE OPEN TYPOLOGY WHERE A PATH LEADING TO THE SOUTHWEST CORNER OF THE SITE IS VISIBLE. ALL DEMONSTRATING THE SOUTHERN END OF THE SITE'S CANOPY IS A DEVELOPMENT OF THE PAST 30 YEARS.

AREA A:
EXISTING BASIN IS FILLED WITH PURPLE LOOSESTRIPE, AUTUMN OLIVE, AND PHRAGMITES. THERE IS A MINOR AMOUNT OF (AVG. 8"DBH) EASTERN COTTONWOOD.

AREA B:
UNMAINTAINED PREVIOUS LAWN AREA, NOW PRIMARILY HERBACEOUS WEEDS INCLUDING BIRDFOOT TREFOIL, VARIOUS WEEDY GRASS SPECIES.

AREA C:
EXISTING SWALE WITH EQUAL PARTS PURPLE LOOSESTRIPE, CANADA GOLDENROD, AND GRASS-LEAVED GOLDENROD. A FEW SHRUB-SIZED CRABAPPLES HAVE ALSO SEEDING INTO THE EDGE OF THE SWALE.

AREA D:
LESS UNDERSTORY SHRUBS RELATIVE TO THE REST OF THE WOODED AREA, MORE UNDERSTORY HERBACEOUS MATERIAL INCLUDING
AVENS, SEDGES, AND MOSS SPECIES. OVERSTORY CONSISTS PRIMARILY OF BOXELDER TREES (AVG. 5" DBH).

AREA E:
A SIGNIFICANT SWALE AND BASIN SLOPES HERE INTO THE SOUTHWESTERN CORNER OF THE PROPERTY. CHAIN-LINK FENCING ORIGINALLY ENCLOSED IT FROM THE NORTHERN END OF THE PROPERTY, PORTIONS HAVE COLLAPSED. CANOPY OPENS UP SIGNIFICANTLY IN WETTEST PORTION OF THE BASIN, BUT IT IS SURROUNDED BY AMERICAN ELM (5" DBH) AND EASTERN COTTONWOOD (8+ DBH). PURPLE LOOSESTRIPE, CATTAIL MAKE UP THE MAJORITY OF THE VEGETATION WITHIN THE BASIN.

MULTIPLE INVASIVE SPECIES FILL THE UNDERSTORY INCLUDING HONEYSUCKLE, MULTIFLORA ROSE, AND AUTUMN OLIVE. NATIVE FLORA IN THE UNDERSTORY INCLUDES WILD GRAPE SPECIES AND A THICKET OF GROUNDNUT. POISON IVY AND VIRGINIA CREEPER ARE PRESENT THROUGHOUT, BUT NOTABLY ENGLISH IVY FILLS A SIGNIFICANT PORTION OF THE GROUND AND CLIMBS UP TREES. EXISTING ASPHALT PATHS WERE FOUND BURIED BENEATH A LAYER OF SEDUM, MAP IMAGERY SUGGESTS THERE WAS ONCE A U-SHAPED PATH TO ACCESS THE BASIN DESCRIBED IN AREA E. THERE IS A LARGE (ROUGHLY 20' TALL) YEW, AND A EAST-WEST ROW OF ROUGHLY 5' INDIVIDUAL (AVG. 6" DBH) NORWAY SPRUCE.

THIS PART OF THE PROPERTY ADJUTS THE NEIGHBORING SPEEDWAY WHICH HAS ITS OWN BASIN LOCATED NEARBY WITH NOTABLE NATIVE SPECIES SUCH AS ECHINACEA, CONEFLOWER, AND BIG BLUE STEM PRESENT, SLIGHTLY SEEDING INTO THE PROPERTY LINE. A LINE OF CONIFERS ON THE SPEEDWAY PROPERTY ACTS TO SCREEN THEIR BASIN FROM THE PROPERTY.

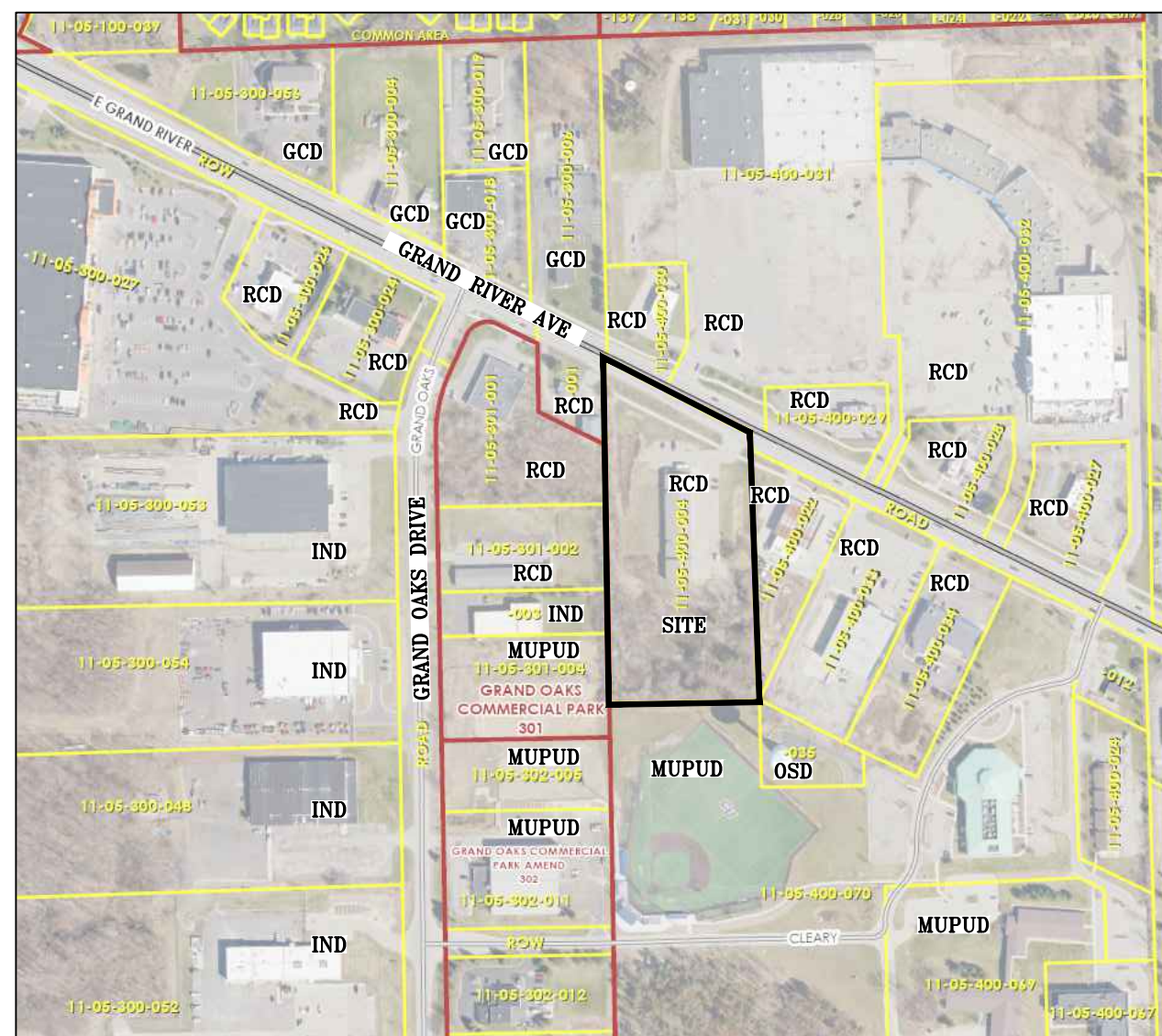
AREA G:
A LINE OF HICKORY SPECIES (AVERAGE ROUGHLY 8" DBH) LINE THE BORDER BETWEEN THE PROPERTY AND THE LAKE TRUST STADIUM ALONG A CHAIN-LINK FENCE. THEY THIN OUT APPROACHING THE WEST END OF THE SITE AND THE TOPOGRAPHY TRANSITIONS FROM UPLAND TO WETTER CONDITIONS.

NRCS EXISTING SOILS DATA:

CvraaB	CONOVER LOAM, 0-4% SLOPES
MoB	MIAMI LOAM, 2-6% SLOPES
MoD	MIAMI LOAM, 12-18% SLOPES

BEBOSS *Engineering*
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

PROJECT:	3600 E. GRAND RIVER REDEVELOPMENT									
PREPARED FOR:	KN WEST, LLC 29900 TELEGRAPH ROAD, SUITE 550 SOUTHFIELD, MI 48033 248-755-7727									
DESIGNED BY:	TC									
DRAWN BY:	TC									
CHECKED BY:	PC									
SCALE:	1" = 40'									
JOB NO:	24-075									
DATE:	2/18/25									
SHEET NO.	3									
TITLE		NATURAL FEATURES PLAN								
1	ST	PER	TOWNSHIP	COMMENTS	3/24/25					
NO	BY	REVISION	PER	DATE						



SURROUNDING AREAS MAP
NO SCALE

REGIONAL COMMERCIAL DISTRICT (RCD)

#4711-05-400-029
"ARBY'S"
3639 E GRAND RIVER
CHEW LAND MANAGEMENT LLC
3253 OWEN RD
FENTON, MI 48430-1755

BOSS SURVEY
JOB #22-262
(2-13-24)

APPROXIMATE LOCATION OF 8" GAS
MAIN AS MARKED IN FIELD AND AS
DEPICTED ON CONSUMERS ENERGY
QUARTER SECTION MAP #02-55-05-3

REGIONAL COMMERCIAL DISTRICT (RCD)

#4711-05-400-030
"MATTRESS FIRM"
3625 E GRAND RIVER
FATECH REAL ESTATE LLC
45832 BAYWOOD BLVD
CANTON, MI 48187

BEESHIVE CB SS
Manhole IR 2X4
Fiber Optic AS
MARKED IN FIELD

FD Steel Rod ILLEGIBLE
on Section Line

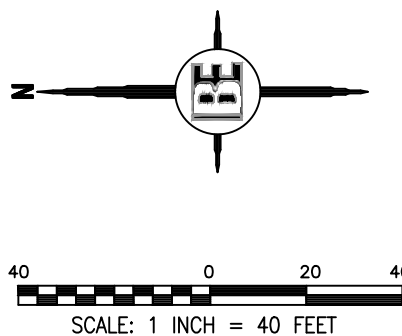
HOUSE
#3560
995.09 FFE

APPROXIMATE SANITARY LEAD AS
DEPICTED ON MCNAMEE, PORTER &
SEELEY LATERAL LOCATION SHEET,
CONTRACT NO. 88-S-3 DIV.,
INSTALLATION DATE OF 3/19/90.

REGIONAL COMMERCIAL DISTRICT (RCD)

#4711-05-301-001

CURRENT ZONING: RCD (REGIONAL COMMERCIAL DISTRICT)
MINIMUM SETBACK REQUIREMENTS:
FRONT = 70 FEET; 35 FEET IF NOT PARKING IN FRONT YARD
SIDES = 20 FEET
REAR = 50 FEET
MAXIMUM LOT COVERAGE = 35% BUILDING; 75% IMPERVIOUS SURFACE



DESCRIPTION OF PROPERTY PER BOSS ENGINEERING SURVEY, JOB NO. 87490, DATED 12-3-87, AS RECORDED IN LIBER 1268, PAGE 194, LIVINGSTON COUNTY RECORDS:

Part of the SE 1/4 of Section 5, T2N-R5E, Genoa Township, Livingston County, Michigan, described as:
Commencing at the South 1/4 Corner of said Section 5; thence N 02°00'53" W, along the North-South 1/4 line of Section 5 and the East line of "Grand Oaks Commercial Park", a subdivision as recorded in Liber 21 of Plats, Pages 45-47, Livingston County Records, 1094.51 feet; thence S 86°49'03" E, 2.26 feet to the Point of Beginning of the parcel to be described; thence N 01°54'58" W, 830.76 feet (recorded as 831.50 feet) to the centerline of Grand River Avenue (100 feet wide); thence S 64°49'53" E along said centerline, 391.00 feet; thence S 02°09'41" E, 646.65 feet (recorded as 631.00 feet); thence S 87°05'24" W, 351.00 feet to the Point of Beginning, containing 5.92 acres, more or less and subject to the rights of the public over existing Grand River Avenue.

(DESCRIPTION DOES NOT FORM A MATHEMATICAL CLOSURE BY 0.05" IN AN EAST-WEST DIRECTION)

GENERAL SURVEY NOTES:

1. BEARINGS ARE BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE.
2. SUBSURFACE UTILITIES NOT LOCATED FOR THIS SURVEY MAY EXIST. IT IS THE RESPONSIBILITY OF THE OWNER OF THE RESPECTIVE UTILITY TO ACCURATELY LOCATE SUCH UTILITIES.
3. EASEMENTS OR RESTRICTIONS OF RECORD NOT DEPICTED ON THIS DRAWING MAY EXIST.
4. ELEVATIONS WERE ESTABLISHED WITH GPS USING OPUS GPS POST-PROCESSING, (NAVD83 DATUM).
5. CONTOURS ARE SHOWN AT 1 FOOT INTERVALS.
6. THE LOCATIONS OF STORM SEWER, SANITARY SEWER & WATERMAIN, AS SHOWN ON THIS DRAWING ARE APPROXIMATE. THE LOCATIONS ARE BASED ON PHYSICAL FIELD LOCATIONS OF STRUCTURES ALONG WITH RECORD DRAWINGS AND MISS DIG MARKINGS.

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HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

PROJECT 3600 E. GRAND RIVER REDEVELOPMENT

PREPARED FOR KN WEST, LLC

25900 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
248.755.7727

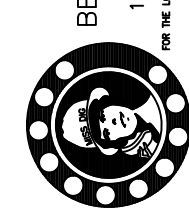
TITLE EXISTING CONDITIONS & DEMOLITION PLAN

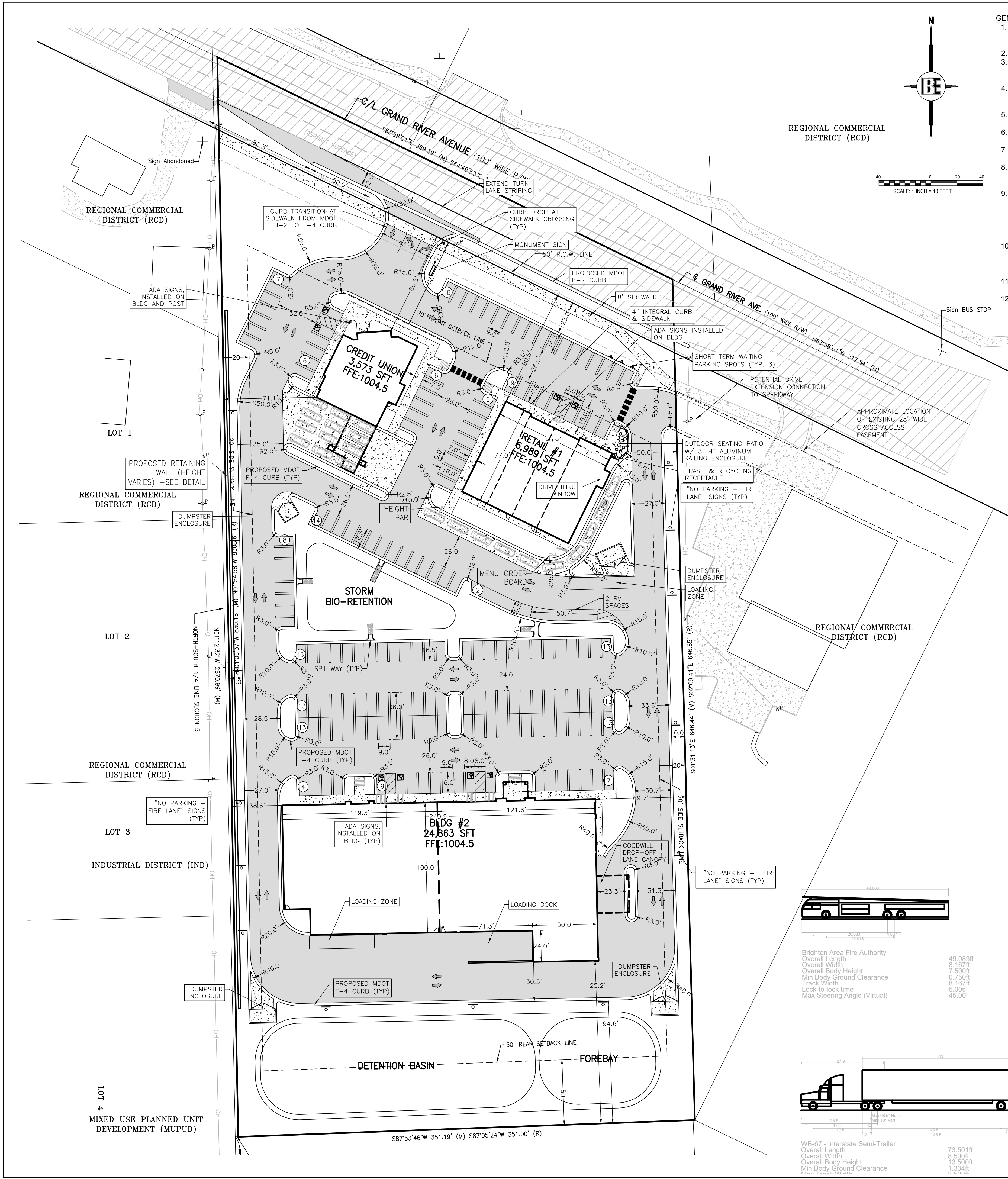
NO	BY	PER	TOWNSHIP	COMMENTS	REVISION	DATE
1	ST	RR/PB			3-24-25	
2	ST	RR/PB			3-24-25	
3	ST	RR/PB			3-24-25	
4	ST	RR/PB			3-24-25	
5	ST	RR/PB			3-24-25	
6	ST	RR/PB			3-24-25	
7	ST	RR/PB			3-24-25	
8	ST	RR/PB			3-24-25	
9	ST	RR/PB			3-24-25	
10	ST	RR/PB			3-24-25	

DRAWN BY: AEB
FIELD CREW: RR/PB
CHECKED BY:
SCALE: 1" = 40'
JOB NO: 24-075
DATE: 2/18/25
SHEET NO: 4



THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS MADE BY THE ENGINEER AS TO THE ACCURACY OF THE LOCATION OR ELEVATION OF EXISTING UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND ELEVATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY CONFLICTS OR DISCREPANCIES IN THE LOCATION OR DEPTH OF UTILITIES SHOWN ON THE PLANS.



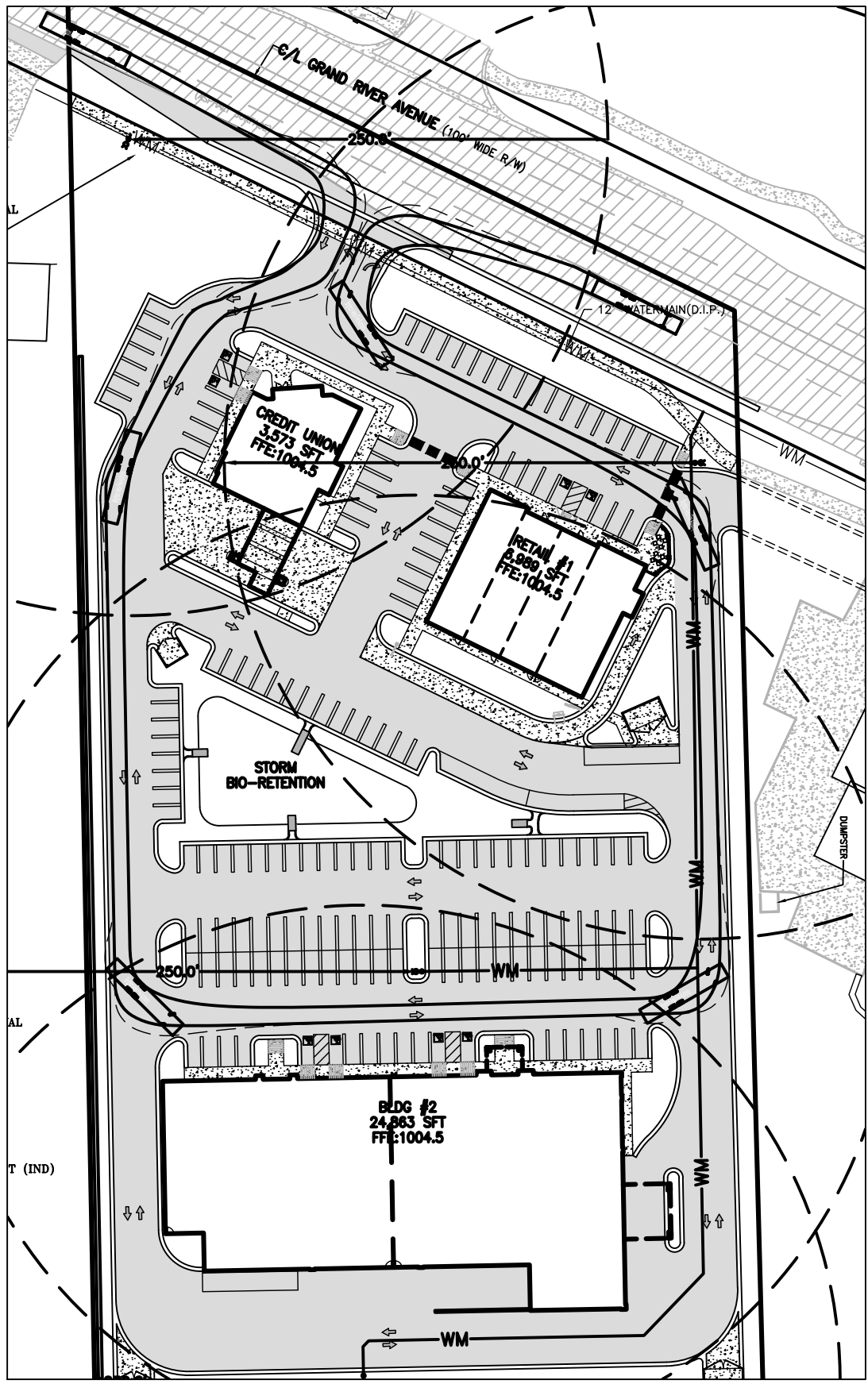


- GENERAL NOTES**
1. ALL OUTDOOR LIGHTS SHALL BE SHIELDED TO REDUCE GLARE AND SHALL BE ARRANGED TO NOT INTERFERE WITH THE VISION OF PERSONS ON ADJACENT ROADWAYS OR ADJACENT PROPERTY.
 2. ALL SIGNS SHALL MEET LOCAL MUNICIPALITY ORDINANCE REQUIREMENTS.
 3. THE BUILDING ADDRESS SHALL BE A MINIMUM 6" HIGH LETTERS OF CONTRASTING COLORS AND BE CLEARLY VISIBLE FROM THE STREET. THE LOCATION AND SIZE SHALL BE VERIFIED PRIOR TO INSTALLATION.
 4. A KEY BOX/KNOX BOX SHALL BE LOCATED NEAR THE FRONT ENTRY AT EACH TENANT SPACE (FINAL LOCATION TO BE DETERMINED BETWEEN THE OWNER & FIRE MARSHALL).
 5. ONE SIDE OF THE STREET SHALL BE MARKED AS A FIRE LANE AND SHALL HAVE APPROPRIATE SIGNAGE.
 6. ACCESS ROADS TO THE SITE SHALL BE PROVIDED AND MAINTAINED DURING CONSTRUCTION.
 7. ACCESS ROADS SHALL BE CONSTRUCTED TO BE CAPABLE OF SUPPORTING THE IMPOSED LOAD OF FIRE APPARATUS WEIGHING AT LEAST 84,000 LBS.
 8. A MINIMUM VERTICAL CLEARANCE OF 13.5 FEET SHALL BE MAINTAINED THROUGHOUT THE SITE. THIS INCLUDES ENCROACHMENTS FROM LARGE TREE CANOPIES, LIGHTING, ETC.
 9. DURING THE CONSTRUCTION PROCESS, THE BUILDING WILL BE EVALUATED FOR EMERGENCY RESPONDER RADIO SIGNAL STRENGTH. IF COVERAGE IS FOUND TO BE QUESTIONABLE OR INADEQUATE; AN APPROVED CONTRACTOR SHALL BE HIRED TO PERFORM A GRID TEST OF THE FACILITY. IF THE SIGNAL STRENGTH COVERAGE IS FOUND TO BE NON-COMPLIANT, AN APPROVED EMERGENCY RESPONDER RADIO COVERAGE SYSTEM SHALL BE PROVIDED IN THE BUILDING.
 10. SITE LIGHTING SHALL BE PLACED ON TIMERS TO BE OFF DURING NON-USE HOURS TO THE EXTENT POSSIBLE WHILE MAINTAINING SITE SAFETY. SITE LIGHTING SHALL BE PROGRAMMED TO TURN OFF AT NIGHT WHEN ACTIVITIES ARE NO LONGER OCCURRING ON THE PROPERTY.
 11. DELIVERIES SHALL BE ARRANGED FOR OFF PEAK HOURS TO AVOID POTENTIAL VEHICULAR CONFLICTS.
 12. ANTICIPATED HOURS OF OPERATION OF THE DRIVE-THRU USE ARE 8AM-10PM. NO OUTDOOR SPEAKERS ARE PROPOSED OTHER THAN THAT REQUIRED FOR THE DRIVE-THRU WINDOW ORDERING EQUIPMENT.

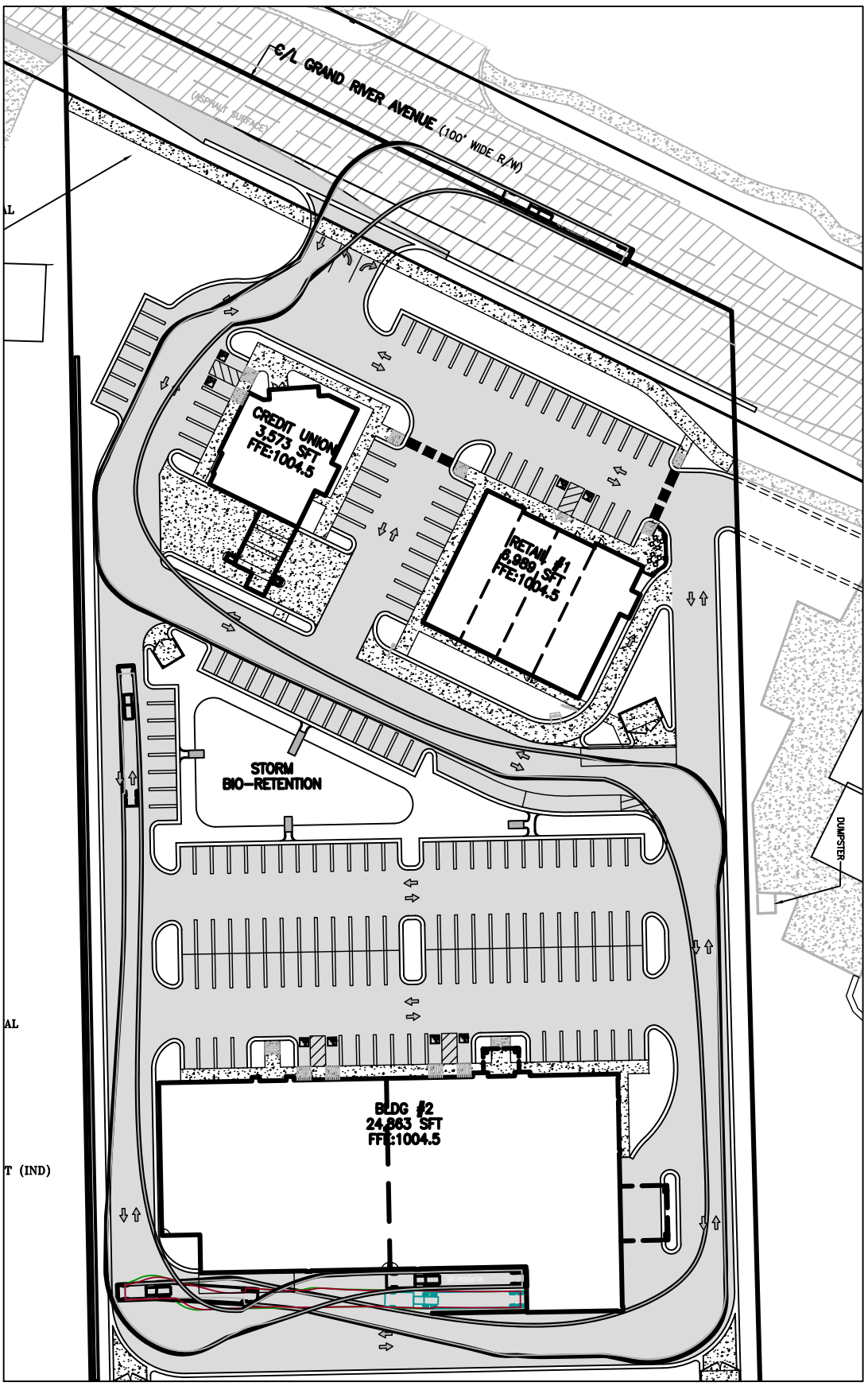
VARIANCES REQUIRED:	
1) DRIVE-THRU SEPARATION TO ANOTHER DRIVE-THRU	
* TOTAL PROPOSED GROSS SQUARE FOOTAGE:	
-DRIVE-THROUGH	2,167 GSF
-GENERAL RETAIL	3,164 GSF
-SIT DOWN RESTAURANT (NO LIQUOR LICENSE)	1,658 GSF
-CREDIT UNION	3,573 GSF
-BLDG #2 (FURNITURE)	11,531 GSF
-BLDG #2 (RETAIL)	13,332 GSF

SITE DATA	
PARCEL # 4711-05-400-004 (5.92 AC)	
HOWELL, MI	
GENOA TOWNSHIP	
ZONING: REGIONAL COMMERCIAL DISTRICT (RCD)	
REGIONAL COMMERCIAL DISTRICT	
- MIN. LOT AREA: 2 ACRE	
- MIN. LOT WIDTH: 200 FT	
- BUILDING SETBACK:(FOR PROPOSED BUILDING)	
REQUIRED	PROVIDED
FRONT: 20 FT	80.5 FT
SIDE: 20 FT	38.6 FT
REAR: 50 FT	125.2 FT
-PARKING SETBACK:	PROVIDED
FRONT: 20 FT	25.0 FT
SIDE: 10 FT	10.0 FT
REAR: 10 FT	112.8 FT
-MAX LOT COVERAGE:	PROVIDED
PARCEL AREA:	238,390 SFT (5.47 AC)
BUILDING: 35%	35,425 SFT (14.9%)
IMPERVIOUS: 75%	162,840 SFT (68.3%)*
*INCLUDES FUTURE BUILDOUT AREA	
-MAX BUILDING HEIGHT: 45 FT (3 STORIES)	29 FT

PARKING CALCULATIONS:	
-BLDG #1 FAST FOOD DRIVE THRU: 1 SPACE PER 70 SQFT GROSS LEASABLE FLOOR AREA (85% OF GROSS FLOOR AREA)	
2,167 / 85% = 1842 SFT / 70 = 27 SPACES + 10 STACKING SPACES + 2 RV SPACES + 3 SHORT TERM WAITING SPACES	
-BLDG #1 SIT DOWN RESTAURANT WITHOUT LIQUOR LICENSE = 1 SPACE/100 SFT GFA	
1,658 SFT / 100 SFT = 17 SPACES	
-BLDG #1 RETAIL = 1 SPACE /250 SFT GFA	
3,164 SFT / 250 SFT = 13 SPACES	
-CREDIT UNION = 1 SPACE / 200 SFT GFA	
3,573 SFT / 200 SFT = 18 SPACES	
-BLDG #2(FURNITURE) = 1 SPACE / 700 SFT	
11,531 SFT / 700 SFT = 16.5 ~ 17 SPACES	
-BLDG #2(RETAIL) = 1 SPACE / 250 SFT	
13,332 SFT / 250 SFT = 54 SPACES	
-OUTDOOR SEATING	
10 SEATS / 2 SEATS = 5 SPACES	
REQUIRED: 27 + 17 + 13 + 17 + 18 + 54 + 5 = 151 SPACES	
PROVIDED: 172 SPACES + 3 SHORT TERM SPACES + 2 RV SPACES	
LOADING/UNLOADING SPACES: 10' x 50'	
REQUIRED: 5,001 GFA TO 20,000 GFA REQUIRES 2 SPACES	
PROVIDED: 2 LOADING/UNLOADING SPACES	



FIRE TRUCK CIRCULATION PLAN
(1"=80')



SEMI TRUCK (WB-67)CIRCULATION PLAN
(1"=80')

SEE SHEET 2 FOR GENERAL NOTES AND LEGEND

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PROJECT 3600 E. GRAND RIVER REDEVELOPMENT
PREPARED FOR KN WEST, LLC
2900 TELEGRAPH ROAD, SUITE 550
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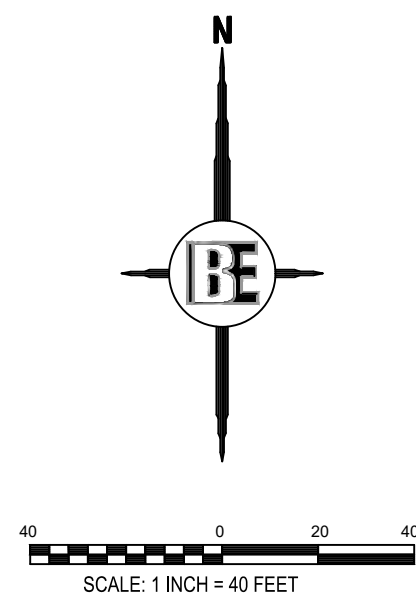
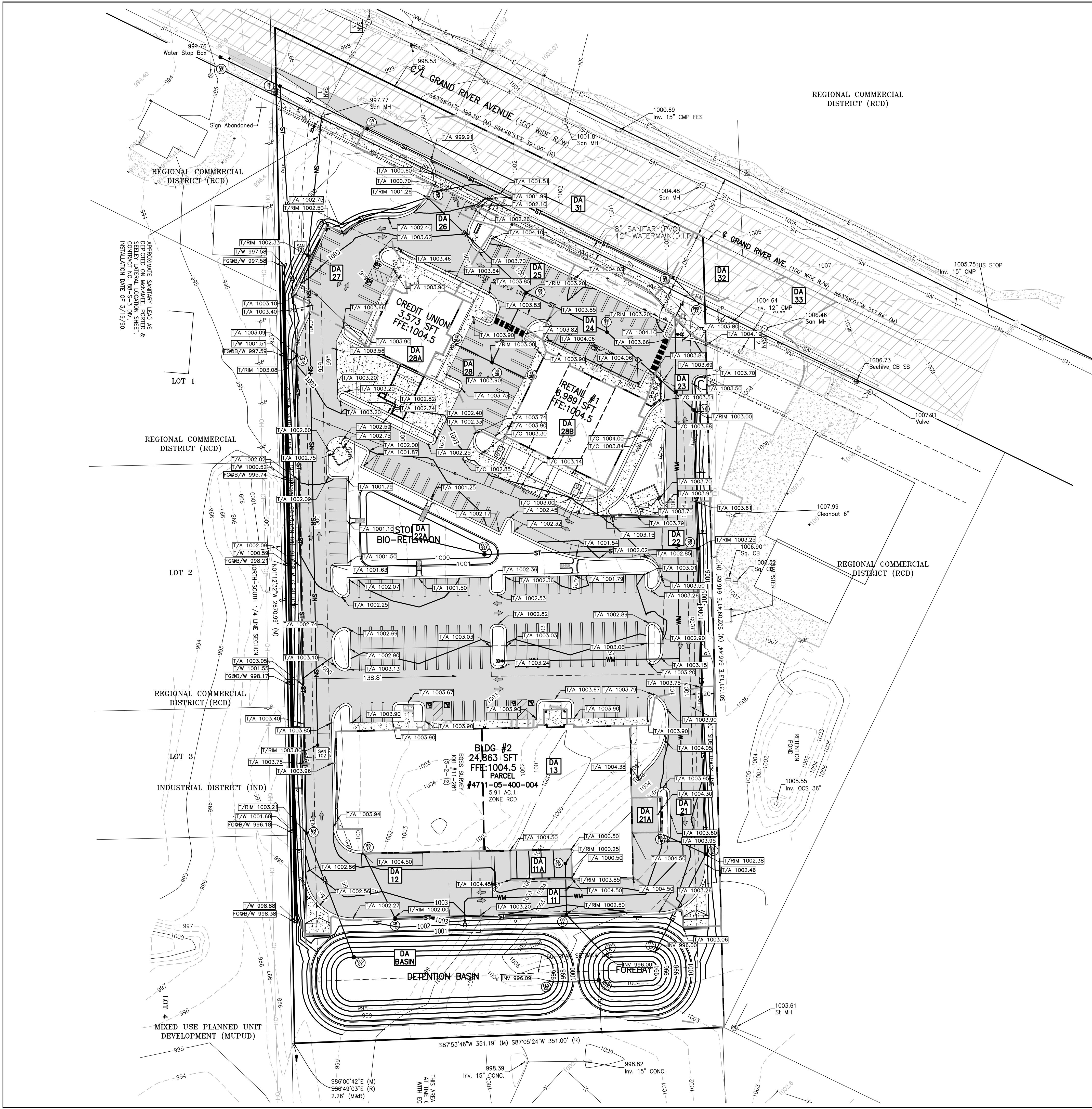
TITLE SITE PLAN

DESIGNED BY:	ST
DRAWN BY:	DH
CHECKED BY:	
SCALE:	1" = 40'
JOB NO:	24-075
DATE:	2/18/25
SHEET NO.	5

1 ST
1 BY

PER TOWNSHIP COMMENTS
REVISION PER

3/24/25
DATE



SEE SHEET 2 FOR GENERAL NOTES AND LEGEND

DRAINAGE AREA TABLE				
DRAINAGE AREA	TOTAL AREA (AC)	IMP. AREA (AC)	C VALUE	A°C
BASIN	0.65	-	0.20	0.13
11	0.12	0.12	0.90	0.10
11A	0.03	0.03	0.90	0.02
12	0.24	0.23	0.87	0.21
13	0.58	0.58	0.90	0.52
21	0.26	0.19	0.71	0.19
21A	0.02	0.02	0.90	0.01
22	0.07	0.05	0.71	0.05
22A	1.89	1.52	0.76	1.44
23	0.14	0.10	0.72	0.10
24	0.17	0.15	0.83	0.14
25	0.11	0.09	0.75	0.09
26	0.10	0.08	0.78	0.08
27	0.13	0.13	0.86	0.12
28	0.14	0.13	0.84	0.12
28A	0.08	0.07	0.76	0.06
28B	0.16	0.15	0.87	0.14
TOTALS	4.88	3.62	0.72	3.51
31	0.36	0.31	0.81	0.29
32	0.07	0.07	0.82	0.06
33	0.13	0.07	0.57	0.07

DRAINAGE NARRATIVE
EXISTING DRAINAGE:
THE EXISTING SITE CONTAINS A COMMERCIAL BUILDING WITH TWO STORM WATER BASINS. THE SOUTHERN BASIN TAKES A MAJORITY OF THE SOUTHERN PORTION OF THE SITE AS WELL AS THE EASTERN PORTION OF THE SITE. IT IS A RETENTION BASIN WITH A HIGH WATER OUTLET CULVERT. THE OUTLET CULVERT DISCHARGES AT THE REAR OF THE PROPERTY INTO THE ADJACENT PROPERTY TO THE SOUTH. THE NORTH DETENTION BASIN IS LOCATED AT THE NORTHWEST CORNER OF THE SITE AND RECEIVES STORM WATER FROM THE NORTHERN AND WESTERN PORTIONS OF THE SITE. THE DETENTION BASIN CURRENTLY OUTLETS TO THE STORM SEWER/DITCH SYSTEM ON THE SOUTH SIDE OF GRAND RIVER WHERE THE STORM WATER HEADS WESTERLY TOWARDS GRAND OAKS DRIVE.

PROPOSED DRAINAGE:
THE PROPOSED DEVELOPMENT WILL CONTAIN A DETENTION BASIN AT THE REAR OF THE SITE THAT MEETS THE LCDC & TOWNSHIP REQUIREMENTS. THE DETENTION BASIN WILL CONTAIN A STANDARD FOREBAY FOR STORM WATER PRE-TREATMENT. THE DETENTION BASIN WILL DISCHARGE INTO THE SAME STORM SEWER AT GRAND RIVER AS THE EXISTING DETENTION POND UTILIZED. THE CENTRAL PORTION OF THE SITE IS PROPOSED TO SHEET FLOW TO A SHALLOW BIO-RETENTION AREA. THIS PROPOSED BIO-RETENTION AREA BMP WILL UTILIZE A PERFORATED UNDERDRAIN PIPE AS WELL AS AN OVERFLOW STRUCTURE TO TRANSMIT WATER ULTIMATELY BACK TO THE PROPOSED DETENTION BASIN. THIS BIO-RETENTION ARE BMP WILL ALLOW A LARGE PORTION OF THE CENTRAL AREA OF THE SITE TO SHEET FLOW TO IT WHILE ALSO PROMOTING A LOCATION FOR INFILTRATION ON SITE.

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OF THE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES.

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PROJECT		3600 E. GRAND RIVER REDEVELOPMENT	
PREPARED FOR		KN WEST, LLC 25900 TELEGRAPH ROAD, SUITE 550 SOUTHFIELD, MI 48034 248-755-7727	
TITLE		GRADING & DRAINAGE AREA PLAN	
DESIGNED BY:		ST	3/24/25
DRAWN BY:		DH	DATE
CHECKED BY:			
SCALE:		1" = 40'	
JOB NO:		24-075	
DATE:		2/18/25	
SHEET NO.		6	
		<div>BOSS BE Engineering</div>	

LIVINGSTON COUNTY SOIL EROSION PERMIT TEMPLATE
TEMPORARY CONTROLS AND SEQUENCE

1. NOTIFY LIVINGSTON COUNTY DRAIN COMMISSIONER'S OFFICE 24 HOURS PRIOR TO START OF GRADE WORK.
2. IN ACCORDANCE WITH PUBLIC ACT NO. 53, OF 1974 THE PERMIT HOLDER SHALL CALL MISS DIG FOR STAKING AND LOCATING OF UTILITIES, AT LEAST 72 HOURS IN ADVANCE OF THE START OF ANY WORK.

PERMITTING STANDARDS

3. (IMPORTANT NOTICE) RETENTION/DETENTION PONDS SHALL BE EXCAVATED, TOPSOILED, SEEDED, MULCHED AND TACKED PRIOR TO THE START OF MASSIVE EARTH DISRUPTION. INGRESS/EGRESS MUST HAVE LARGE CRUSHED ROCK TO REDUCE THE TRACKING OF SOIL ONTO THE PUBLIC TRAFFIC AREAS. SEE DETAIL ITEMS BELOW.
4. 36" M.D.O.T SPECIFICATION TYPE SILT FABRIC FENCE AS SHOWN ON PLANS SHALL BE PLACED AND MAINTAINED ALONG PERIMETER ON ALL LOW LYING AREAS OF THE CONSTRUCTION SITE TO FILTER RUNOFF BEFORE LEAVING PROJECT SITE.
5. ALL TEMPORARY EROSION CONTROL DEVICES AS NOTED ON PLANS SHALL BE INSTALLED PRIOR TO THE START OF MASSIVE EARTH DISTRIBUTION.
6. PLAN DOES DENOTE A DETAILED EROSION CONTROL DEVICE TO RESTRICT TRACKING OF MATERIAL ONTO THE HIGHWAY. STONE DIAPERS SHALL BE INSTALLED AT ALL INGRESS/EGRESS AREAS OF THE SITE PRIOR TO THE START OF MASSIVE EARTH DISRUPTION. DIAPERS SHALL BE OF CRUSHED STONE AND SHALL HAVE A MINIMUM LENGTH OF 100' LINEAL FEET.

RETENTION PONDS

7. RETENTION/DETENTION/SEDIMENTATION PONDS SHALL BE EXCAVATED, TOPSOILED, SEEDED, MULCHED AND TACKED PRIOR TO THE START OF MASSIVE EARTH DISRUPTION.
8. DETENTION POND OUTLETS SHALL BE OF THE STANDPIPE AND STONE FILTER SYSTEM, WITH TRASH SCREEN. OUTLET FLOW SHALL NOT EXCEED 0.20 CUBIC FEET OF WATER PER SECOND/PER ACRE. POND DIKES SHALL HAVE A MINIMUM OF ONE (1) FOOT OF FREEBOARD. AN EMERGENCY SPILLWAY SHALL BE CONSTRUCTED WITHIN THE FREEBOARD LEVEL.
9. THE EMERGENCY SPILLWAY FROM THE DETENTION POND SHALL BE SODDED AND PEGGED, OR RIP RAPPED, 15 FEET PAST THE TOE OF THE SLOPE OF THE BERM.
10. DIKES AND BERMS SHALL BE FREE OF ALL ORGANIC MATTER.

11. RETENTION/DETENTION PONDS SHALL BE FENCED WITH A 4" CHAIN LINK FENCE, INCLUDING A 12' ACCESS GATE FOR MAINTENANCE UNLESS MINIMUM 5 FT. HORIZONTAL TO 1 FT. VERTICAL SIDE SLOPES ARE PROVIDED. THE FENCE SHALL BE INSTALLED AT THE OUTER PORTION OF THE BERM, TO ALLOW FOR MAINTENANCE WORK TO BE DONE INSIDE THE FENCE.
12. ALL UNIMPROVED DISTURBED AREAS SHALL BE STRIPPED OF TOPSOIL WHICH WILL BE STORED ONSITE DURING THE EXCAVATING STAGE. TOPSOIL PILES SHALL BE SEEDED AND MULCHED, OR MATTED WITH STRAW IN THE NON-GROWING SEASON, IMMEDIATELY AFTER THE STRIPPING PROCESS IS COMPLETED, TO PREVENT WIND AND WATER EROSION.
13. SOIL EROSION CONTROLS SHALL BE MONITORED DAILY BY THE ON-SITE ENGINEER, OR CONTRACTOR, WHICHEVER CASE APPLIES.

SLOPES AND DITCHES

14. ON SITE DITCHES SHALL BE OF THE FLAT BOTTOM TYPE MINIMUM WIDTH OF 2' WITH A MINIMUM OF 3 HORIZONTAL TO 1 VERTICAL SIDE SLOPES, 3:1.
15. DITCHES WITH STEEP SLOPES WILL NEED FLOW CHECKS TO PREVENT SCOURING OF THE DITCH BOTTOM. THESE SHALL BE INSTALLED AS DIRECTED BY THE ENGINEER OR INSPECTOR.
16. SLOPES IN EXCESS OF 3 HORIZONTAL TO 1 VERTICAL SHALL NOT BE USED EXCEPT WITH A MECHANICAL DEVICE SUCH AS A RETAINING WALL, TERRACING, OR OTHER PRIOR APPROVED DEVICE.

STORM DRAINS

17. ALL STORM WATER STRUCTURES, CATCH BASINS AND/OR MANHOLES, IF BLOCK, SHALL BE PLASTERED ON BOTH THE INSIDE AND OUTSIDE OF THE STRUCTURES. GROUTING AND POINTING WILL BE NECESSARY AT THE CASTING AND STRUCTURE JOINT TO PREVENT LEAKAGE AND THE RESULTING SOIL MOVEMENT, AROUND THE STRUCTURE.
18. STORM WATER INLETS SHALL HAVE AS A TEMPORARY CONTROL A STRAW BALE BARRIER AND STONE FILTER INSTALLED AROUND THE INLET DURING CONSTRUCTION. AS AN ALTERNATIVE TO THE STRAW BALE BARRIER, A BURLAP AND PEA STONE FILTER MAY BE USED. THREE LAYERS OF BURLAP FIBER AND A FILTER OF PEA STONE MINIMUM 1 FT. IN DEPTH CAN BE USED. DUE TO THE POROSITY OF THE BURLAP FILTER THE MINIMUM OF 1 FT. OF STONE IS VERY IMPORTANT. THE CONTROL SHALL BE INSTALLED AS SOON AS THE STRUCTURE IS BUILT AND INSPECTED DAILY.
19. COUNTY CODE REQUIRES A MINIMUM PIPE SIZE OF 12" IN DIAMETER. IF SMALLER PIPE IS NEEDED FOR OUTLET PURPOSES THE 12" CAN BE BAFFLED TO THE CORRECT SIZE. ALL PIPE SHALL MEET THE 12" DIAMETER CODE SIZE.

20. ALL STORM DRAIN OUTLETS 15" IN DIAMETER OR LARGER SHALL HAVE ANIMAL GUARDS INSTALLED TO PREVENT ENTRANCE TO THE SYSTEM.
21. ALL STORM DRAINAGE PIPE 30" IN DIAMETER OR LARGER SHALL BE POINTED, AT THE JOINTS ON THE INSIDE WITH MORTAR, AFTER BACKFILLING.

22. ALL STORM DRAIN OUTLETS THAT DO NOT EMPTY INTO THE RETENTION/DETENTION POND SHALL HAVE A TEMPORARY 5'X10'X3' SUMP INSTALLED AT THE TERMINATION OF THE STORM SEWER. UPON COMPLETION OF THE STABILIZATION WORK THE SUMP AREA SHALL BE FILLED AND RIP RAPPED WITH STONE. SILT TRAPS SHALL BE INSPECTED AFTER EACH STORM.
23. STORM WATER OUTLETS DO DENOTE RIP RAP. ALL OUTLETS SHALL BE RIP RAPPED OVER KEYED FILTER FABRIC WITH A MINIMUM OF 15 SQ. YARDS OF 6" OR LARGER STONE.

24. RIP RAP AS NOTED ON THE PLAN SHALL BE OF A FUNNEL SHAPE CONSTRUCTION, WIDTH SHALL INCREASE AS DISTANCE FROM THE OUTLET POINT INCREASES AT A 3:1 RATIO.
25. RIP RAP SHALL BE 6" IN DIAMETER OR LARGER. GROUTING MAY BE NECESSARY, AND SHALL BE A MINIMUM OF 6" IN DEPTH WITH THE STONE SET IN THE CEMENT SLURRY.

26. STORM WATER OUTLET IS IN NEED OF A SPLASH BLOCK WHICH IS NOT NOTED ON THE PLAN. INSTALL SPLASH BLOCK IF SLOPE OF THE PIPE IS 4% OR GREATER.

27. IT WILL BE NECESSARY FOR THE DEVELOPER TO HAVE THE STORM DRAINAGE LINES CLEANED PRIOR TO FINAL INSPECTION BY THE LIVINGSTON COUNTY DRAIN COMMISSIONER'S OFFICE. IF REQUIRED, THIS WORK SHALL BE DONE BY A PROFESSIONAL SEWER CLEANING FIRM AND CERTIFIED IN WRITING BY THE PROJECT ENGINEER. ALL SUMPS AND TEMPORARY SILT TRAPS SHALL ALSO BE CLEANED AT THIS TIME.

STABILIZATION

28. ALL UNIMPROVED DISTURBED AREAS SHALL BE RE-TOP SOILED, WITH A MINIMUM OF 3" OF MATERIAL. SEEDED, MULCHED AND TACKED WITHIN 15 DAYS OF THE COMPLETION OF THE MASSIVE EARTH DISRUPTION. IN THE NON-GROWING SEASON STRAW MATTING WILL SUFFICE. HYDROSEEDING WILL BE AN ACCEPTABLE ALTERNATE FOR MULCHING. EXTREME CARE SHOULD BE GIVEN IN SPRING AND FALL PERIODS AS A FROST WILL BREAK THE BIND OF THE HYDROSEEDING, WHICH WILL AFFECT THE EFFECTIVENESS OF THIS PROCEDURE.

29. IN THE NON-GROWING SEASON, TEMPORARY STABILIZATION OF MASSIVELY EXPOSED AREAS FOR WINTER STABILIZATION SHALL BE DONE WITH STRAW MATTING.

30. PERIODIC INSPECTIONS WILL BE MADE THROUGHOUT THE COURSE OF THE PROJECT. IT WILL BE THE RESPONSIBILITY OF THE MANAGERS OF THE PROJECT TO CONTACT THIS OFFICE FOR THE FINAL INSPECTION AT THE END OF THE PROJECT.

31. THIS COMMERCIAL PERMIT IS VALID FOR THE MASS EARTH MOVEMENT, THE INSTALLATION OF ROADS, DRAINS, AND UTILITIES AND IS NOT FOR ANY SINGLE FAMILY RESIDENCE. ALL RESIDENTIAL BUILDERS WILL NEED TO SECURE WAIVERS AND OR PERMITS AS NECESSARY FOR EACH LOT IN THIS DEVELOPMENT AT THE TIME APPLICATION FOR SINGLE FAMILY RESIDENCE IS MADE.

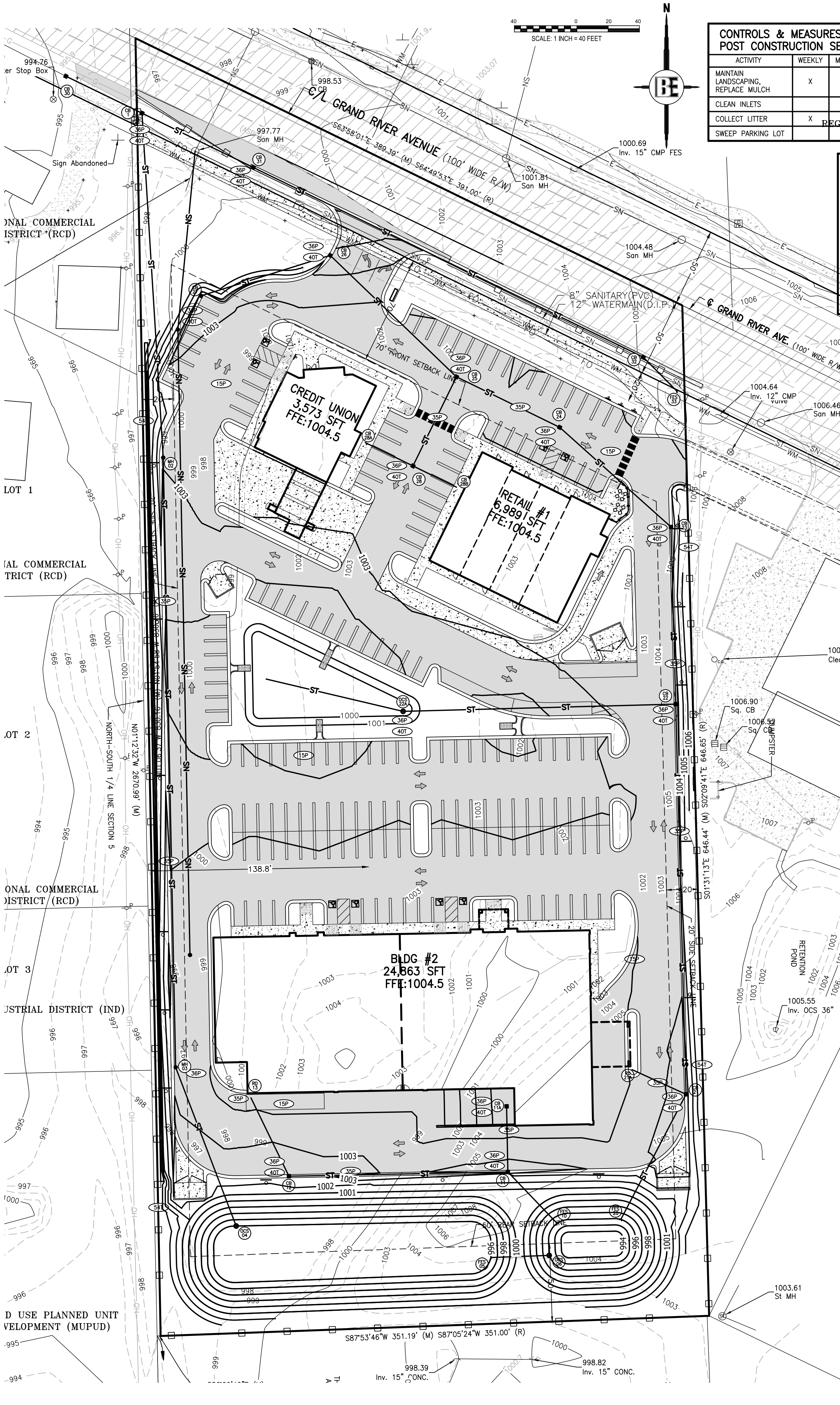
32. THE ISSUING BUILDING DEPARTMENT SHALL NOT ISSUE THE CERTIFICATE OF OCCUPANCY UNTIL THE FINAL INSPECTION LETTER FROM THE LIVINGSTON COUNTY DRAIN COMMISSIONER'S OFFICE HAS BEEN OBTAINED.

33. PER THE LIVINGSTON COUNTY DRAIN COMMISSIONER THE SEEDING, FERTILIZER AND MULCH MINIMUM QUANTITIES SHALL BE AS FOLLOWS:
- | | |
|---------------|--|
| TOP-SOIL | 3" IN DEPTH |
| GRASS SEED | 218 LBS. PER ACRE |
| FERTILIZER | 150 LBS. PER ACRE |
| STRAW MULCH | 3" IN DEPTH 1.5 TO 2 TONS PER ACRE (ALL MULCHING MUST HAVE A TIE DOWN, SUCH AS TACKIFIER, NET BINDING, ETC.) |
| HYDRO-SEEDING | IS NOT ACCEPTABLE FOR SLOPES EXCEEDING 1%, IN SUCH CASES STABILIZATION SHALL BE DONE WITH SEED AND STRAW MULCH WITH A TACKIFIER. |

MAINTENANCE SCHEDULE FOR SOIL EROSION CONTROLS

1. SILT FENCE SHALL BE INSPECTED WEEKLY AND AFTER EACH MAJOR STORM EVENT. MAINTENANCE SHALL INCLUDE REMOVAL OF ACCUMULATED SILT AND REPLACEMENT OF TORN SECTIONS. SILT FENCE SHALL BE REMOVED WHEN ALL CONTRIBUTING AREAS HAVE BEEN STABILIZED.
2. TRACKING PAD SHALL BE INSPECTED MONTHLY FOR ACCUMULATED DIRT. TRACKING PAD SHALL BE REPLACED WHEN THE STONES ARE CHOKED WITH DIRT. TRACKING PAD SHALL BE REMOVED IMMEDIATELY PRIOR TO THE FIRST COURSE OF ASPHALT BEING LAID.
3. DETENTION/RETENTION POND SHALL BE INSPECTED QUARTERLY ON A PERMANENT BASIS. MAINTENANCE SHALL INCLUDE SEDIMENT REMOVAL, EMBANKMENT STABILIZATION AND MAINTAINING THE OUTLET STRUCTURE IN GOOD CONDITION. NO TREES SHALL BE ALLOWED TO GROW ON THE EMBANKMENT.
4. CATCH BASINS SHALL BE INSPECTED ANNUALLY FOR ACCUMULATION OF SEDIMENT. ALL SEDIMENT MUST BE REMOVED AND DISPOSED OF PROPERLY WHEN THE SUMP IS FULL.
5. COMMON AREAS SHALL BE STABILIZED NO LATER THAN 15 DAYS AFTER GRADE WORK, PURSUANT TO RULE 1709 (5).

SILT FENCE SHALL BE A MINIMUM 36".



CONTROLS & MEASURES SEQUENCE			
ACTIVITY	WEEKLY	MONTHLY	AS REQUIRED
MAINTAIN LANDSCAPING, REPLACE MULCH	X	X	X
CLEAN INLETS		X	X
COLLECT LITTER	X	X	X
SWEEP PARKING LOT		X	X

CONTROLS & MEASURES NARRATIVE	
ACTIVITY	DESCRIPTION
MAINTAIN LANDSCAPING, REPLACE MULCH	COLLECT GRASS, TREE, AND SHRUB CLIPPINGS; DISPOSE IN APPROVED CONTAINER; REPLACE DEAD SOD, TREES AND SHRUBS.
CLEAN INLETS	REMOVE LITTER, SEDIMENT, AND DEBRIS; DISPOSE OF IN APPROVED LANDFILL.
COLLECT LITTER	DISPOSE OF WITH INLET DEBRIS.
SWEEP PARKING LOT	REMOVE MUD, DIRT, GREASE AND OIL WITH PERIODIC SWEEPING.
DUST CONTROL	SPRINKLE WATER AS NEEDED.

CONSTRUCTION SEQUENCE

- THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT EROSION IS MINIMIZED AND THAT COMPLIANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, REGULATIONS, AND ORDINANCES IS MAINTAINED THROUGHOUT EXECUTION OF THIS PROJECT.
- | | |
|---------|--|
| 1 DAYS | 1. INSTALL SILT FENCE AS SHOWN ON PLANS. |
| 30 DAYS | 2. ROUGH GRADE AND INSTALL STORM DRAINAGE. |
| 1 DAY | 3. INSTALL INLET PROTECTION ON STORM INLETS. |
| 180 DAY | 4. START BLDG. CONSTRUCTION |
| 30 DAYS | 5. INSTALL PAVEMENT |
| 5 DAYS | 6. FINE GRADE AROUND BUILDING, SPREAD TOPSOIL, SEED/SOD AS APPLICABLE. |
| 1 DAY | 7. REMOVE ALL EROSION CONTROL STRUCTURES. |
| 1 DAY | 8. REMOVE ACCUMULATED SILT FROM ALL EXISTING DRAINAGE. |

PROPOSED CONST. SCHEDULE FOR THE YEAR 2025

ACTIVITY	JULY	AUG	SEPT	OCT	NOV	APRIL
DEMO & CLEAR						
MASS GRADING						
UNDERGROUND UTILITY						
FINAL GRADING						
SEED & MULCH						

SEE SHEET 2 FOR GENERAL NOTES AND LEGEND

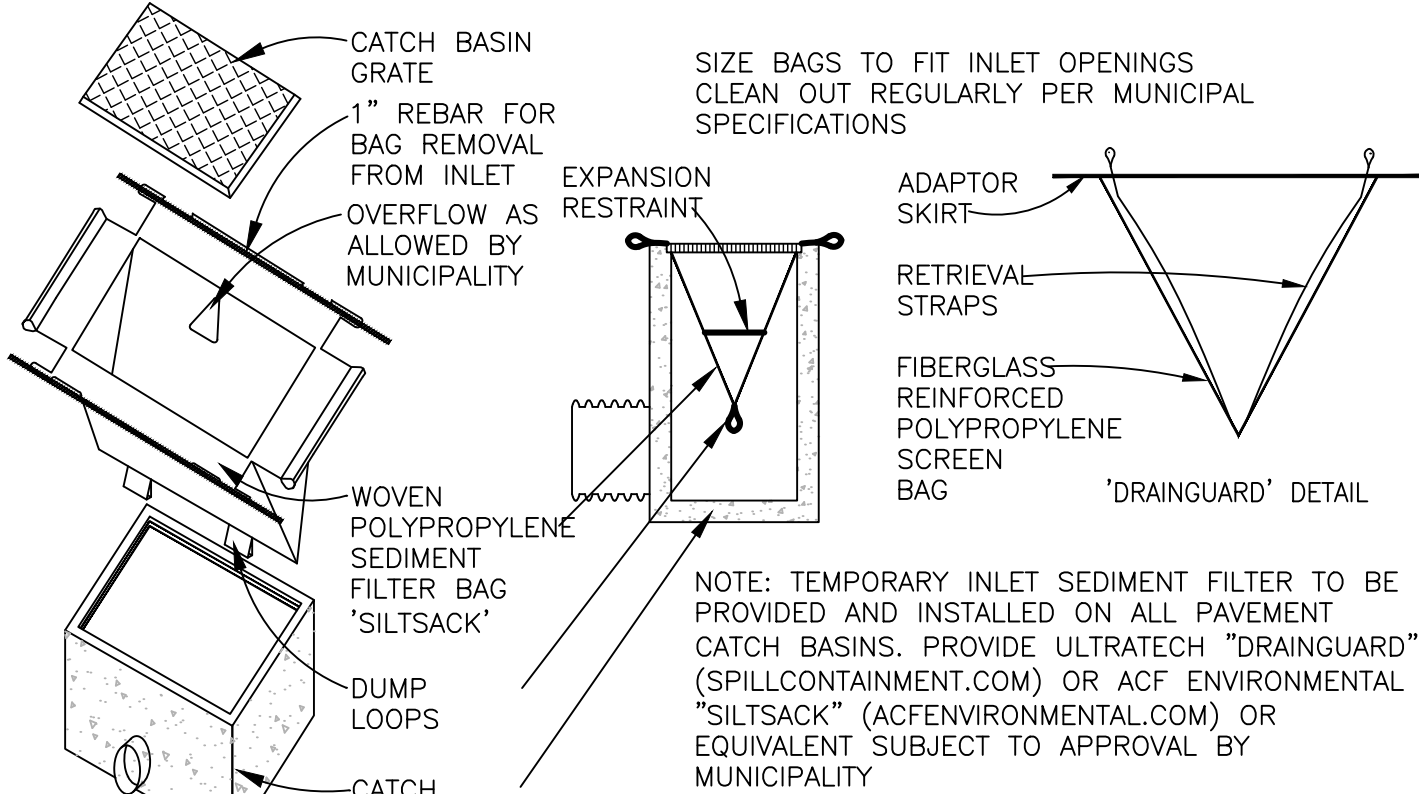
SOIL EROSION CONTROL MEASURES

1	STRIPPING & STOCKPILING TOPSOIL	TOPSOIL MAY BE STOCKPILED ABOVE BORROW AREAS TO ACT AS A DIVERSION. STOCKPILE SHOULD BE TEMPORARILY SEEDED.
6	SEEDING WITH MULCH AND/OR MATTING	FACILITATES ESTABLISHMENT OF VEGETATIVE COVER. EFFECTIVE FOR DRAMATICALLY LOW VELOCITY. EASY PLACED IN SMALL QUANTITIES BY INDEPENDENT PERSONNEL. SHOULD BE USED TO STABILIZE EXPOSED SOIL.
14	AGGREGATE COVER	STABILIZES SOIL SURFACE, THIS METHOD OF EROSION PERMITS CONSTRUCTION TRAFFIC IN ADVERSE WEATHER MAY BE USED AS PART OF PERMANENT BASE CONSTRUCTION OF PAVED AREAS.
15	PAVING	PROTECTS AREAS WHICH CANNOT OTHERWISE BE PROTECTED, BUT INCREASES RUNOFF VELOCITY. REGULAR SURFACE WILL HELP SLOW VELOCITY.
16	CURB & GUTTER	KEEPS HIGH VELOCITY RUNOFF ON PAVED AREAS FROM LEAVING PAVED SURFACE. COLLECTS AND CONDUCTS RUNOFF TO ENCLOSED DRAINAGE SYSTEM OR PREPARED DRAINAGE.
35	STORM SEWER	SYSTEM REMOVES COLLECTED RUNOFF FROM SITE, PARTICULARLY FROM PAVED AREAS. ON ACCEPT LARGE CONCENTRATIONS OF RUNOFF. CONDUCTS RUNOFF TO MUNICIPAL SEWER SYSTEM OR STABILIZED OUTFALL LOCATION. USE CATCH BASINS TO COLLECT SEDIMENT.
36	CATCH BASIN, DRAIN INLET	COLLECTS HIGH VELOCITY CONCENTRATED RUNOFF. MAY USE FILTER CLOTH OVER INLET.
40	INLET SEDIMENT FILTER	EASY TO SHAPE. COLLECTS SEDIMENT. MAY BE TIED AND EXPANDED AS NEEDED.
51	RETAINING WALL	REDUCES GRADIENT WHERE SLOPES ARE EXTREMELY STEEP. PERMITS RETENTION OF EXISTING VEGETATION, KEEPING SOIL STABLE IN CRITICAL AREAS. MINIMUMS MAINTENANCE.
54	SILT FENCE	USES REUSEABLE FABRIC AND POST OR POLES. EASY TO CONSTRUCT AND LOCATE AS NECESSARY. (SEE DETAIL THIS SHEET)

T= TEMPORARY, P= PERMANENT
TOTAL DISTURBED AREA= 5.91 AC.

SURFACE WATER & COUNTY DRAINS

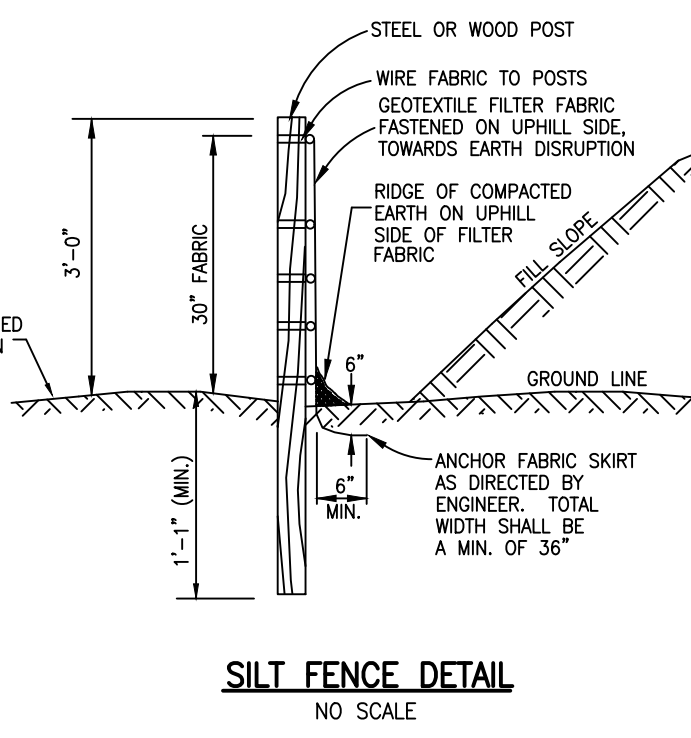
WETLAND - APPROXIMATELY 2,700 FT NORTHEAST TO INTERSECTION OF LATSON RD AND SNOWDEN LN
LAKES - APPROXIMATELY 4,050 FT NORTHWEST TO EARL LAKE
STREAMS - APPROXIMATELY 11,352 FT NORTH TO BOGUE CREEK
BASINS - APPROXIMATELY 70 FT EAST AT 3598 E. GRAND RIVER
DRAINS - APPROXIMATELY 2,170 FT EAST TO LATSON ROAD DRAIN
PONDS - APPROXIMATELY 2,270 FT WEST AT 855 VICTORY DR.



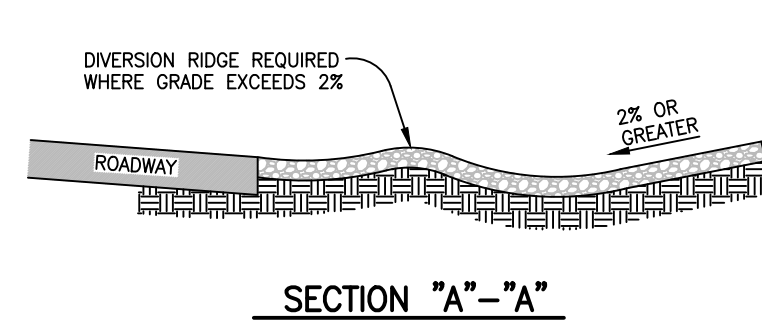
TEMPORARY INLET SEDIMENT FILTER DETAIL (NO SCALE)

DEWATERING NOTE:

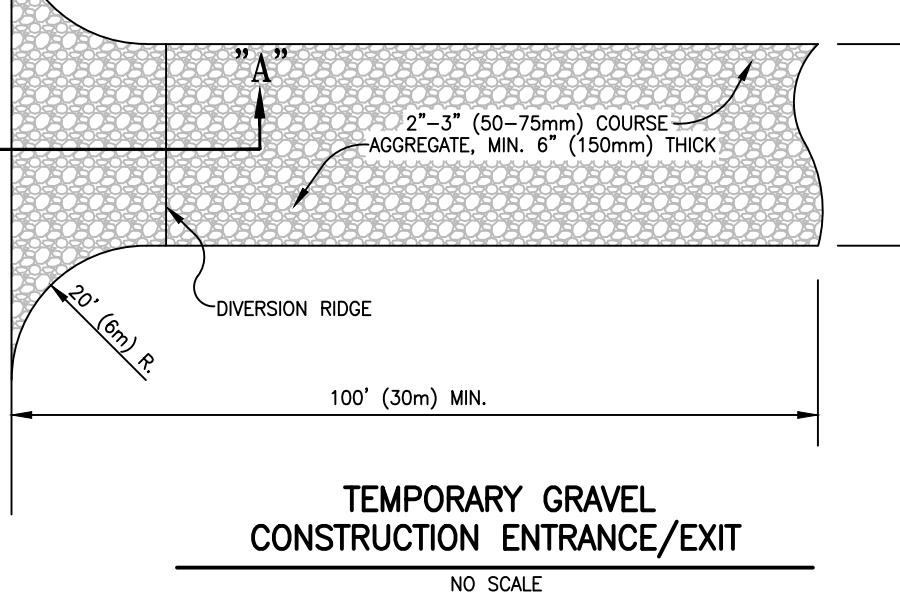
1. ANY DEWATERING REQUIRED SHALL HAVE A DEWATERING PLAN SUBMITTED PRIOR TO STARTING THE ACTIVITY AND MAY REQUIRE EGLE APPROVAL.



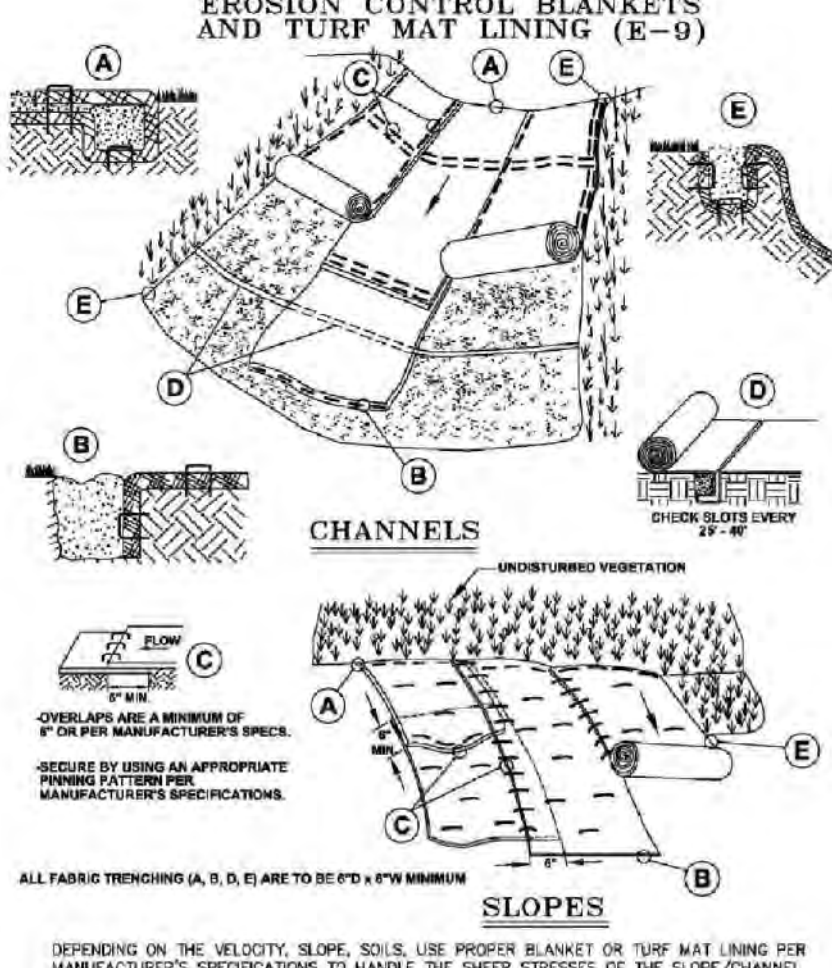
SILT FENCE DETAIL NO SCALE



SECTION "A"- "A"



TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT NO SCALE



MULCH BLANKET NOTES:
MULCH BLANKET TO BE HANES-GEO STRAW EROSION CONTROL BLANKETS OR APPROVED EQUAL.

1. BEFORE PLACING, PREPARE THE SOIL SURFACE BY RAKING, SEEDING, AND FERTILIZING. MAKE SURE SURFACE HAS NO RILLS, GULLIES, OR VOIDS THAT WILL CAUSE THE BLANKET NOT TO BE IN CONTACT WITH THE GROUND.

2. FOLLOW MANUFACTURER'S SPECIFICATIONS IN THE PLACEMENT OF STAPLES/STAKES TO SECURE THE BLANKET TO THE SLOPE.

3. ALL ANCHORING TRENCHES, OVERLAPS, OR CHECK SLOTS SHALL BE 6" MINIMUM.

4. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED TO INSURE THAT THE EROSION CONTROL BLANKETS AND TURF MAT LINING OPERATE EFFICIENTLY.

ENGINEERING DATE: 3/24/2025
CALL MSS DIG: 1-800-462-7771
BE BOSS Engineering

3600 E. GRAND RIVER REDEVELOPMENT

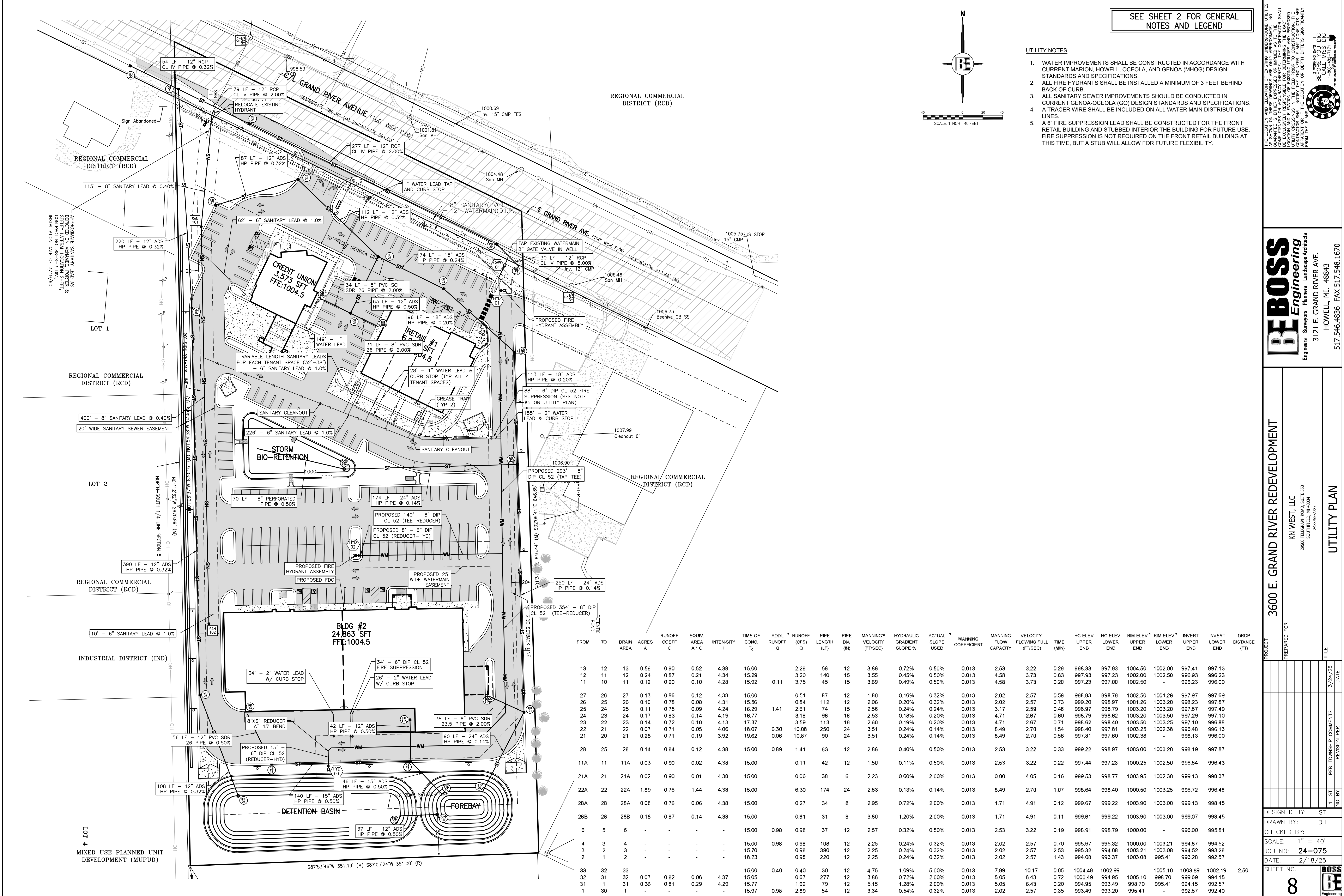
PREPARED FOR: KN WEST, LLC
25900 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
248-755-7727

TITLE: SOIL EROSION & SEDIMENTATION PLAN

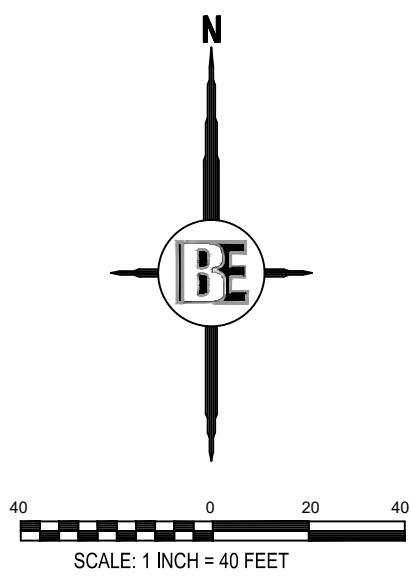
NO	BY	PER	TOWNSHIP	COMMENTS	DATE
1	ST	ST			3/24/25

DESIGNED BY: ST
DRAWN BY: DH
CHECKED BY:
SCALE: 1" = 40'
JOB NO: 24-075
DATE: 2/18/25
SHEET NO. 7

BOSS Engineering



SEE SHEET 2 FOR GENERAL NOTES AND LEGEND



- UTILITY NOTES
1. WATER IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CURRENT MARION, HOWELL, OCEOLA, AND GENOA (MHOG) DESIGN STANDARDS AND SPECIFICATIONS.
 2. ALL FIRE HYDRANTS SHALL BE INSTALLED A MINIMUM OF 3 FEET BEHIND BACK OF CURB.
 3. ALL SANITARY SEWER IMPROVEMENTS SHOULD BE CONDUCTED IN CURRENT GENOA-OCEOLA (GO) DESIGN STANDARDS AND SPECIFICATIONS.
 4. A TRACER WIRE SHALL BE INCLUDED ON ALL WATER MAIN DISTRIBUTION LINES.
 5. A 6" FIRE SUPPRESSION LEAD SHALL BE CONSTRUCTED FOR THE FRONT RETAIL BUILDING AND STUBBED INTERIOR THE BUILDING FOR FUTURE USE. FIRE SUPPRESSION IS NOT REQUIRED ON THE FRONT RETAIL BUILDING AT THIS TIME, BUT A STUB WILL ALLOW FOR FUTURE FLEXIBILITY.

BEBOSS
Engineering
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

3600 E. GRAND RIVER REDEVELOPMENT
KN WEST, LLC
25900 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
248.755.7727

PROJECT	PREPARED FOR	TITLE
3600 E. GRAND RIVER REDEVELOPMENT	KN WEST, LLC	UTILITY PLAN
DESIGNED BY: ST	DRAWN BY: DH	CHECKED BY:
SCALE: 1" = 40'	JOB NO: 24-075	DATE: 2/18/25
SHEET NO. 8	PER TOWNSHIP COMMENTS	REVISION PER DATE

FROM	TO	DRAIN AREA	ACRES	RUNOFF COEFF	EQUIV. AREA	INTEN-SITY	TIME OF CONC.	ADDL. RUNOFF	PIPE LENGTH	PIPE DIA	MANING'S VELOCITY	HYDRAULIC GRAIENT	ACTUAL SLOPE	MANING COEFFICIENT	MANING CAPACITY	VELOCITY FLOWING FULL	TIME (MIN)	HG ELEV UPPER END	HG ELEV LOWER END	RIM ELEV UPPER END	RIM ELEV LOWER END	INVERT UPPER END	INVERT LOWER END	DROP DISTANCE
13	12	13	0.58	0.90	0.52	4.38	15.00		2.28	56	12	3.86	0.72%	0.50%	0.013	2.53	3.22	0.29	998.33	997.93	1004.50	1002.00	997.41	997.13
12	11	12	0.24	0.87	0.21	4.34	15.29		3.20	140	15	3.55	0.45%	0.50%	0.013	4.58	3.73	0.63	997.93	997.23	1002.00	996.93	996.23	996.00
11	10	11	0.12	0.90	0.10	4.28	15.92	0.11	3.75	45	15	3.69	0.49%	0.50%	0.013	4.58	3.73	0.20	997.23	997.00	1002.50	996.23	996.00	
27	26	27	0.13	0.86	0.12	4.38	15.00		0.51	87	12	1.80	0.16%	0.32%	0.013	2.02	2.57	0.56	998.93	998.79	1002.50	1001.26	997.97	997.69
26	25	26	0.10	0.78	0.08	4.31	15.56		0.84	112	12	2.06	0.20%	0.32%	0.013	2.02	2.57	0.73	999.20	998.97	1001.26	1003.20	998.23	997.87
25	24	25	0.11	0.75	0.09	4.24	16.29	1.41	2.61	74	15	2.56	0.24%	0.24%	0.013	3.17	2.59	0.48	998.97	998.79	1003.20	1003.20	997.67	997.49
24	23	24	0.17	0.83	0.14	4.19	16.77		3.18	96	18	2.53	0.18%	0.20%	0.013	4.71	2.67	0.60	998.79	998.62	1003.20	1003.50	997.29	997.10
23	22	23	0.14	0.72	0.10	4.13	17.37		3.59	113	18	2.60	0.19%	0.20%	0.013	4.71	2.67	0.71	998.62	998.40	1003.50	1003.25	997.10	996.88
22	21	22	0.07	0.71	0.05	4.06	18.07	6.30	10.08	250	24	3.51	0.24%	0.14%	0.013	8.49	2.70	1.54	998.40	997.81	1003.25	1002.38	996.48	996.13
21	20	21	0.26	0.71	0.19	3.92	19.62	0.06	10.87	90	24	3.51	0.24%	0.14%	0.013	8.49	2.70	0.56	997.81	997.60	1002.38	996.13	996.00	
28	25	28	0.14	0.84	0.12	4.38	15.00	0.89	1.41	63	12	2.86	0.40%	0.50%	0.013	2.53	3.22	0.33	999.22	998.97	1003.00	1003.20	998.19	997.87
11A	11	11A	0.03	0.90	0.02	4.38	15.00		0.11	42	12	1.50	0.11%	0.50%	0.013	2.53	3.22	0.22	997.44	997.23	1000.25	1002.50	996.64	996.43
21A	21	21A	0.02	0.90	0.01	4.38	15.00		0.06	38	6	2.23	0.60%	2.00%	0.013	0.80	4.05	0.16	999.53	998.77	1003.95	1002.38	999.13	998.37
22A	22	22A	1.89	0.76	1.44	4.38	15.00		6.30	174	24	2.63	0.13%	0.14%	0.013	8.49	2.70	1.07	998.64	998.40	1000.50	1003.25	996.72	996.48
28A	28	28A	0.08	0.76	0.06	4.38	15.00		0.27	34	8	2.95	0.72%	2.00%	0.013	1.71	4.91	0.12	999.67	999.22	1003.90	1003.00	999.13	998.45
28B	28	28B	0.16	0.87	0.14	4.38	15.00		0.61	31	8	3.80	1.20%	2.00%	0.013	1.71	4.91	0.11	999.61	999.22	1003.90	1003.00	999.07	998.45
6	5	6	-	-	-	-	15.00	0.98	0.98	37	12	2.57	0.32%	0.50%	0.013	2.53	3.22	0.19	998.91	998.79	1000.00	996.00	995.81	
4	3	4	-	-	-	-	15.00	0.98	0.98	108	12	2.25	0.24%	0.32%	0.013	2.02	2.57	0.70	995.67	995.32	1000.00	1003.21	994.87	994.52
3	2	3	-	-	-	-	15.70	0.98	0.98	390	12	2.25	0.24%	0.32%	0.013	2.02	2.57	2.53	995.32	994.08	1003.08	994.52	993.28	
2	1	2	-	-	-	-	18.23	0.98	0.98	220	12	2.25	0.24%	0.32%	0.013	2.02	2.57	1.43	994.08	993.37	1003.08	995.41	993.28	992.57
33	32	33	-	-	-	-	15.00	0.40	0.40	30	12	4.75	1.09%	5.00%	0.013	7.99	10.17	0.05	1004.49	1002.99	-	1005.10	1003.69	1002.19
32	31	32	0.07	0.82	0.06	4.37	15.05		0.67	277	12	3.86	0.72%	2.00%	0.013	5.05	6.43	0.72	1000.49	994.95	1005.10	998.70	999.69	994.15
31	1	31	0.36	0.81	0.29	4.29	15.77		1.92	79	12	5.15	1.28%	2.00%	0.013	5.05	6.43	0.20	994.95	993.49	998.70	995.41	994.15	992.57
1	30	1	-	-	-	-	15.97	0.98	2.89	54	12	3.34	0.54%	0.32%	0.013	2.02	2.57	0.35	993.49	993.20	995.41	-	992.57	992.40

LIVINGSTON COUNTY DETENTION BASIN CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	IMPERVIOUS ACRE
3.62	0.9	3.26
0.00	0.7	0.00
1.26	0.2	0.25

COMPOUND C: 0.72
TOTAL DRAINAGE AREA: 4.88 ACRES

WATER QUALITY VOLUME V_{WQ}
 $V_{WQ} = 3,630(C)(A) = 12754 \text{ FT}^3$
 Are upstream infiltration BMP's provided? yes
 $V_E = 0.15(V_{WQ}) = 1913 \text{ FT}^3$

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

$T_C = \text{MAX TIME OF CONCENTRATION} = 19.62 \text{ MIN}$
 $Q_{WQ} = (C)(A)30.2/(T_C + 9.17)^{0.81} = 6.98 \text{ CFS}$

CHANNEL PROTECTION VOLUME CONTROL - REQUIRED

$V_{CP,R} = 4.719(C)(A) = 16581 \text{ FT}^3$

CHANNEL PROTECTION VOLUME CONTROL - PROVIDED

In-Situ Infiltration rate = 1 IN/HR
 Are upstream infiltration BMP's provided? yes
 Basin Footprint Infiltration Area Required = 6632 FT^2
 $V_{CP,P} = 5057 \text{ FT}^3$

CHANNEL PROTECTION RATE CONTROL (EXTENDED DETENTION VOLUME)

$V_{ED} = 6.897(C)(A) = 24233 \text{ FT}^3$

EXTENDED DETENTION OUTLET RATE

$Q_{ED} = V_{ED}/(48\text{hr}) = 0.140 \text{ CFS}$
 $H_{ED} = V_{ED}/4,800 (H)^{1/2} = 2.0 \text{ 1" HOLES}$
 $H = 5.00 \text{ FT}$
 $ELEV_{ED} = 998.56 \text{ FT}$

100-YEAR ALLOWABLE OUTLET RATE

$Q_{DRAIN} = \text{Restricted Drain Rate} = 0.2 \text{ CFS/ACRE}$
 $Q_{VRR} = 1.1055 - 0.206LN(A) = 0.779 \text{ CFS/ACRE}$
 $Q_{100P} = (\text{LESSER OF } Q_{DRAIN} \text{ \& } Q_{VRR})^A = 0.976 \text{ CFS}$

100-YEAR DETENTION VOLUME

$V_{100R} = 18985(C)(A) = 66706 \text{ FT}^3$
 $Q_{100IN} = (C)(A)83.3/(T_C + 9.17)^{0.81} = 19.25 \text{ CFS}$
 $R = 0.206 - 15(\ln(Q_{100P}/Q_{100IN})) = 0.6533$
 $V_{100D} = V_{100R} - V_{CP,P} = 38521 \text{ FT}^3$
 Is $V_{100D} \geq V_{ED}$? YES
 $V_{100D} = 38521 \text{ FT}^3$

FOREBAY STORAGE PROVIDED

ELEVATION	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
1001	22018	1	13,458	26,032	FREEBOARD
1000	4897	1	4,415	12,575	DHWL
999	3932	1	3,500	8,160	
998	3068	1	2,687	4,660	
997	2305	1	1,974	1,974	
996	1642	1	1,361	0	BOTTOM OF STORAGE
995	1080	1	849	0	SUMP
994	618	1	309	0	SUMP
993	0	0	0	0	SUMP

BASIN STORAGE PROVIDED

ELEVATION	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
1001	22018	1	17,647	58,790	FREEBOARD
1000	13276	1	12,296	41,143	DHWL
999	11316	1	10,386	28,847	
998	9456	1	8,576	18,461	
997	7696	1	6,867	9,885	
996	6037	1	3,019	3,019	
995	0	0	0	0	BOTTOM OF STORAGE

PROVIDED FOOTPRINT OF BASIN BOTTOM AREA 6037 FT^2

OUTLET CONTROL STRUCTURE

$Q_{ED,ACTUAL} = 2 (1" \text{ HOLES})$
 $H_{ED} = 0.0109 \text{ FT}^2$
 $Q_{ED,ACTUAL} = (A_{ED})0.62 \times (2 \times 32.2 \times h)^{0.5} = 0.121 \text{ CFS}$

OUTLET

$Q_{100,ACTUAL} = Q_{100P} - Q_{ED,ACTUAL} = 0.855 \text{ CFS}$
 $A_{100} = Q_{100,ACTUAL} / (0.62 \times (2 \times 32.2 \times (ELEV_{DHWL} - ELEV_{ED}))^{0.5}) = 0.143 \text{ FT}^2$
 AREA OF 2 INCH DIAMETER ORIFICE = 0.022 FT^2
 $\# \text{ ORIFICES} = A_{100} / 0.005 = 6.0$

OVERFLOW SPILLWAY DESIGN

Design Flow Rate: $Q_{100IN} = 19.25 \text{ CFS}$
 Depth of Spillway: $D_{SPILL} = 6 \text{ INCHES}$
 Width of Spillway: $W_{SPILL} = Q_{100IN}/3.33D_{SPILL}^{3/2} = 16.4 \text{ FT}$

BASIN DESIGN SUMMARY

FOREBAY SIZE REQUIRED =	1913 FT^3
FOREBAY SIZE PROVIDED =	12575 FT^3
BASIN SIZE REQUIRED =	38521 FT^3
BASIN SIZE PROVIDED =	41,143 FT^3

ORIFICE DESIGN SUMMARY

ELEVATION	# OF HOLES	DIAMETER OF HOLES
995.00	2.0	1-INCH
998.56	6.0	2-INCH

OVERFLOW SPILLWAY SUMMARY

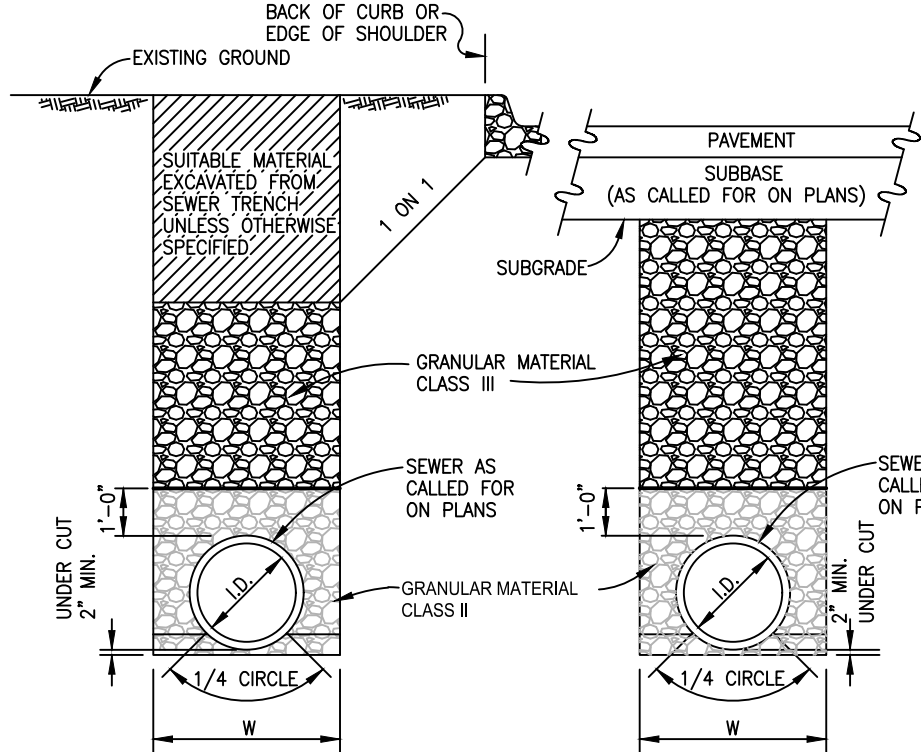
WIDTH OF OVERFLOW SPILLWAY = 17/FT

INSTALL SUBDRAINS AT ALL CATCH BASINS LOCATED WITHIN ROADWAY

- 4 L.F. (MIN.) 6" PERFORATED P.V.C. PIPE WRAPPED WITH GEOTEXTILE FABRIC PLACED AT LOWEST INVERT PARALLEL TO ROAD OR LINE OF PIPE BACK-FILLED WITH PEA STONE ONE FOOT ABOVE PIPE.
- AT LOWPOINT CATCH BASINS 20 L.F. (MIN.) OF 6" PERFORATED P.V.C. PIPE WRAPPED WITH GEOTEXTILE FABRIC, STARTING AT LOWEST INVERT AND CONTINUING AT 3.5 FT BELOW ROAD-WAY, PARALLEL TO ROAD, (BOTH DIRECTIONS) BACK-FILLED WITH PEA STONE TO THE SUBGRADE.

2 FT. DIA. CATCH BASIN W/SUMP

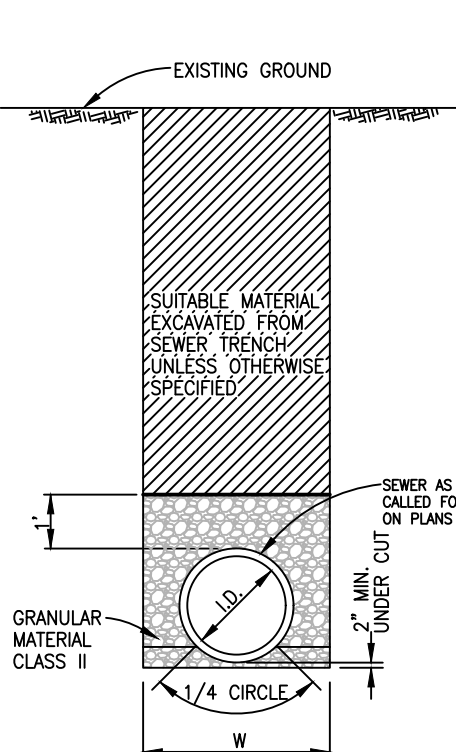
NO SCALE



SEWER UNDER ROADBED OR WITHIN INFLUENCE OF ROADBED

(REF. MDOT DETAIL IV-83D)

NO SCALE



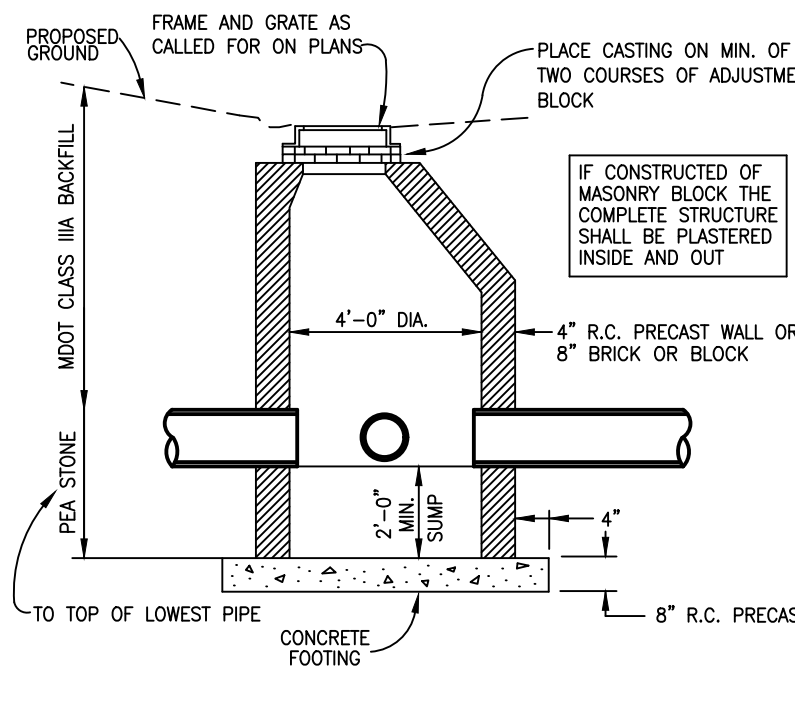
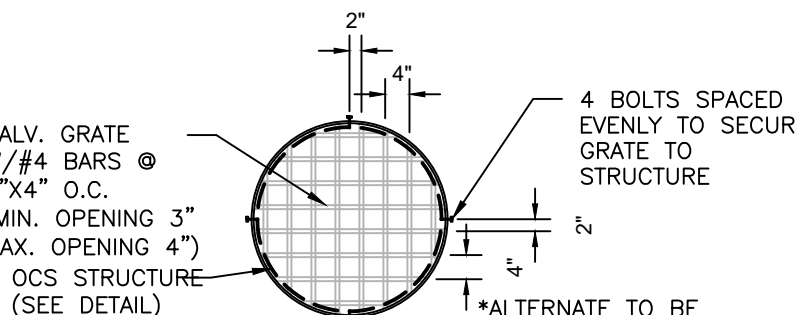
SEWER NOT UNDER ROADBED

(REF. MDOT DETAIL IV-83D)

NO SCALE

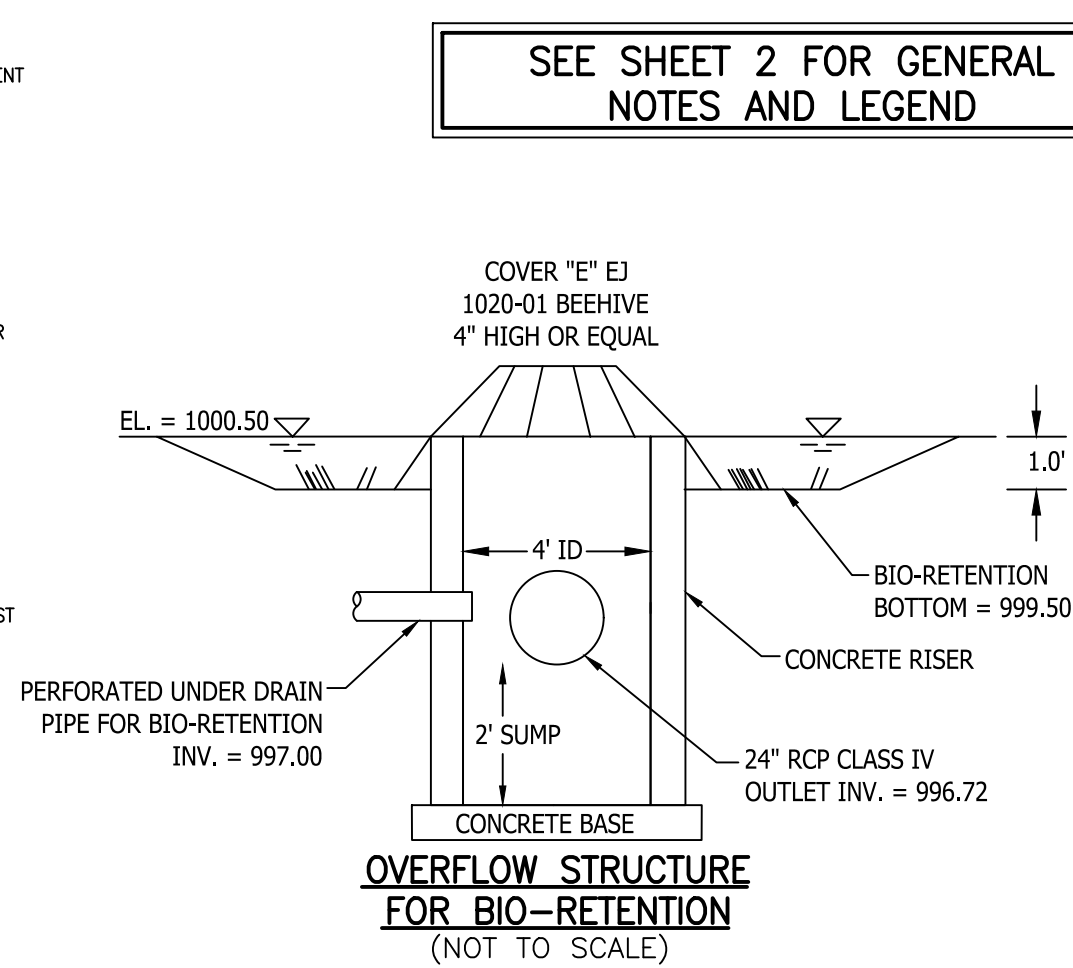
OUTLET CONTROL STRUCTURE GRATE

(NO SCALE)



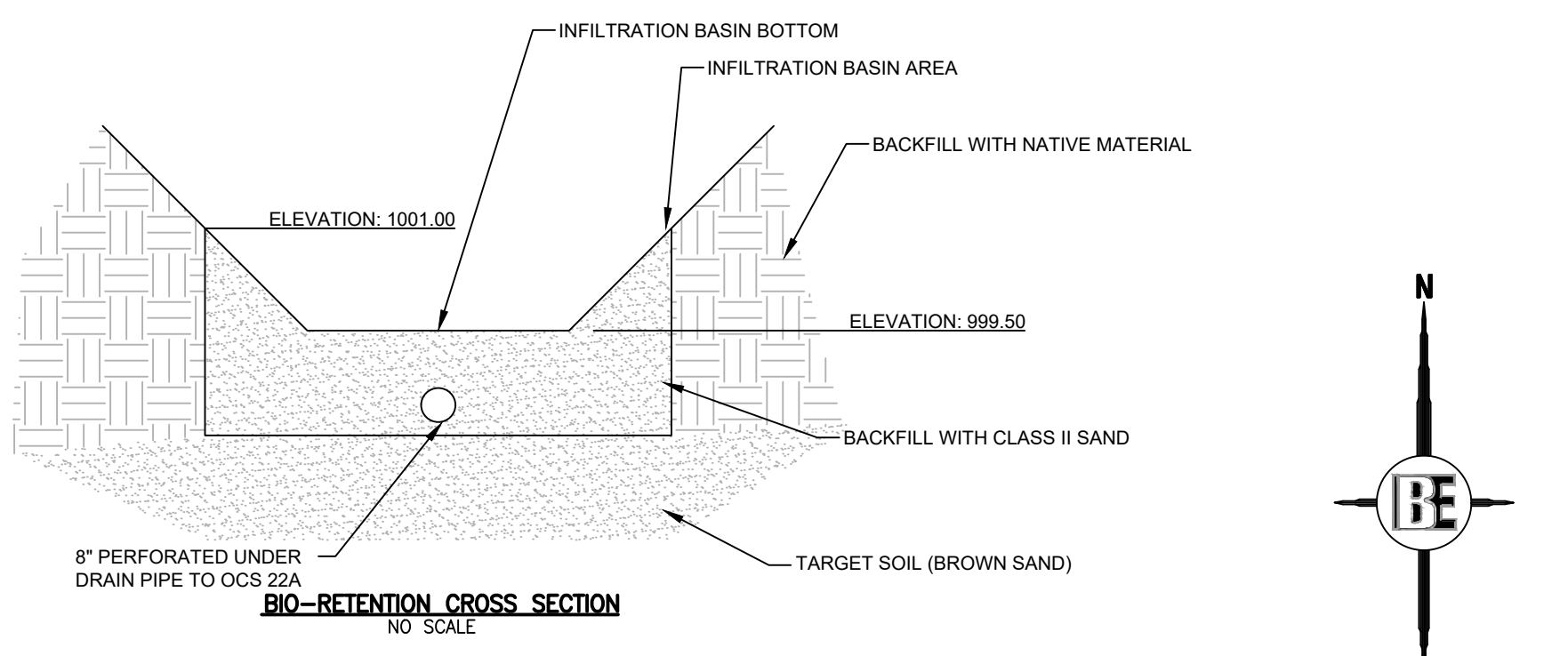
4 FT. DIA. CATCH BASIN W/SUMP

NO SCALE



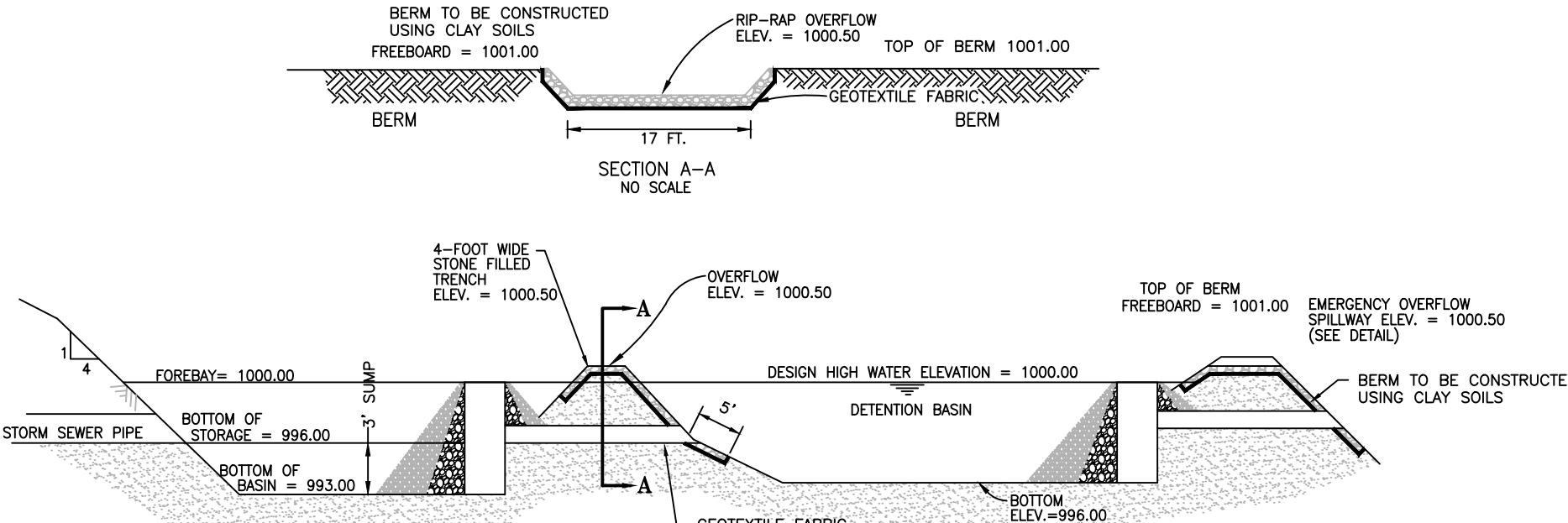
OVERFLOW STRUCTURE FOR BIO-RETENTION

(NOT TO SCALE)



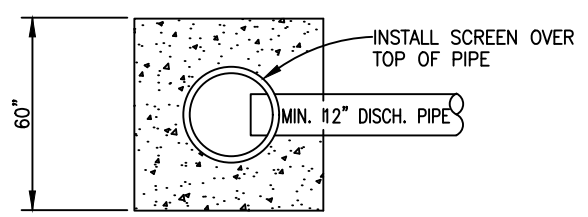
BIO-RETENTION CROSS SECTION

(NO SCALE)



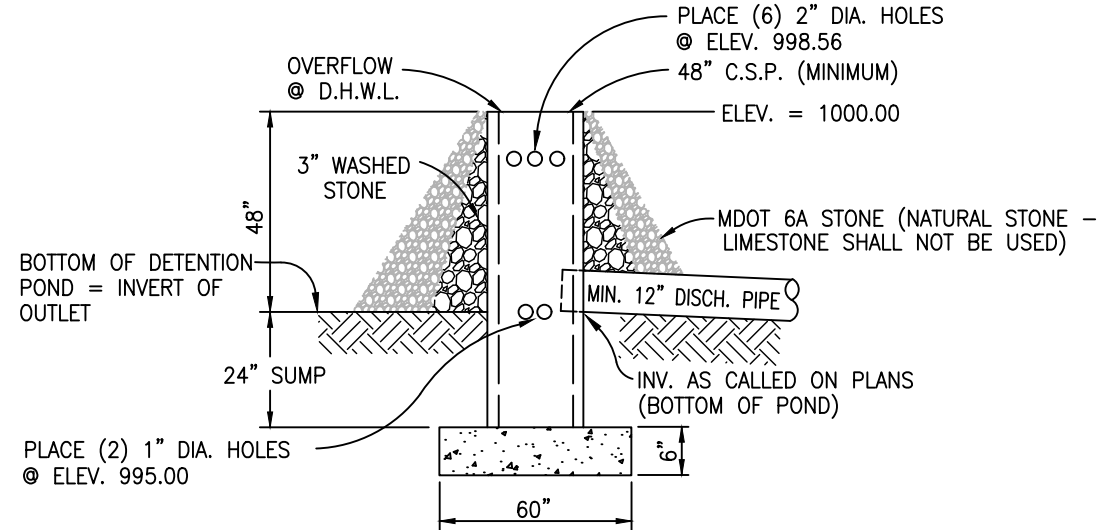
DETENTION BASIN CROSS SECTION

NOT TO SCALE



PLAN

NOTE: SET PIPE IN CONCRETE.

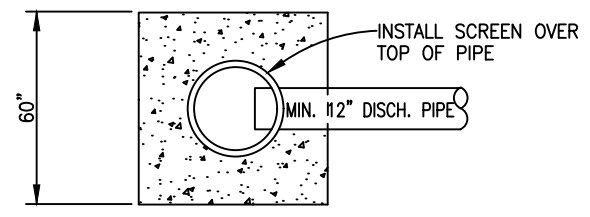


PROFILE

NOTE: UPON COMPLETION OF CONSTRUCTION STONE AROUND THE STRUCTURE SHALL BE REFRESHED WITH CLEAN STONE.

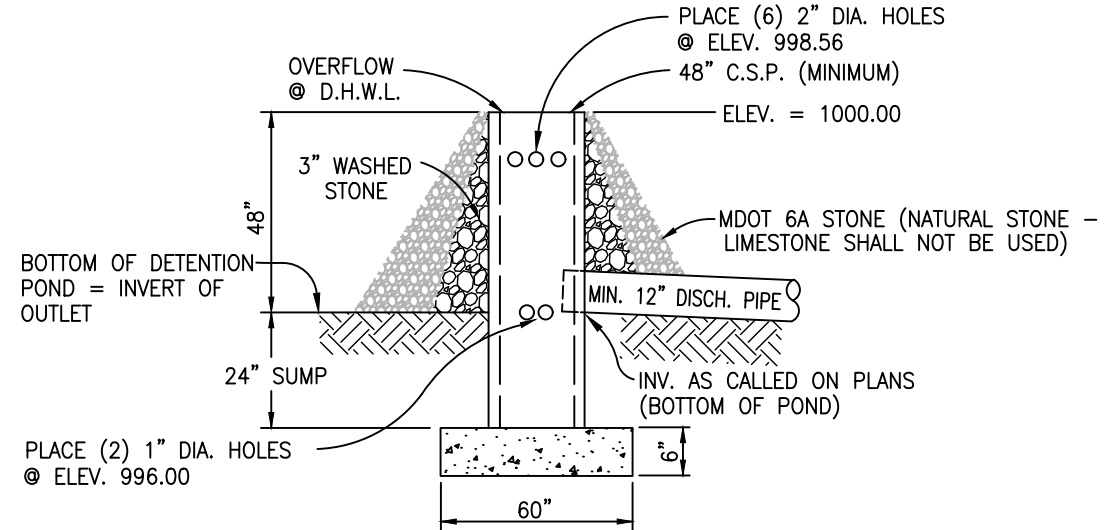
LCDC DETENTION POND OUTLET CONTROL STRUCTURE_04

(NO SCALE)



PLAN

NOTE: SET PIPE IN CONCRETE.

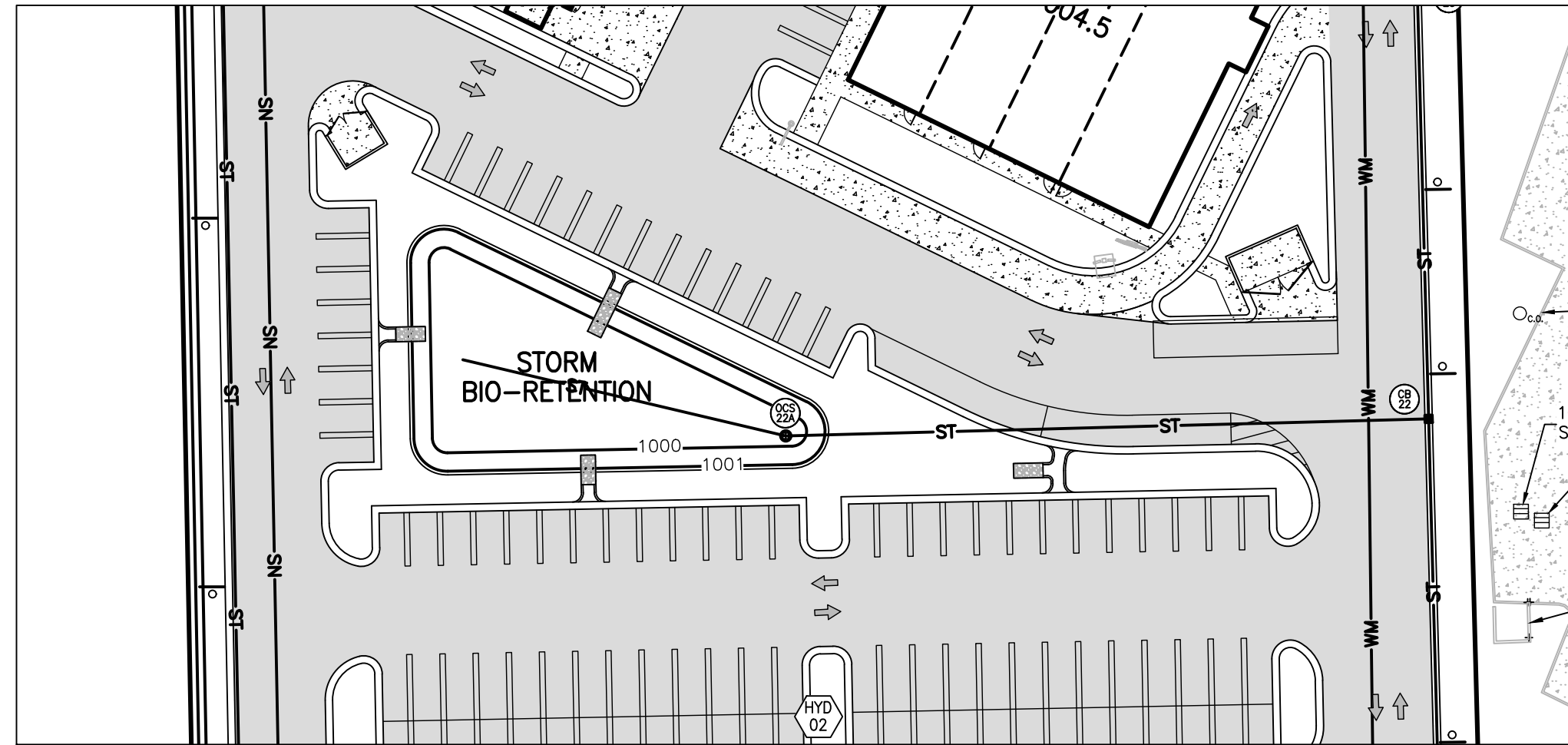


PROFILE

NOTE: UPON COMPLETION OF CONSTRUCTION STONE AROUND THE STRUCTURE SHALL BE REFRESHED WITH CLEAN STONE.

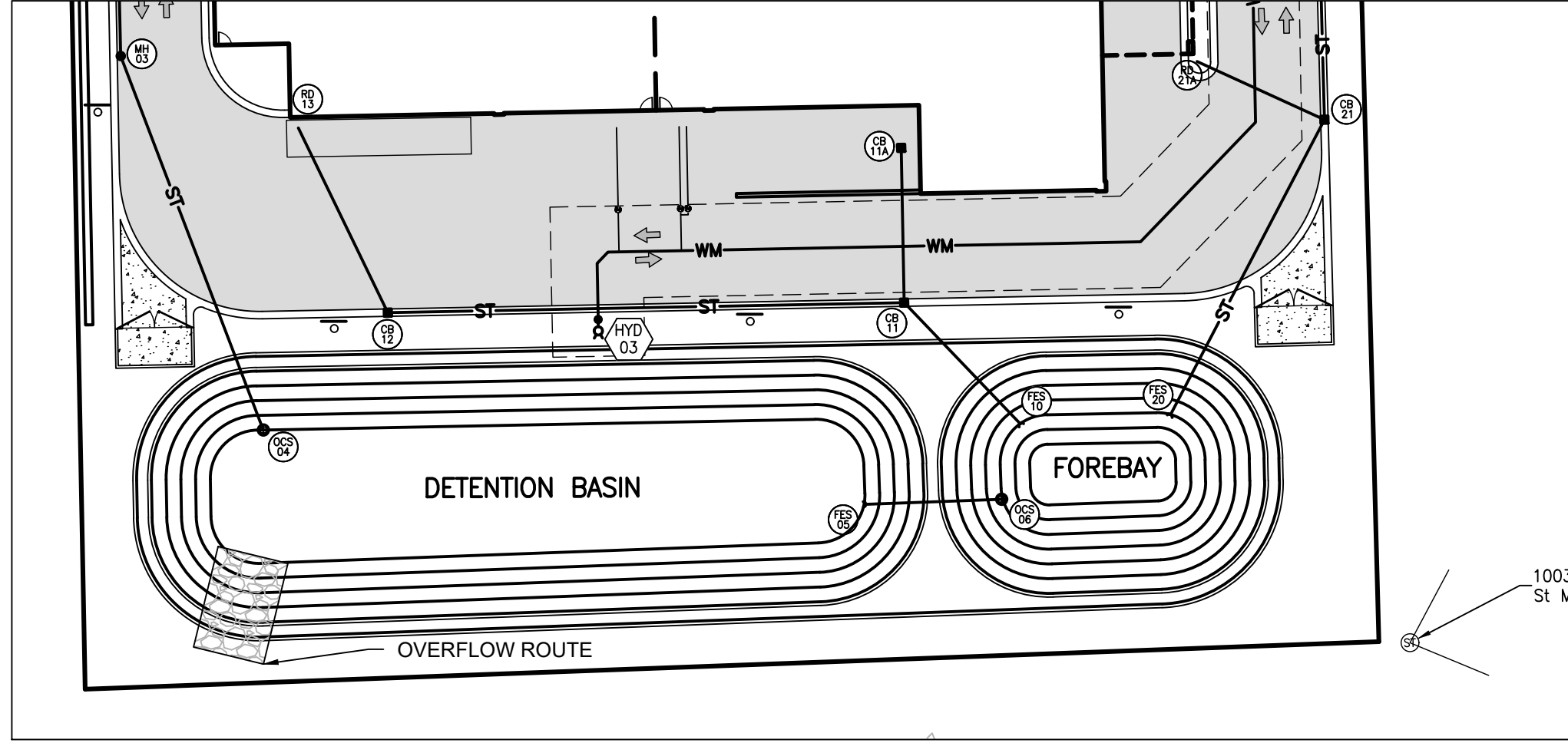
LCDC FOREBAY OUTLET CONTROL STRUCTURE_06

(NO SCALE)



STORM BIO-RETENTION PLAN VIEW

(1"=40')



DETENTION BASIN PLAN VIEW

(1"=40')



BEBOSS Engineering
 Engineers Surveyors Planners Landscape Architects
 3121 E. GRAND RIVER AVE.
 HOWELL, MI. 48843
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PROJECT 3600 E. GRAND RIVER REDEVELOPMENT

PREPARED FOR KN WEST, LLC

25900 TELEGRAPH ROAD, SUITE 550
 SOUTHFIELD, MI 48034
 248.755.7727

TITLE BASIN DETAILS

DESIGNED BY:	ST
DRAWN BY:	DH
CHECKED BY:	
SCALE:	1" = 40'
JOB NO:	24-075
DATE:	2/18/25
SHEET NO.	10

PER	TOWNSHIP	COMMENTS	DATE
1	ST	BY	3/24/25

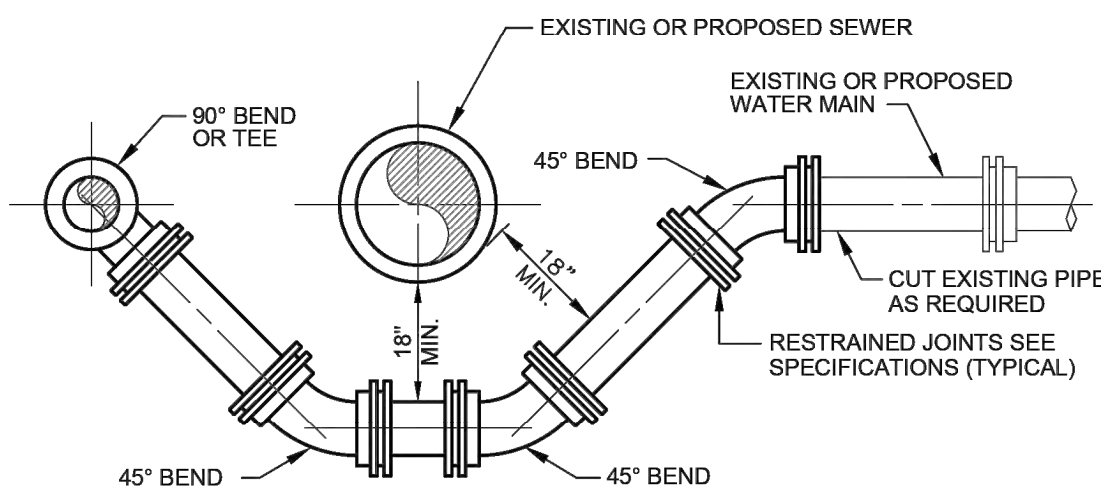


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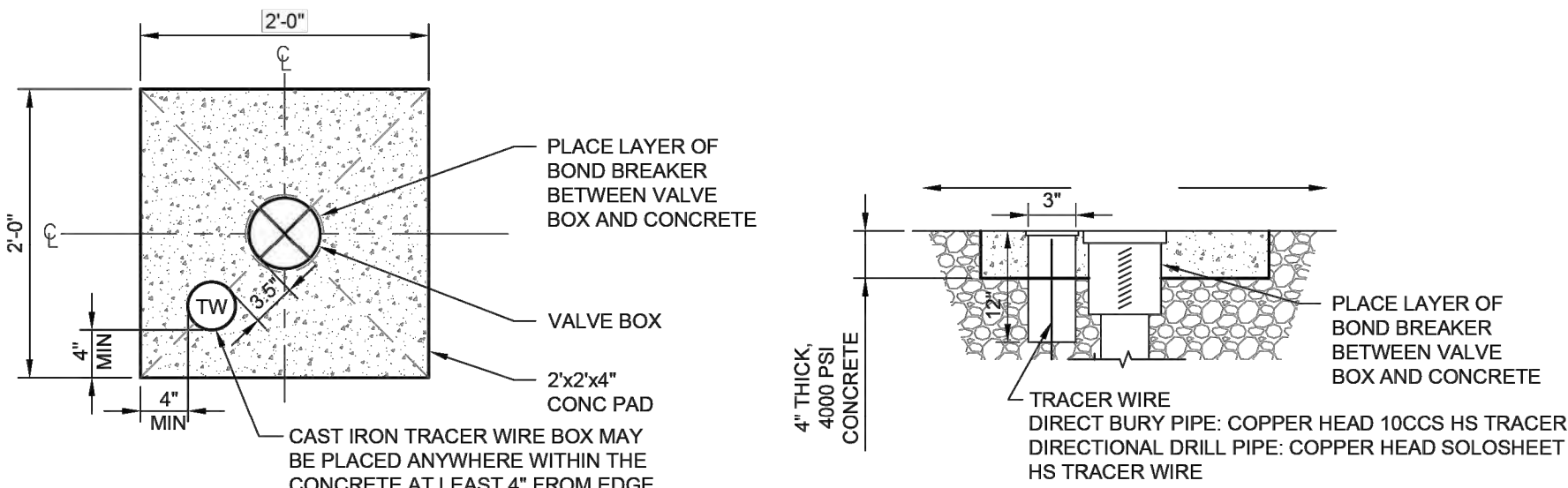
Thursday, September 14, 2023 1:52:26 PM DRAWING: O:\Projects\laning\ER12719\206-12719-00\00\CAD\SheetFiles\MHOG.sxd2 DWG

PIPE RESTRAINT SCHEDULE								
GROUND BURIED PRESSURE PIPE - POLYETHYLENE ENCASED DUCTILE IRON PIPE								
PIPE DIAMETER	TEES, 90° BENDS	45° BENDS	22-1/2° BENDS	11-1/4° BENDS	DEAD ENDS	REDUCERS (ONE SIZE REDUCTION)*	REDUCERS (TWO SIZE REDUCTION)*	
4	13	5	3	1	40	--	--	
6	19	8	4	2	58	31	--	
8	24	10	5	2	75	30	70	
12	34	14	7	3	107	57	116	
16	43	18	9	4	139	59	137	
20	52	22	10	5	169	59	134	
24	61	25	12	6	199	60	132	
30	73	30	15	7	242	85	168	
36	84	35	17	8	281	84	168	

1. LENGTHS OF PIPE RESTRAINT ARE GIVEN IN FEET.
 2. IF REQUIRED PIPE DIAMETER IS NOT LISTED IN THIS TABLE, THE NEXT LARGEST PIPE DIAMETER SHALL BE USED.
 3. THIS TABLE IS BASED ON A TEST PRESSURE OF 180 PSI (OPERATING PRESSURE PLUS WATER HAMMER. FOR OTHER TEST PRESSURES, ALL VALUES TO BE INCREASED OR DECREASED PROPORTIONALLY.
 4. THE VALUES PROVIDED OF RESTRAINT LENGTH ARE IN EACH DIRECTION FROM THE POINT OF DEFLECTION OR TERMINATION EXCEPT FOR TEES, AT WHICH ONLY THE BRANCH IN THE DIRECTION OF THE STEM.
 5. IF TIE RODS ARE USED, USE FOUR RODS MINIMUM AND ADD 1/8-INCH TO BAR DIAMETER AS CORROSION ALLOWANCE.
 - * SIZE REDUCTION IS BASED UPON THE PIPE DIAMETER SHOWN IN THIS TABLE.
- BASED UPON:
- | | |
|--------------------|-----------|
| INTERNAL PRESSURE: | 180 |
| PIPE DEPTH: | 5 |
| BEDDING CLASS: | TYPE 4 |
| SOIL TYPE: | GOOD SAND |
| SAFETY FACTOR: | 2 |



WATER MAIN UTILITY OFFSET



NOTE: ALL BOXES & ADJOINING TW BOXES SHALL BE ENCASED IN A CONC. PAD UNLESS OTHERWISE DETERMINED BY MHOG.

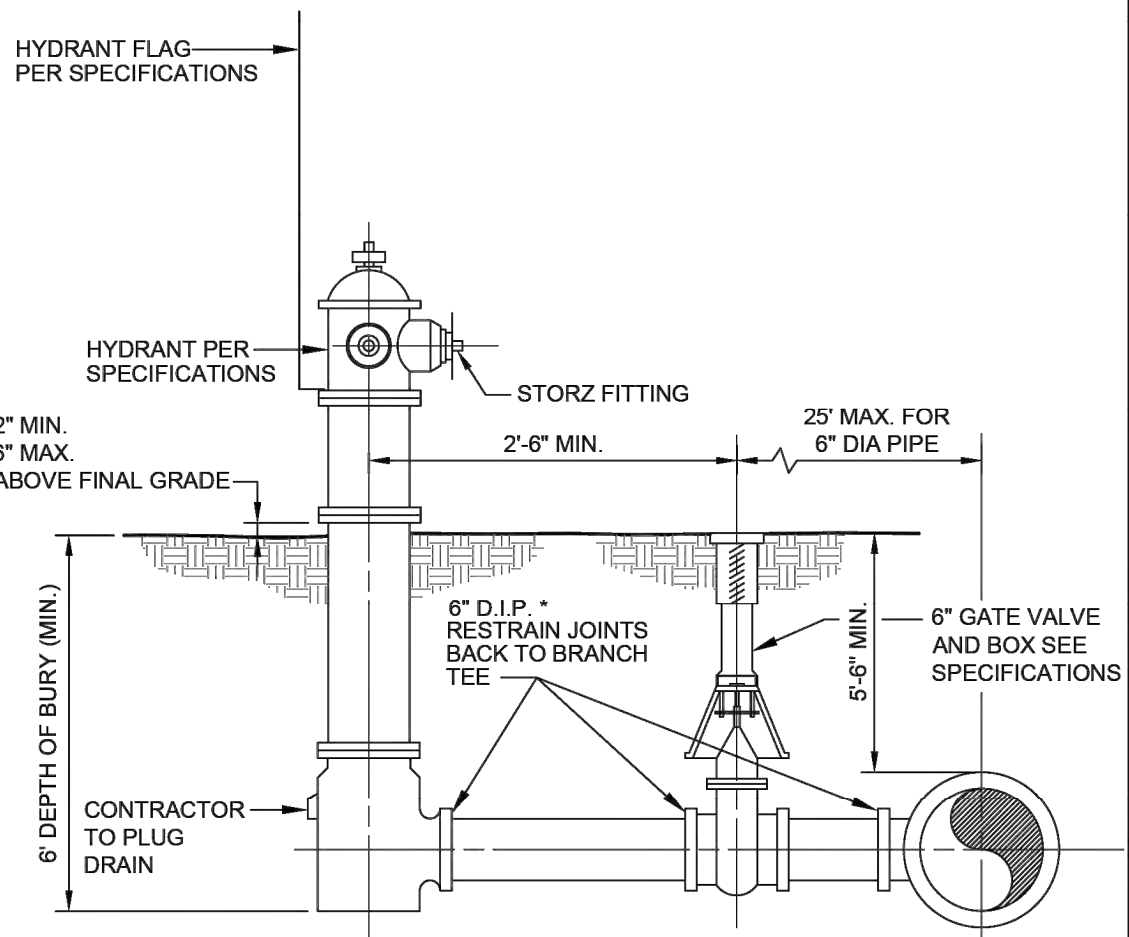
PLAN

VALVE/TRACER WIRE BOX IN CONCRETE DETAIL

NO SCALE

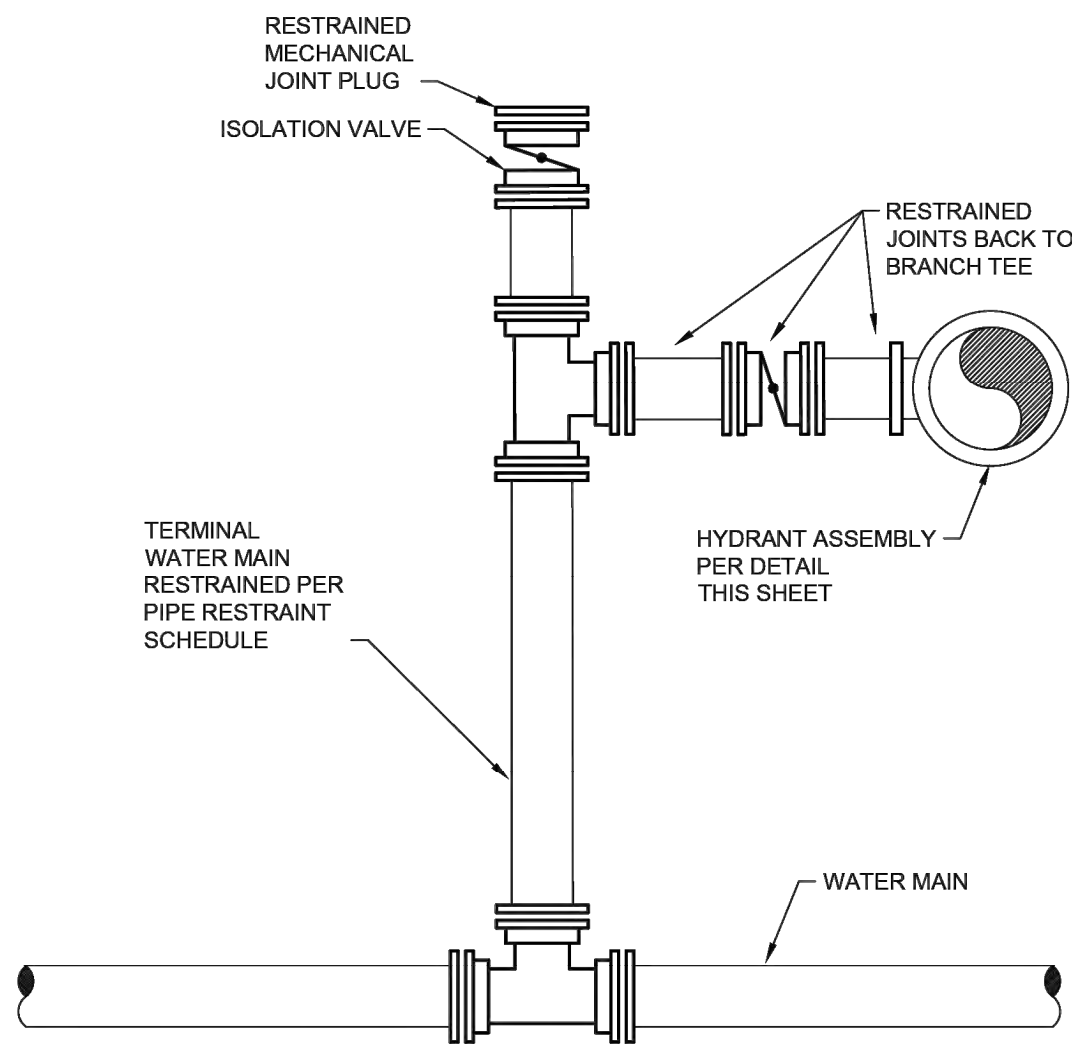
- NOTE:
1. TRACER WIRE BOXES LOCATED WITHOUT A VALVE BOX SHALL REQUIRE AN 18" X 18" CONCRETE PAD.
 2. TRACER WIRE BOX SHALL HAVE A LOCKING LID W/STANDARD AWWA PENTAGON KEY.
 3. TRACER WIRE BOX SHALL BE COPPERHEAD RB14"TP IN ASPHALT INSTALLATIONS AND CD14"TP FOR ALL OTHER INSTALLATIONS.

SECTION

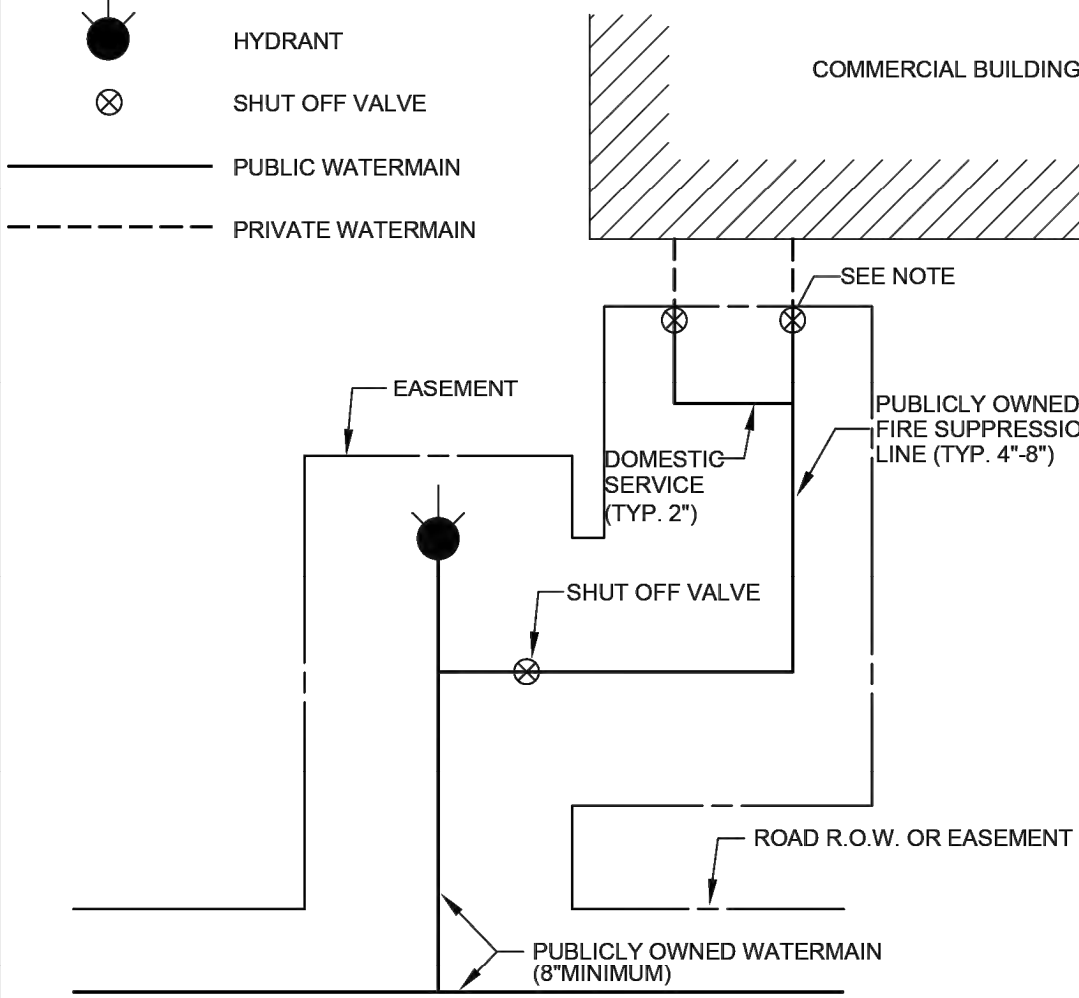


* THE LENGTH OF 6" PIPE FROM THE MAIN TO THE HYDRANT ASSEMBLY CANNOT EXCEED 25' ANY PIPE OVER 25 FEET SHALL BE 8" DIAMETER MINIMUM AND DESIGNED PER MHOG SPECIFICATIONS.

FIRE HYDRANT ASSEMBLY

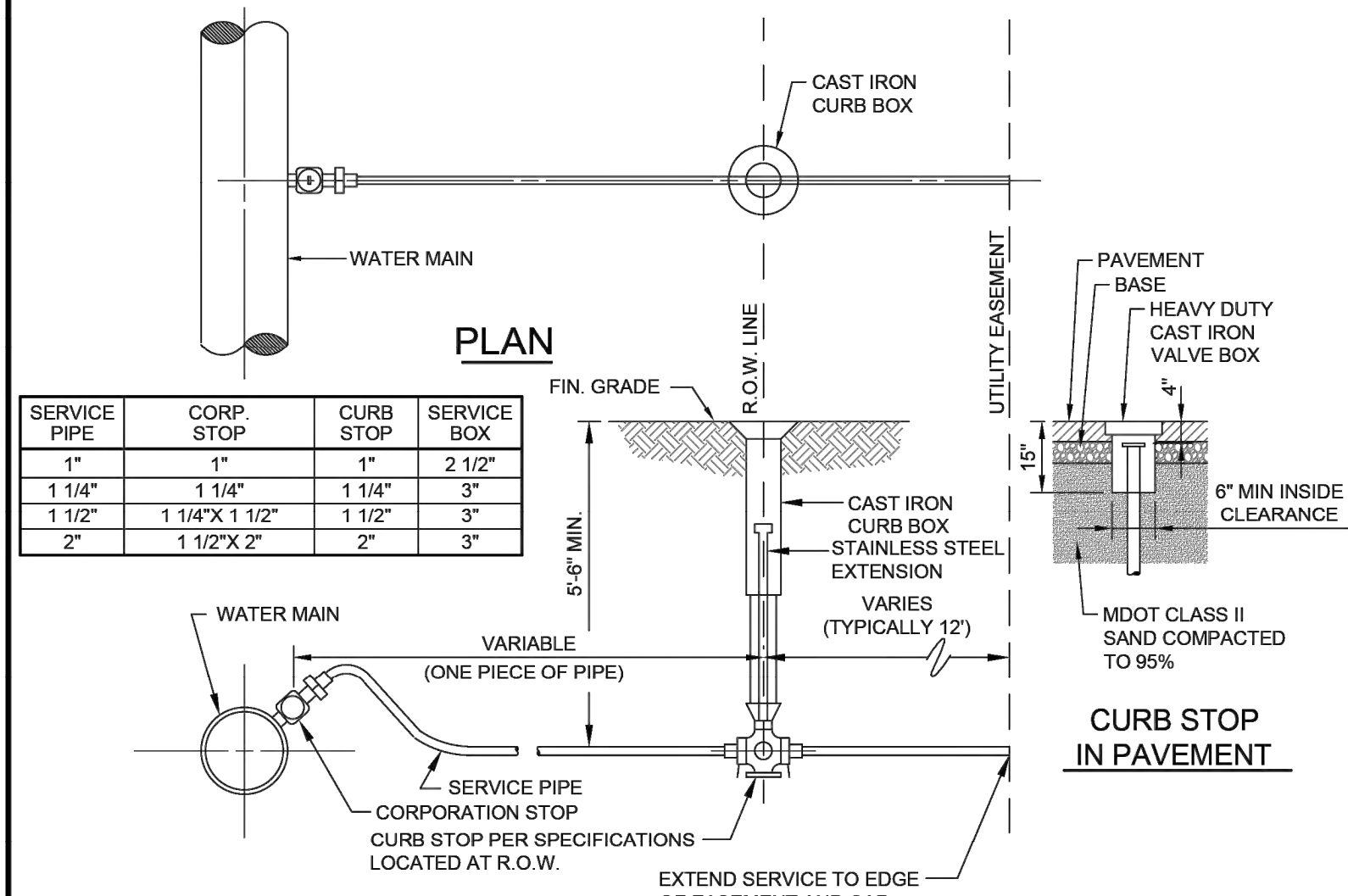


TERMINAL HYDRANT DETAIL



NOTE: FIRE SUPPRESSION LINE AND DOMESTIC SERVICE TO BE LOCATED WITHIN EASEMENT UP TO SHUTOFF VALVES OUTSIDE OF BUILDING.

COMMERCIAL BUILDING WATER SERVICE LAYOUT

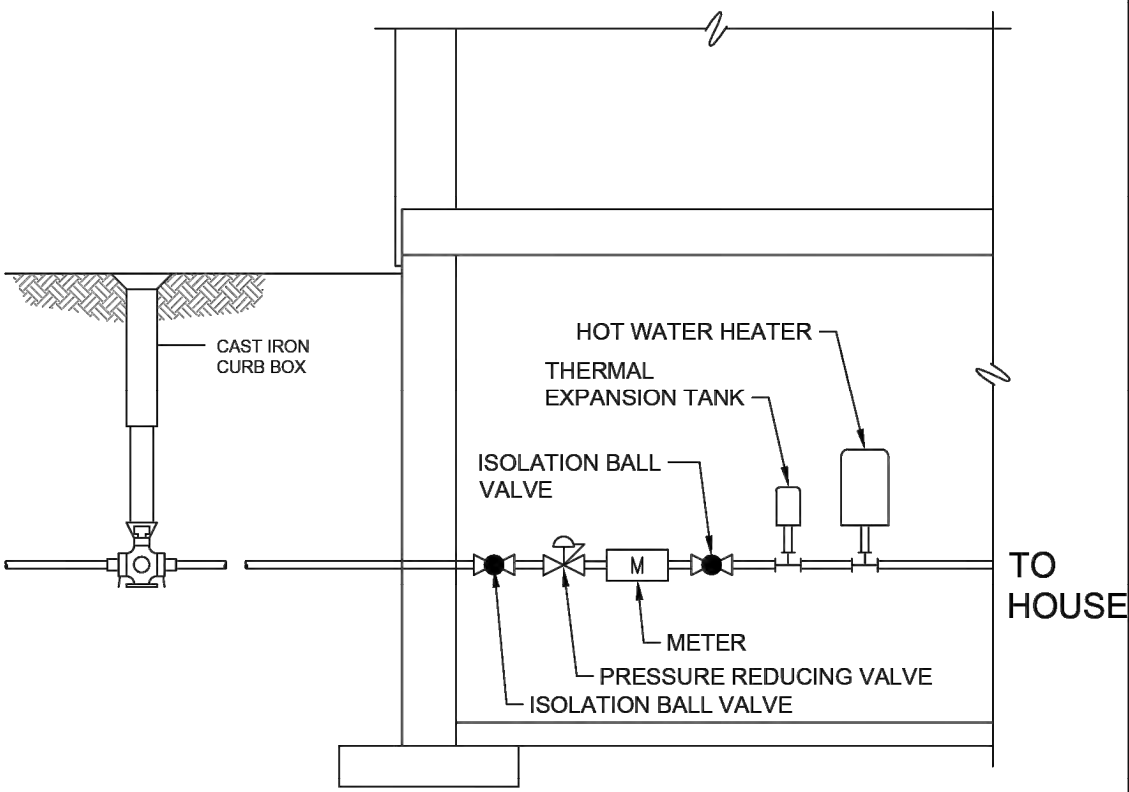


PLAN

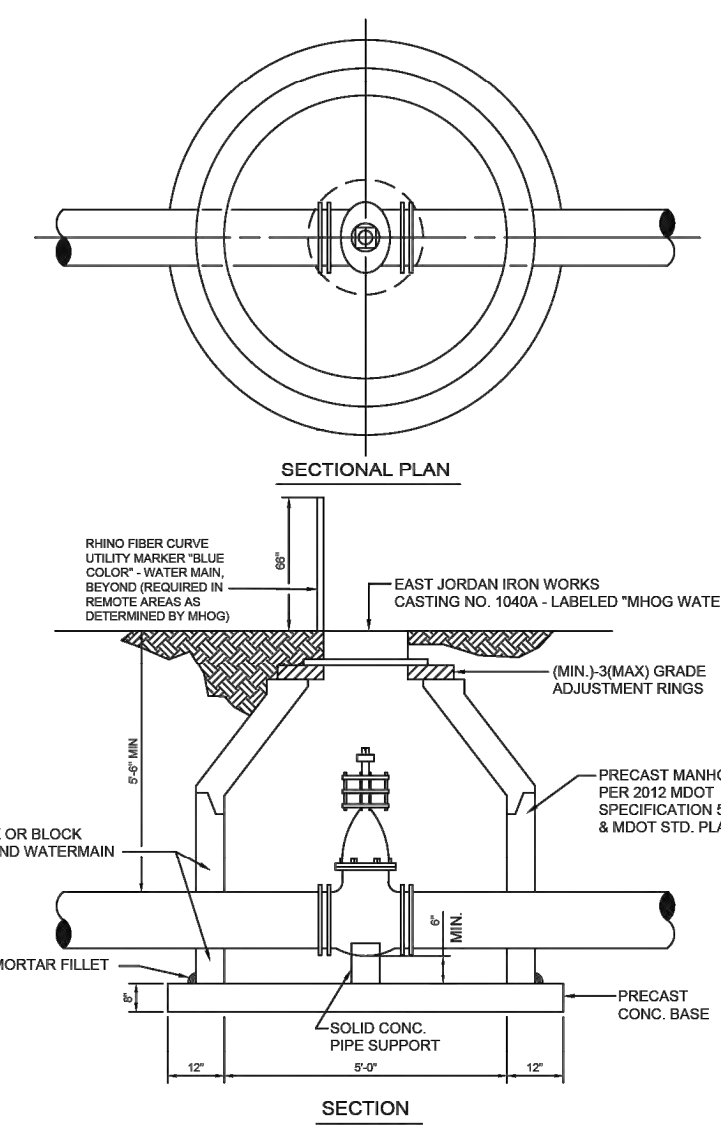
SERVICE PIPE	CORP. STOP	CURB STOP	SERVICE BOX
1"	1"	1"	2 1/2"
1 1/4"	1 1/4"	1 1/4"	3"
1 1/2"	1 1/2"	1 1/2"	3"
2"	1 1/2" X 2"	2"	3"

SECTION

WATER SERVICE LATERAL

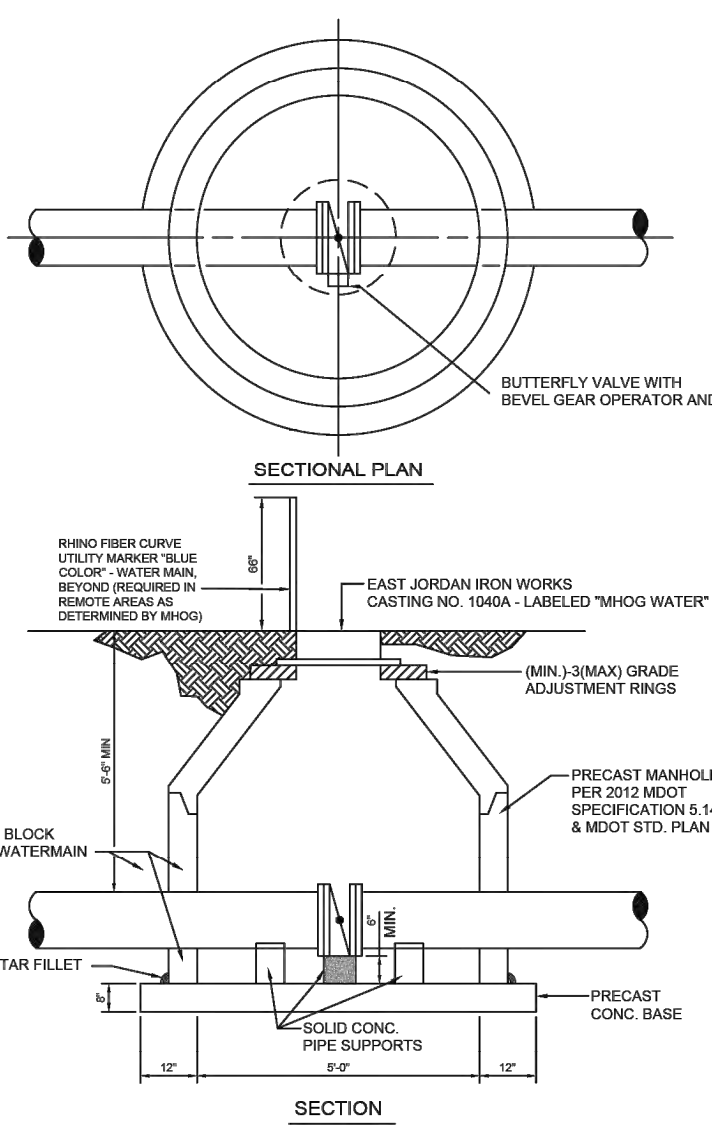


PRIVATE RESIDENCE PRESSURE REDUCING VALVE (PRV)



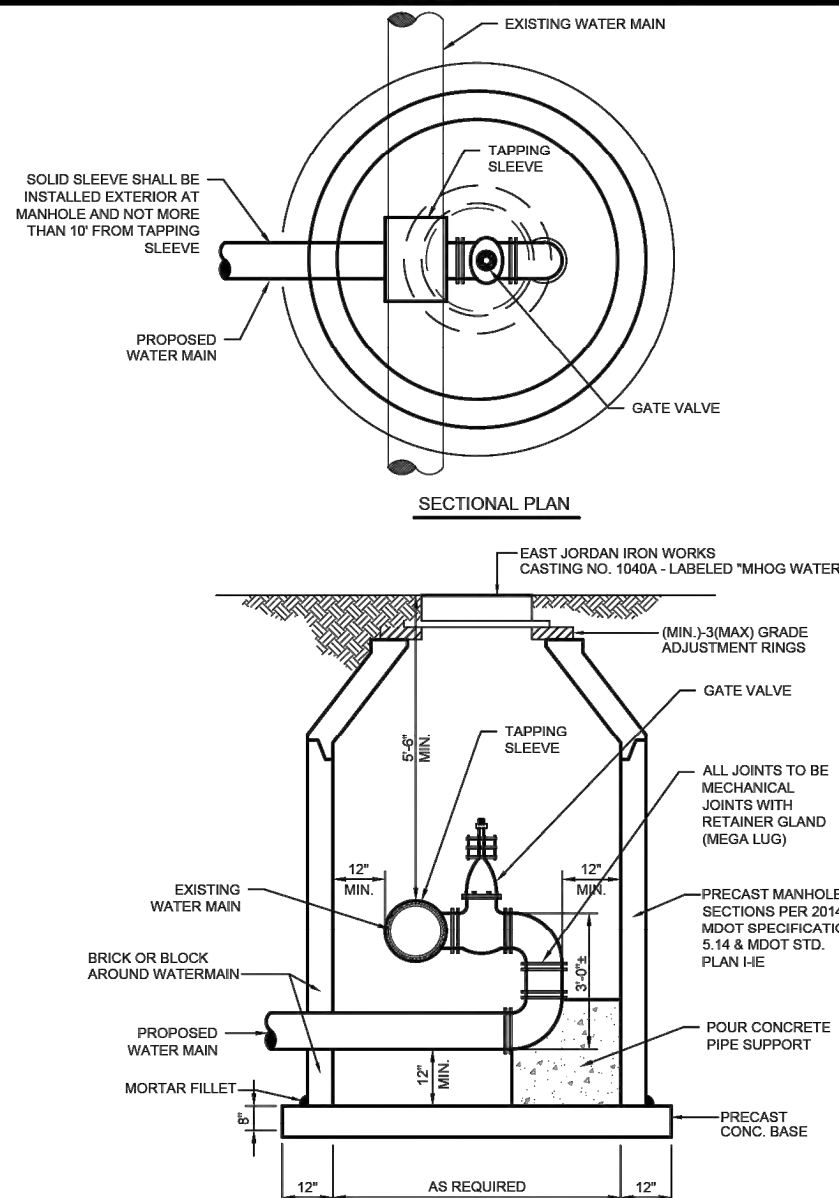
- NOTES:
1. ALL LIFT HOLES AND JOINTS SHALL BE MORTARED BOTH INSIDE AND OUTSIDE.
 2. BLOCK MANHOLES TO BE USED ONLY WITH ENGINEERS PERMISSION.
 3. NO STEPS PERMITTED.

VALVE AND GATE WELL



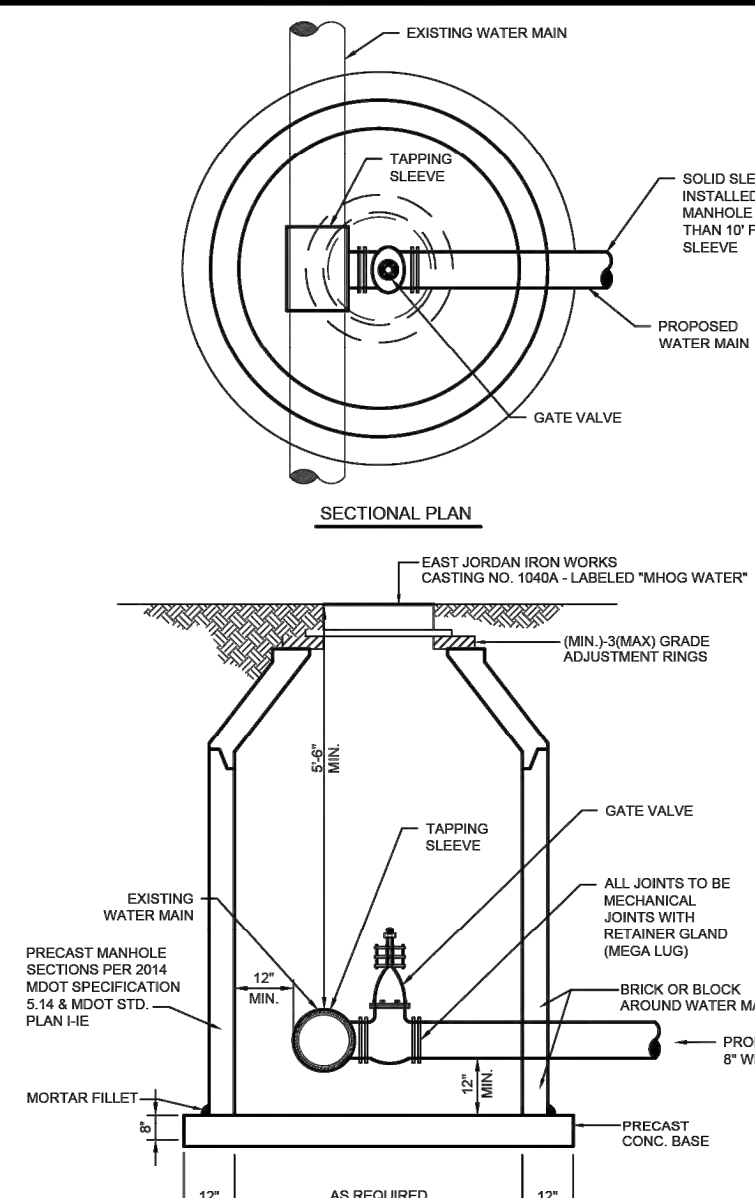
- NOTES:
1. ALL LIFT HOLES AND JOINTS SHALL BE MORTARED BOTH INSIDE AND OUTSIDE.
 2. BLOCK MANHOLES TO BE USED ONLY WITH ENGINEERS PERMISSION.
 3. NO STEPS PERMITTED.

BUTTERFLY VALVE AND WELL



- NOTES:
1. ALL LIFT HOLES AND JOINTS SHALL BE MORTARED BOTH INSIDE AND OUTSIDE.
 2. BLOCK MANHOLES TO BE USED ONLY WITH ENGINEERS PERMISSION.
 3. TAPPING SLEEVES ONLY PERMITTED FOR CONNECTIONS SMALLER THAN MAIN LINE.
 4. NO STEPS PERMITTED.

REVERSE TAP GATE WELL



- NOTES:
1. ALL LIFT HOLES AND JOINTS SHALL BE MORTARED BOTH INSIDE AND OUTSIDE.
 2. BLOCK MANHOLES TO BE USED ONLY WITH ENGINEERS PERMISSION.
 3. TAPPING SLEEVES ONLY PERMITTED FOR CONNECTIONS SMALLER THAN MAIN LINE.
 4. NO STEPS PERMITTED.

REGULAR TAP GATE WELL



MARION HOWELL OCEOLA GENOA
Sewer and Water Authority

Scale: NONE
Issued Date: JANUARY - 2014
UPDATED: MAY 2015
UPDATED: FEBRUARY 2016
UPDATED: OCTOBER 2017
UPDATED: FEBRUARY 2018
UPDATED: NOVEMBER 2022

STANDARD DETAILS

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Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

PROJECT: 3600 E. GRAND RIVER REDEVELOPMENT

PREPARED FOR: KN WEST, LLC
29500 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
248-755-7727

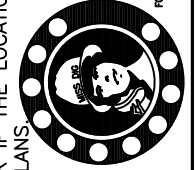
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NO	BY	DATE	REVISION	COMMENTS
1	ST	3/24/25		

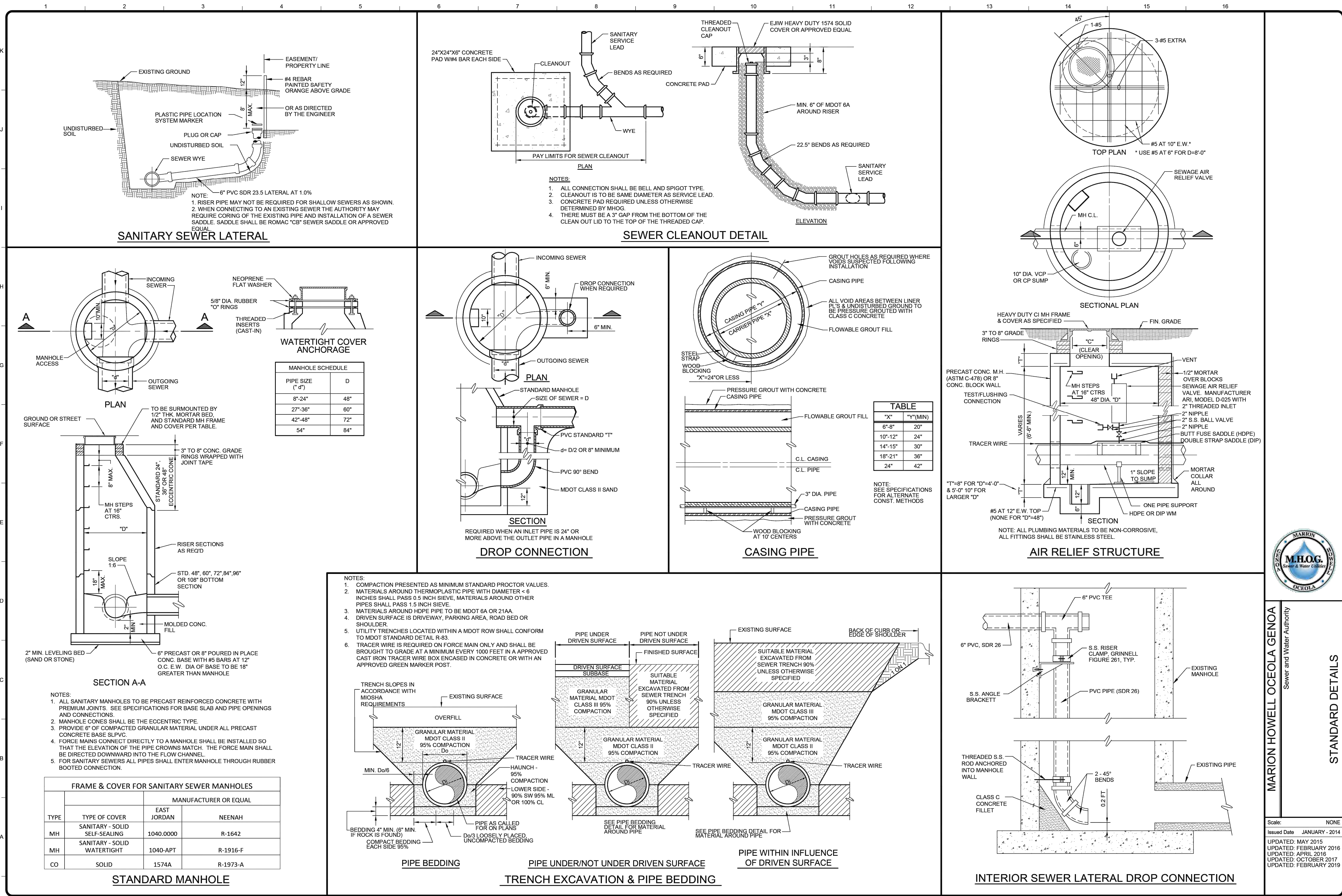
DESIGNED BY: ST
DRAWN BY: DH
CHECKED BY:
SCALE: NO SCALE
JOB NO: 24-075
DATE: 2/18/25
SHEET NO. 12



THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS MADE BY THE ENGINEER AS TO THE ACCURACY, COMPLETENESS OR ADEQUACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES DISCOVERED DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES DISCOVERED DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES DISCOVERED DURING CONSTRUCTION.



Friday, February 8, 2019 9:07:00 AM DRAWING: P:\RIVER\12719\000-12719-00-000\CAD\SheetFiles\MHog-std.dwg



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3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

PROJECT 3600 E. GRAND RIVER REDEVELOPMENT
PREPARED FOR KN WEST, LLC
29500 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
248-755-7727
TITLE MHOG DETAILS



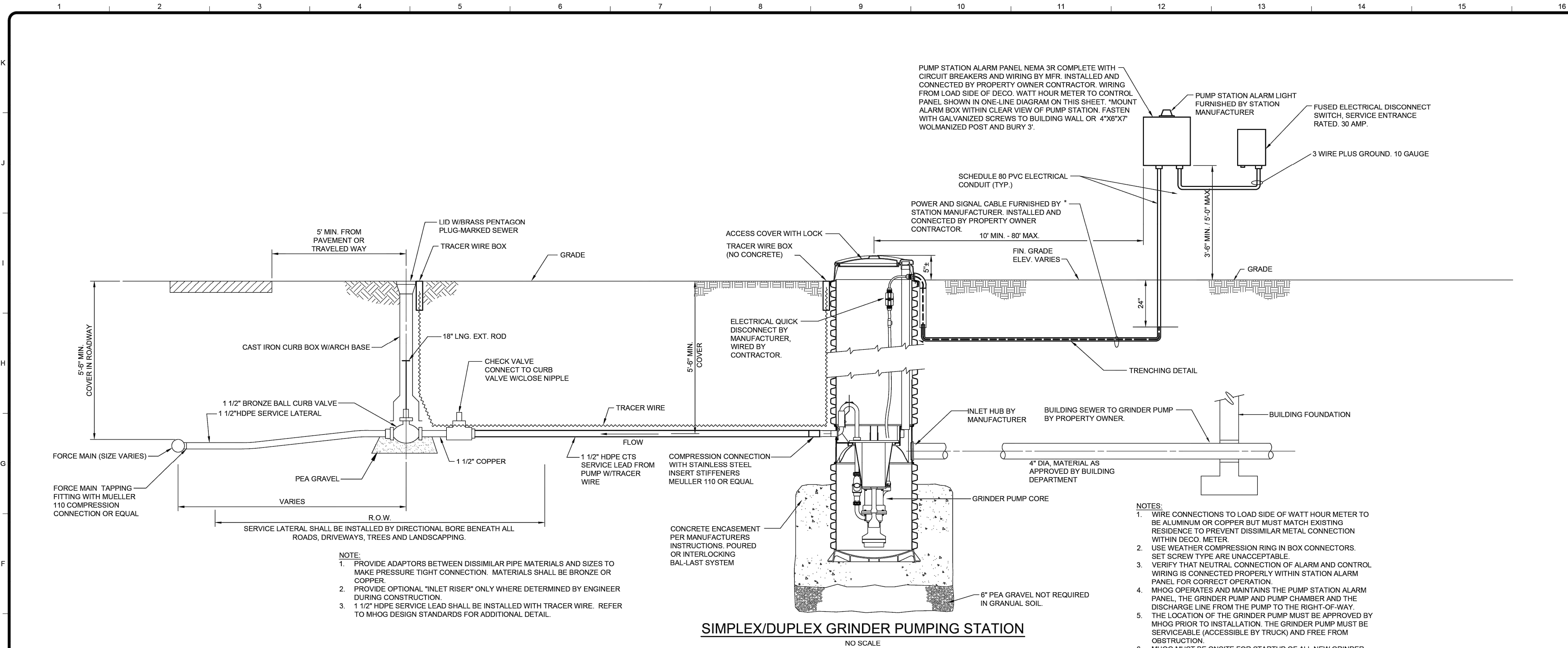
MARION HOWELL OCEOLA GENOA
Sewer and Water Authority

Scale: NONE
Issued Date: JANUARY - 2014
UPDATED: MAY 2015
UPDATED: FEBRUARY 2016
UPDATED: APRIL 2016
UPDATED: OCTOBER 2017
UPDATED: FEBRUARY 2019

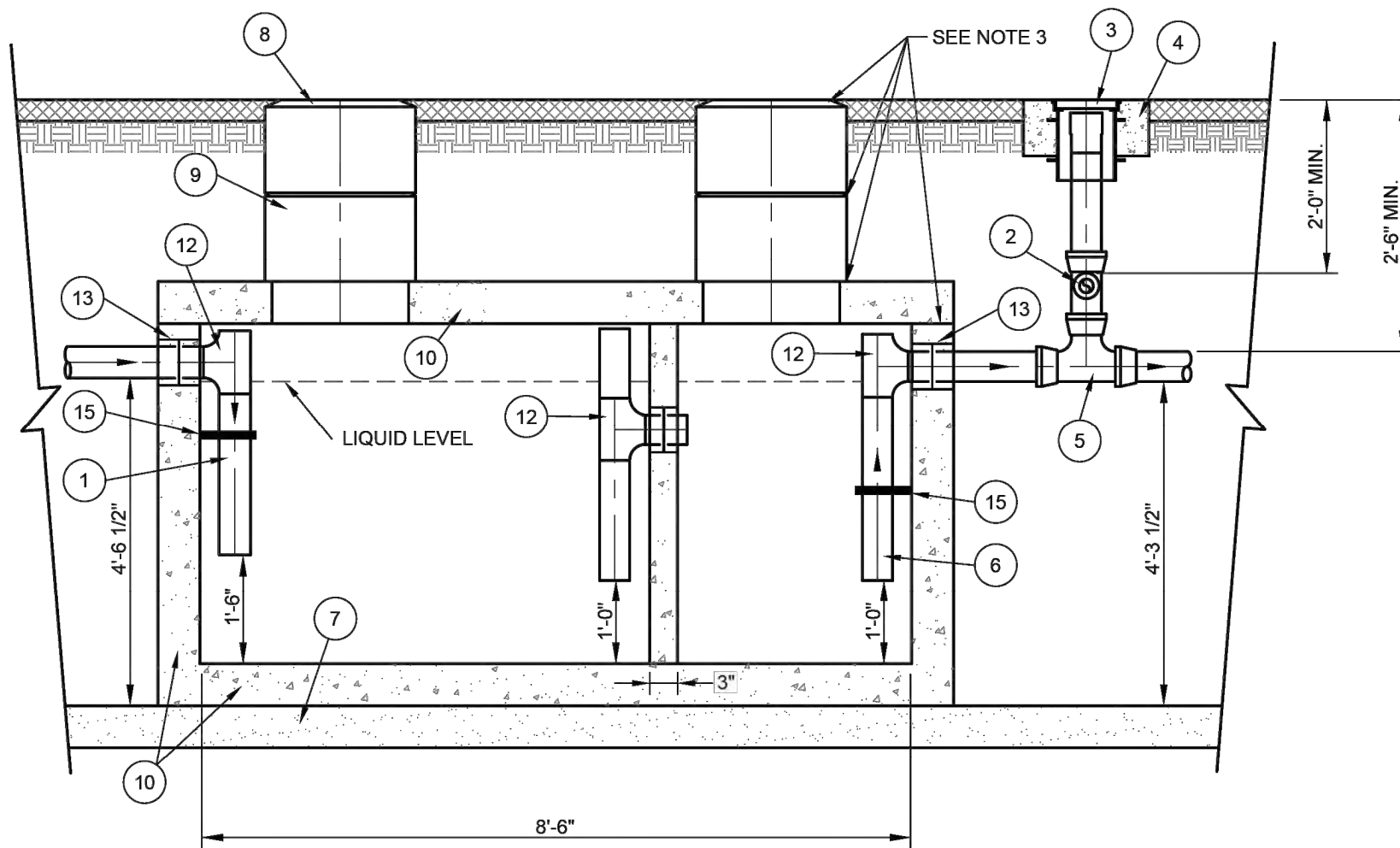
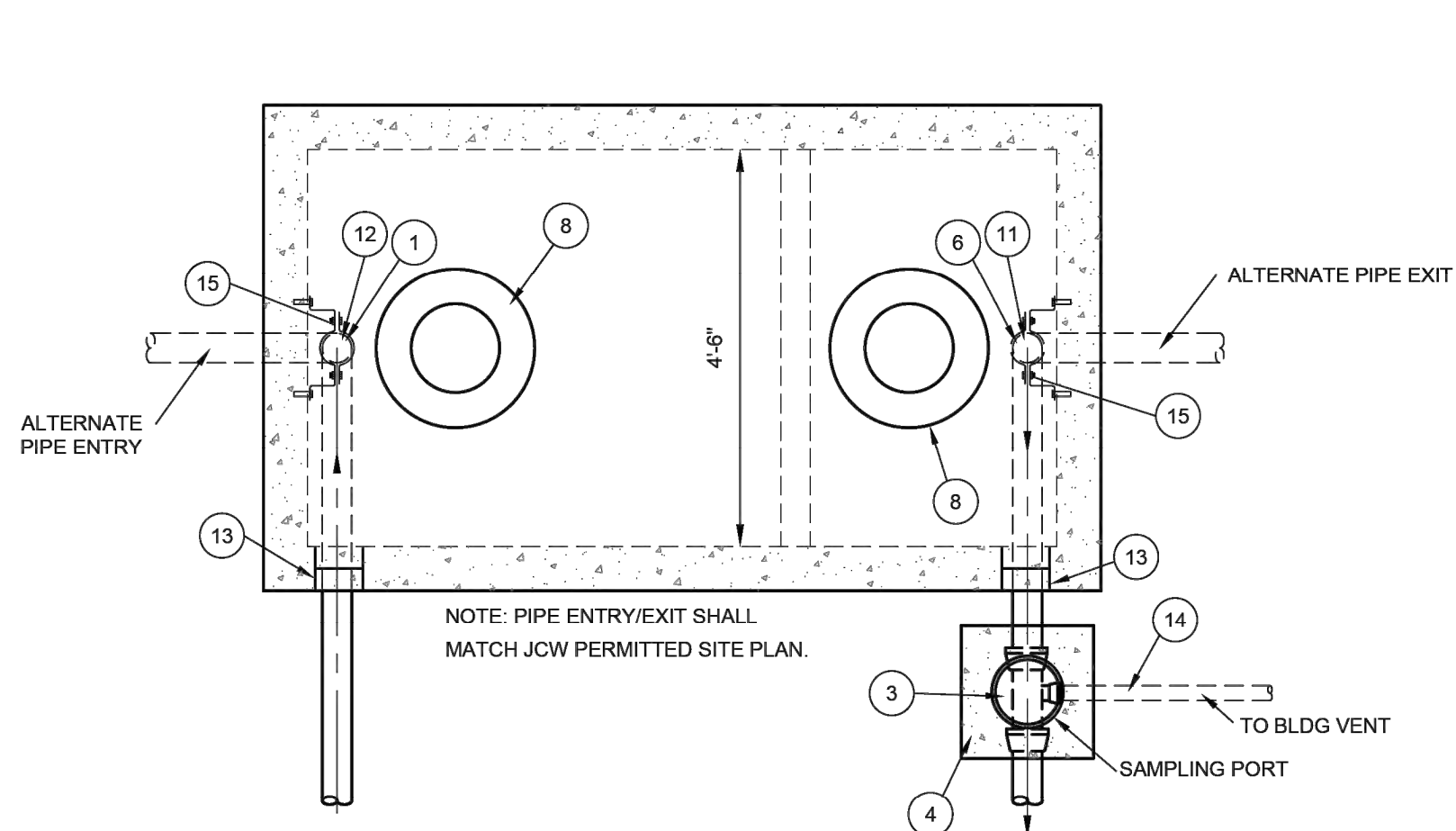
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JOB NO: 24-075
DATE: 2/18/25
SHEET NO. 14



Tuesday, November 22, 2022 11:39:42 AM DRAWING: \\local\\ER\\Projects\\Lanning\\ER\\27192004\\27192004-000\\CAD\\Sheet\\Fas\\Mhog.sld.DWG



- NOTES:
1. WIRE CONNECTIONS TO LOAD SIDE OF WATT HOUR METER TO BE ALUMINUM OR COPPER BUT MUST MATCH EXISTING RESIDENCE TO PREVENT DISSIMILAR METAL CONNECTION WITHIN DECO. METER
 2. USE WEATHER COMPRESSION RING IN BOX CONNECTORS. SET SCREW TYPE ARE UNACCEPTABLE.
 3. VERIFY THAT NEUTRAL CONNECTION OF ALARM AND CONTROL WIRING IS CONNECTED PROPERLY WITHIN STATION ALARM PANEL FOR CORRECT OPERATION
 4. MHOG OPERATES AND MAINTAINS THE PUMP STATION ALARM PANEL, THE GRINDER PUMP AND PUMP CHAMBER AND THE DISCHARGE LINE FROM THE PUMP TO THE RIGHT-OF-WAY.
 5. THE LOCATION OF THE GRINDER PUMP MUST BE APPROVED BY MHOG PRIOR TO INSTALLATION. THE GRINDER PUMP MUST BE SERVICEABLE (ACCESSIBLE BY TRUCK) AND FREE FROM OBSTRUCTION.
 6. MHOG MUST BE ONSITE FOR STARTUP OF ALL NEW GRINDER PUMPS.



ITEM	DESCRIPTION
1	4" PVC INLET PIPE*
2	4"x4"x2" TEE WITH 2" PIPE TO BUILDING VENT**
3	THREADED C/O CAP JOSAM 58860 OR APP EQUAL**
4	CONCRETE PAD
5	4"x4"x4" TWO-WAY CLEANOUT TEE*
6	4" PVC OUTLET*
7	4" - 6" GRAVEL BEDDING
8	HEAVY-DUTY CAST IRON FRAME AND COVER ***
9	CONCRETE ADJUSTMENT RINGS
10	REINFORCE AS REQUIRED FOR SERVICE CONDITIONS
11	4" PVC 90° ELBOW*
12	4" PVC TEE*
13	A-LOK OR PRESS SEAL PSX PIPE/WALL CONNECTOR
14	2" VENT PIPE (IDENTIFY PIPE TYPE, CLASS & JOINT AS REQUIRED FOR PROJECT)
15	STAINLESS STEEL PIPE SUPPORT CLAMP ****

* 6" PIPE MAY BE SUBSTITUTED TO MATCH UPSTREAM PIPE DIAMETER.
** REFER TO CLEAN OUT DETAIL(S) ON STANDARD DETAIL SHEET.
*** CLAY & BAILEY 2008 BV OR EQUAL (FROST PROOF COVERS OPTIONAL).
**** FM STAINLESS FASTENERS #63 OR EQUAL. 1/2"x2-1/2" SS BRACKET W/ 1/2"x1-1/2" FULLY THREADED SS HEX BOLT WITH 1/2" SS WASHER AND 1/2"x1-3/4" SS ANCHORS. CLAMP TO BE FACTORY INSTALLED.

- NOTES:
1. THREE COVERS AND RISERS SHOWN. TWO COVERS AND RISERS CENTERED OVER UPPER TWO BAFLES ARE OPTIONAL.
 2. INTERCEPTOR SIZE - 1000 GAL MINIMUM (REVISE THE SIZE DIMENSIONS, AS NEEDED, FOR LARGER CAPACITY INTERCEPTORS)
 3. ALL JOINTS AT THE FRAME & COVER*, CONCRETE ADJUSTMENT RINGS AND THE LID OF THE INTERCEPTOR SHALL BE SEALED WITH A MINIMUM OF TWO (2) ROWS OF 3/4 TO 1 INCH PREFORMED BUTYL JOINT SEALER AND A 6" BUTYL JOINT WRAP AROUND SLEEVE (EZ WRAP). THE ENDS OF THE 6" EZ WRAP SHALL OVERLAP BY 12".
 4. PIPING ON THE INTERIOR OF THE INTERCEPTOR SHALL BE PVC WITH SOLVENT-CEMENTED JOINTS.
 5. GREASE INTERCEPTOR INCLUDING ADJUSTMENT RINGS AND CASTINGS SHALL BE WATER TESTED FOR WATER TIGHTNESS AFTER THE BACKFILL OPERATIONS HAVE BEEN COMPLETED. WATER TESTING SHALL CONSIST OF THE FOLLOWING: 1. SEAL THE TANK, 2. FILL WITH WATER, 3. LET STAND FOR 24 HOURS, 4. REFILL TANK, 5. TANK IS APPROVED IS WATER LEVEL IS HELD FOR 1 HOUR.
 6. ONLY KITCHEN WASTE SHALL BE DIVERTED TO THE GREASE TRAP.



MARION HOWELL OCEOLA GENOA
Sewer and Water Authority

STANDARD DETAILS

Scale: NONE
Issued Date: JANUARY - 2014
UPDATED: MAY 2015
UPDATED: FEBRUARY 2016
UPDATED: APRIL 2016
UPDATED: OCTOBER 2017
UPDATED: FEBRUARY 2019
UPDATED: NOVEMBER 2022

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PROJECT: 3600 E. GRAND RIVER REDEVELOPMENT

PREPARED FOR: KN WEST, LLC
29500 TELEGRAPH ROAD, SUITE 550
SOUTHFIELD, MI 48034
248.755.7727

TITLE: MHOG DETAILS

NO	BY	DATE	REVISION	COMMENTS
1	ST	3/24/25		

DESIGNED BY: ST
DRAWN BY: DH
CHECKED BY:
SCALE: NO SCALE
JOB NO: 24-075
DATE: 2/18/25
SHEET NO.

15



THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS MADE BY THE CONTRACTOR FOR THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE PLANS.





KN WEST 3600 GRAND RIVER
PHOTOMETRIC LAYOUT
GASSER BUSH ASSOCIATES
WWW.GASSERBUSH.COM

Designer
KS
Date
03/20/2025
Scale
Not to Scale
Drawing No.
#25-38405_V2

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Bank Canopy	✗	6.3 fc	9.6 fc	2.8 fc	3.4:1	2.3:1
Drop Off Canopy	✗	6.3 fc	8.2 fc	4.2 fc	2.0:1	1.5:1
North Lot	✕	2.1 fc	4.8 fc	0.5 fc	9.6:1	4.2:1
Overall Site	+	1.4 fc	7.0 fc	0.0 fc	N/A	N/A
Property Line	+	0.3 fc	1.0 fc	0.0 fc	N/A	N/A
South Lot	✕	1.9 fc	4.0 fc	0.4 fc	10.0:1	4.8:1

Schedule										Lamp Output	LLF	Input Power	Mounting Height
Symbol	Label	QTY	Manufacturer	Catalog	Description								
□	C1	4	Lithonia Lighting	RCNY LED SYMF ALO1 Setting 1 70CRI 40K MVOLT	Recessed Canopy Symmetric Lens Diffused Adjustable Lumen Output 2,000-10,000 Lumens 70CRI 4000K 120-277V					1799	0.9	14.132	10'
○	D1	6	Gotham Architectural Lighting	IVO6 D 10LM 40K 80CRI WD P AR LS	IVO6 Downlight 1000 Lumens 4000K 80+ CRI Wide Batwing Open Parabolic Clear Anodized Specular					969	0.9	9.83	14'
□ ○	S1	6	Lithonia Lighting	DSX0 LED P3 40K 70CRI T2M	D-Series Size 0 Area Luminaire P3 Performance Package 4000K CCT 70 CRI Type 2 Medium					8694	0.9	68.95	20'
□ ○	S2	4	Lithonia Lighting	DSX0 LED P4 40K 70CRI T4M	D-Series Size 0 Area Luminaire P4 Performance Package 4000K CCT 70 CRI Type 4 Medium					11296	0.9	93.04	20'
□ ○	S3	8	Lithonia Lighting	DSX0 LED P4 40K 70CRI T5M	D-Series Size 0 Area Luminaire P4 Performance Package 4000K CCT 70 CRI Type 5 Medium					11622	0.9	186.08	20'
□	W1	7	Lithonia Lighting	DSXW1 P4 40K T3M	5000 4000K 70CRI Type 3 Medium					4142	0.9	28.68	10' & 12'
□	W2	17	Lithonia Lighting	DSXW1 P4 40K TFTM	5000 4000K 70CRI Forward Throw Medium					4214	0.9	28.68	10' & 12'
□	W3	9	Lithonia Lighting	WPX0 LED ALO-1 40K MVOLT	WPX0 LED, 850 Lumen setting, 4000K Setting, 120-277V					829	0.9	6.0096	8'

General Note

1. SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT.
2. SEE LUMINAIRE SCHEDULE FOR LIGHT LOSS FACTOR.
3. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GRADE AND/OR FLOOR UP.

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UNLESS EXEMPT, PROJECT MUST COMPLY WITH LIGHTING CONTROLS REQUIRMENTS DEFINED IN ASHRAE 90.1 2013. FOR SPECIFIC INFORMATION CONTACT GBA CONTROLS GROUP AT CONTROLS@GASSERBUSH.COM OR 734-266-6705.

Alternates Note

THE USE OF FIXTURE ALTERNATES MUST BE RESUBMITTED TO THE CITY FOR APPROVAL.

Ordering Note

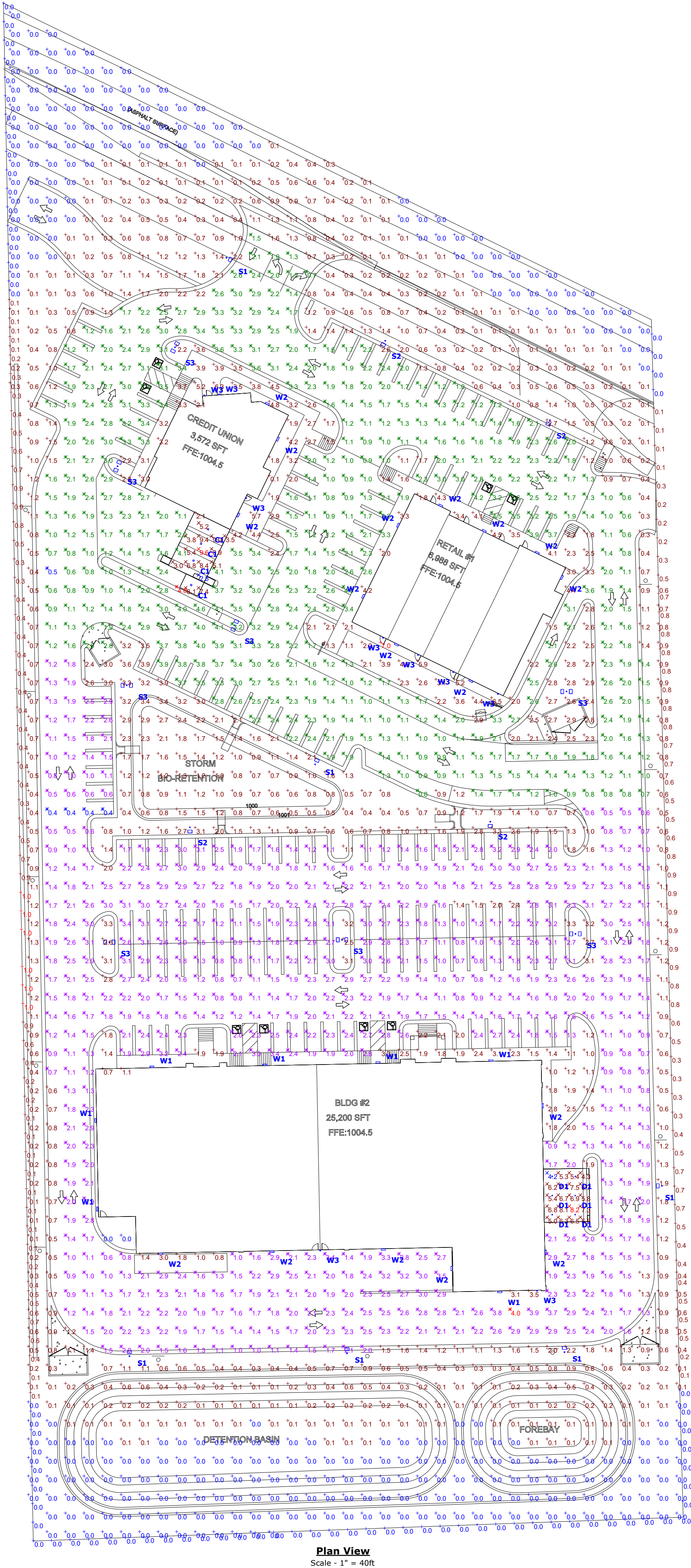
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Mounting Height Note

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[illegible]



D-Series Size 1

LED Wall Luminaire

Specifications

Luminaire Width: 152mm Height: 78mm

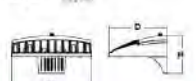
Depth 152mm

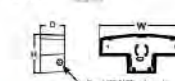
Height 152mm

Back Box (BHX, EWZC)

Width: 152mm Depth: 152mm Height: 78mm

Back Box (BHX, EWZC) Width: 152mm Depth: 152mm Height: 78mm





Understanding Information

EXAMPLE: D50W1 LED 40x70x100 T8M MVOLT SM DIBZDT3

D50W1		D50		D40		D30		D20		D10	
Item	Value	Item	Value	Item	Value	Item	Value	Item	Value	Item	Value
Power	25W	25W	25W	18W	18W	12W	12W	6W	6W	3W	3W
Power Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Beam Angle	60°	60°	60°	60°	60°	60°	60°	60°	60°	60°	60°
Color Temperature	4000K	4000K	4000K	4000K	4000K	4000K	4000K	4000K	4000K	4000K	4000K
Color Rendering Index	90	90	90	90	90	90	90	90	90	90	90
Life Span	50,000h	50,000h	50,000h	50,000h	50,000h	50,000h	50,000h	50,000h	50,000h	50,000h	50,000h
Warranty	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years

Options

Optional Accessories

1. Back Box (BHX, EWZC)

2. Mounting Bracket (BHX, EWZC)

Optional Accessories

1. Back Box (BHX, EWZC)

2. Mounting Bracket (BHX, EWZC)

Options

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2. Mounting Bracket (BHX, EWZC)

Options

1. Back Box (BHX, EWZC)

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Accessories

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1. Back Box (BHX, EWZC)

2. Mounting Bracket (BHX, EWZC)



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[illegible][illegible][illegible]

General Note

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2. SEE LUMINAIRE SCHEDULE FOR LIGHT LOSS FACTOR.
3. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"

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Alternates Note

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Ordering Note

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KN WEST 3600 GRAND RIVER
PHOTOMETRIC LAYOUT
GASSER BUSH ASSOCIATES
WWW.GASSERBUSH.COM

Designer

KS

Date _____

03/20/2025

Scale

Not to Scale
Drawing No.

#25-38405 V2

Key Plan: NO SCALE

Client:
KN West, LLC
Bloomfield Township

Project:
Howell Retail
Development

3600 E. Grand River Avenue
Howell, Michigan 48843

Seal:



Date	Issued For
10/18/24	REVIEW
10/21/24	APPROVAL
10/22/24	APPROVAL
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

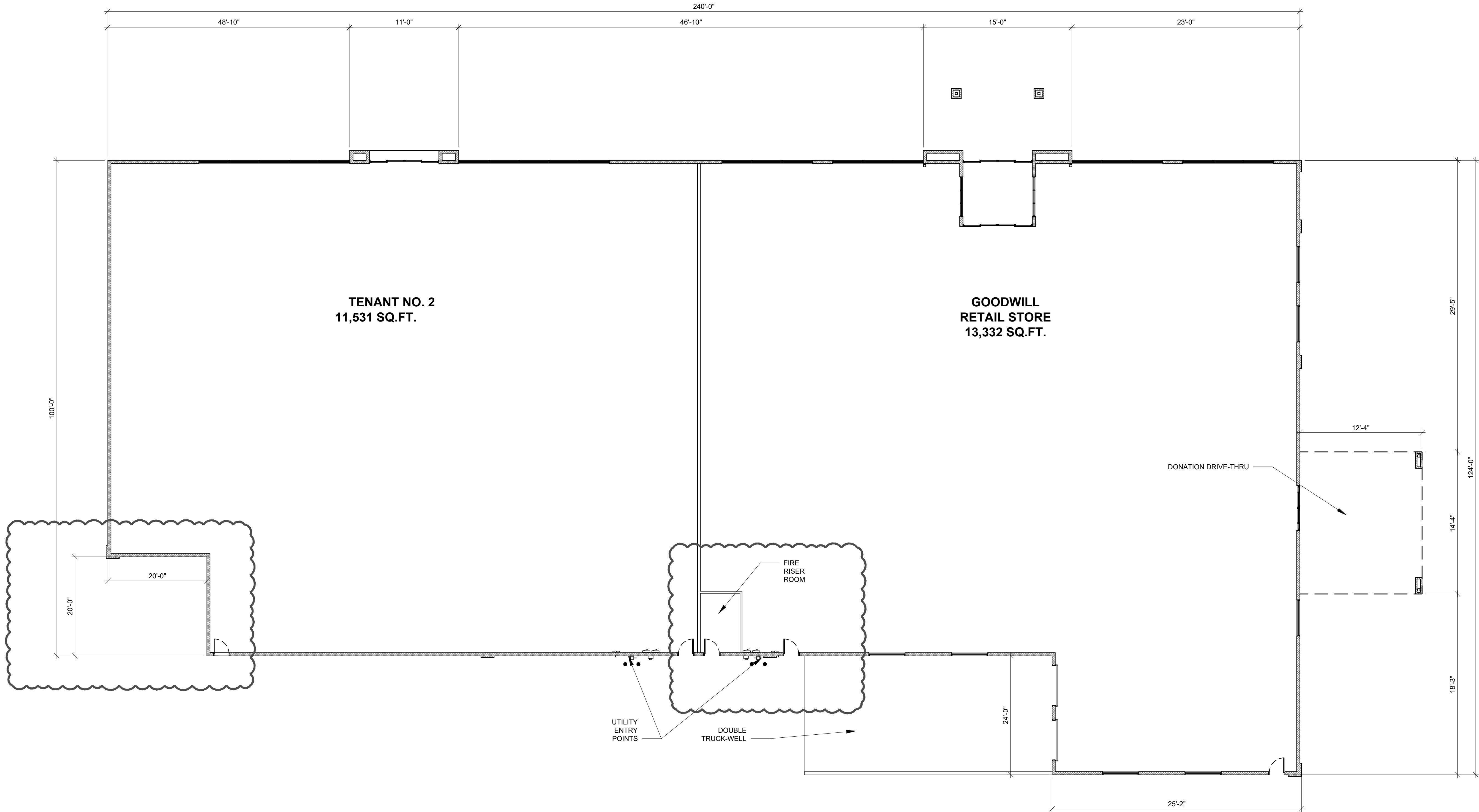
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Checked: RLJ
Approved: RLJ

Sheet Title:
BUILDING NO. 1
FLOOR PLAN

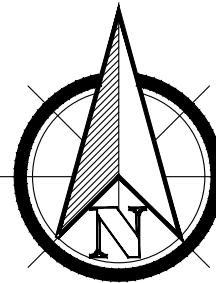
Project No.: 24-141

Sheet Number: A-210-1

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DURING THE CONSTRUCTION PROCESS, THE BUILDING WILL BE EVALUATED FOR EMERGENCY RESPONDER RADIO SIGNAL STRENGTH. IF COVERAGE IS FOUND TO BE QUESTIONABLE OR INADEQUATE, THE CONTRACTOR OR THE BUILDING OWNER SHALL HIRE AN APPROVED CONTRACTOR TO CONDUCT A GRID TEST OF THE FACILITY. IF THE SIGNAL STRENGTH COVERAGE IS FOUND TO BE NON-COMPLIANT, AN APPROVED EMERGENCY RESPONDER RADIO COVERAGE SYSTEM SHALL BE PROVIDED IN THE BUILDING.



BUILDING NO. 1 FLOOR PLAN

SCALE: 1/8" = 1'-0"

23,262 SQ.FT. RETAIL BUILDING



Date	Issued For
10/18/24	REVIEW
10/24/24	REVIEW
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

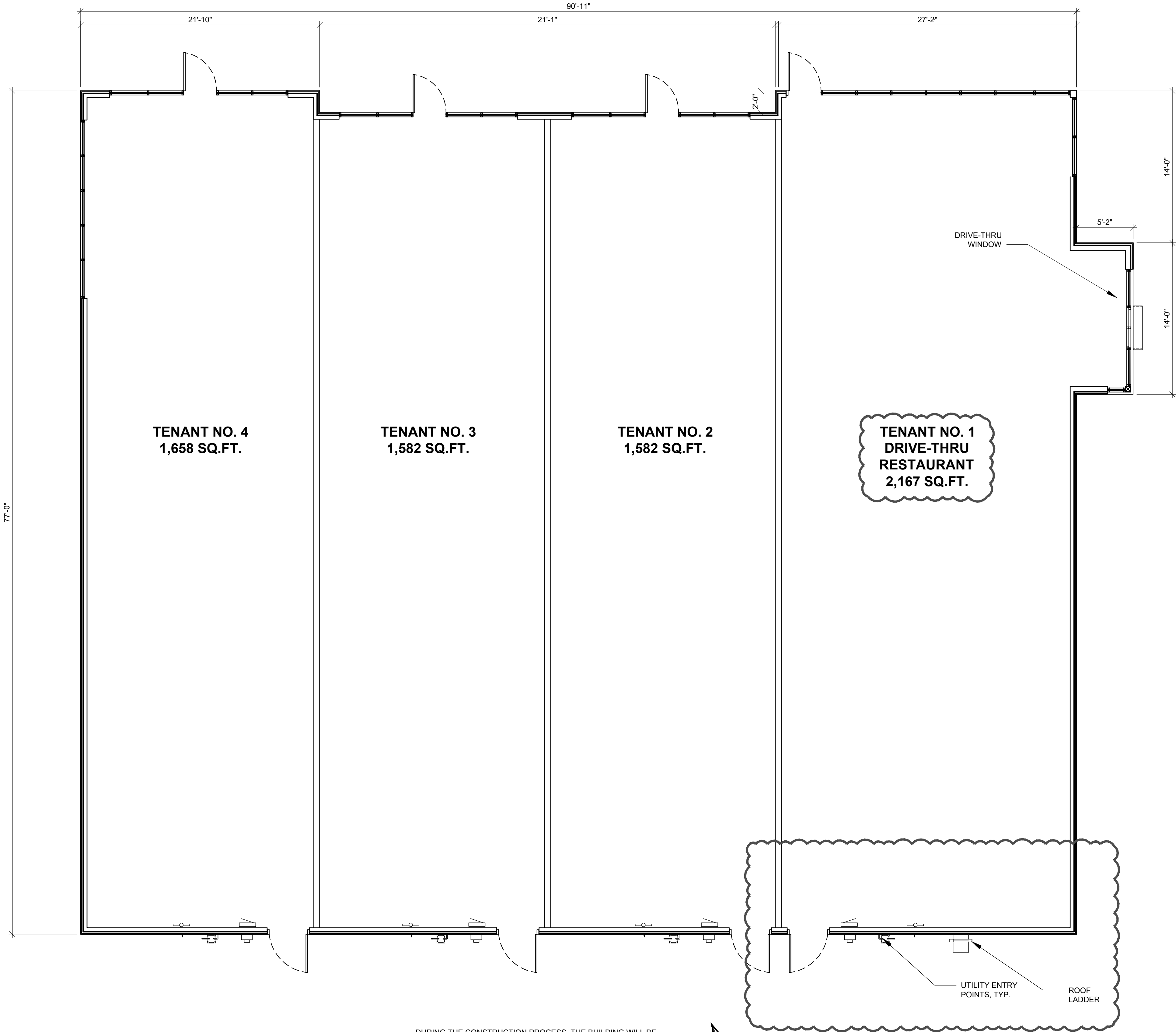
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Approved:	RLJ

Sheet Title:
BUILDING NO. 2
FLOOR PLAN

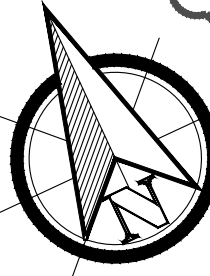
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RADIO COVERAGE SYSTEM SHALL BE PROVIDED IN THE BUILDING.



BUILDING NO. 2 FLOOR PLAN

SCALE: 1/4" = 1'-0"

6,821SQ.FT. RETAIL/RESTAURANT BUILDING

Key Plan: NO SCALE

Client:
KN West, LLC
Bloomfield Township

Project:
Howell Retail
Development

3600 E. Grand River Avenue
Howell, Michigan 48843

Seal:



Date	Issued For
10/18/24	REVIEW
10/22/24	APPROVAL
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

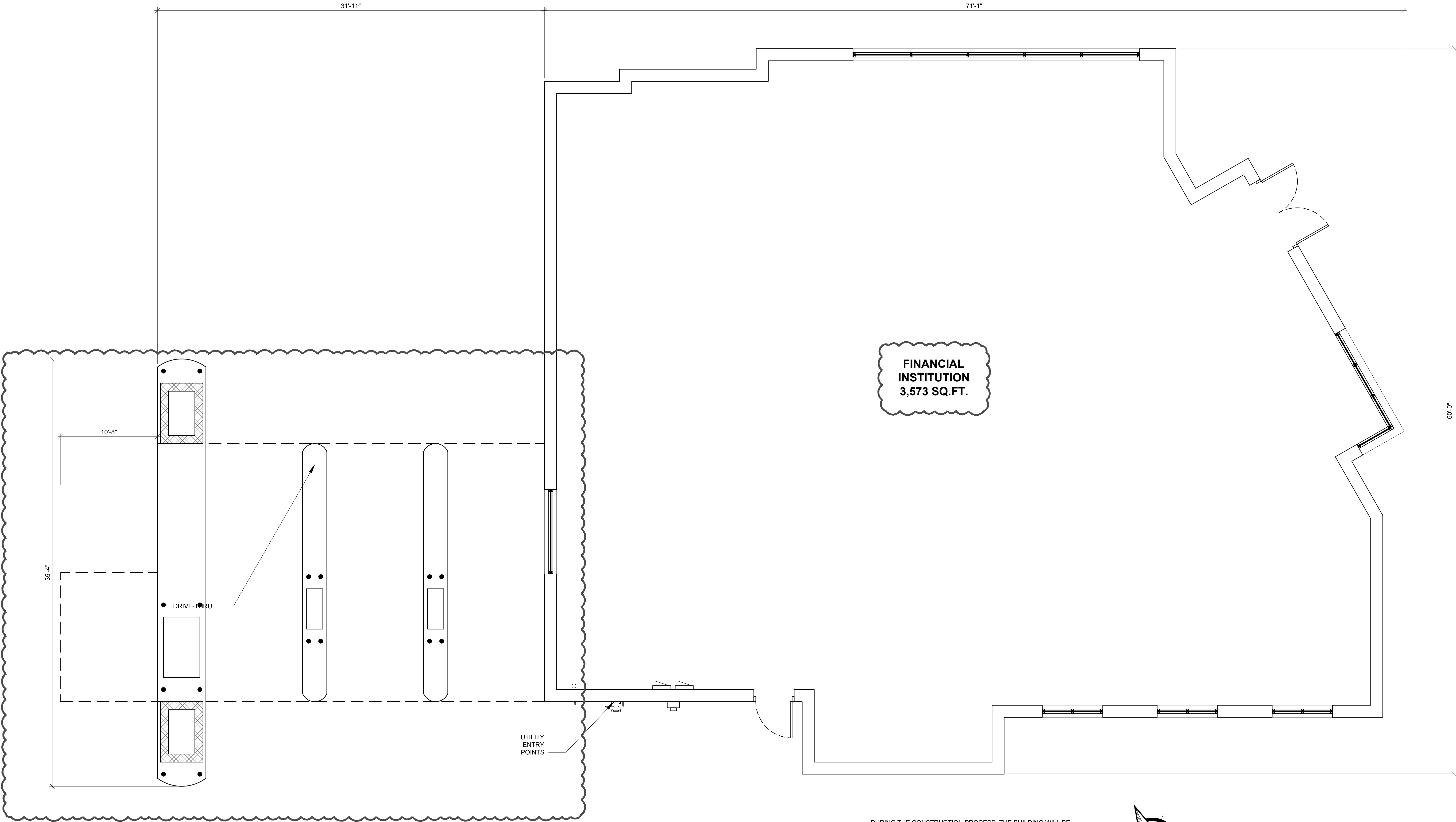
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Sheet Title:
BUILDING NO. 3
FLOOR PLAN

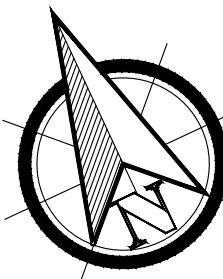
Project No.: 24-141

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BUILDING NO. 3 FLOOR PLAN
SCALE: 1/4" = 1'-0"
3,600 SQ.FT. FINANCIAL INSTITUTION



Date	Issued For
10/21/24	APPROVAL
10/22/24	APPROVAL
11/06/24	REVISIONS
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

Drawn: RLJ
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Approved: RLJ

Sheet Title:
BUILDING NO. 1
EXTERIOR
ELEVATIONS

Project No.: 24-141

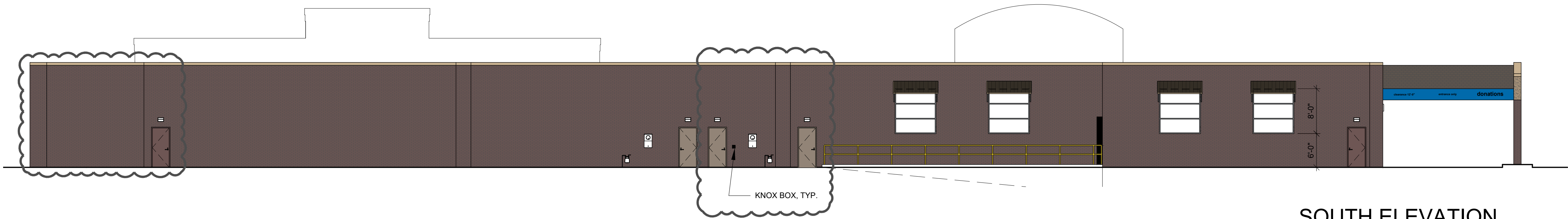
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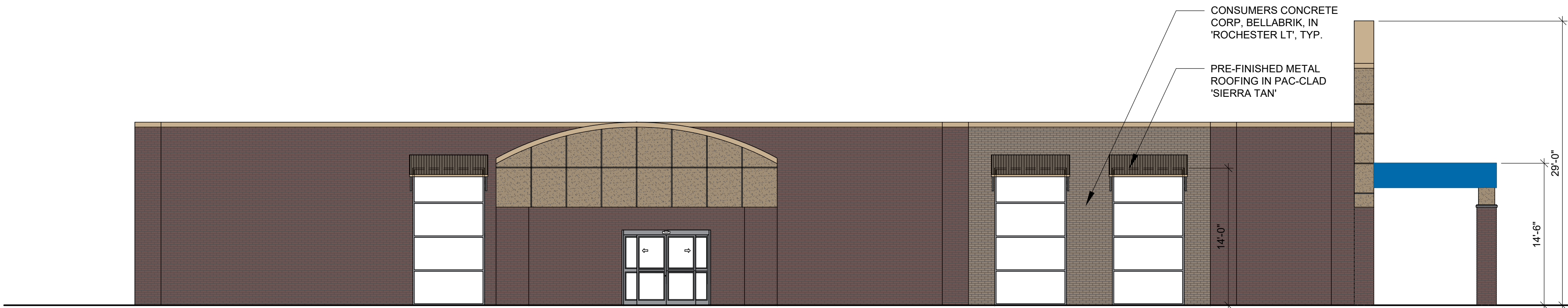
WEST ELEVATION

SCALE: 1/8" = 1'-0"



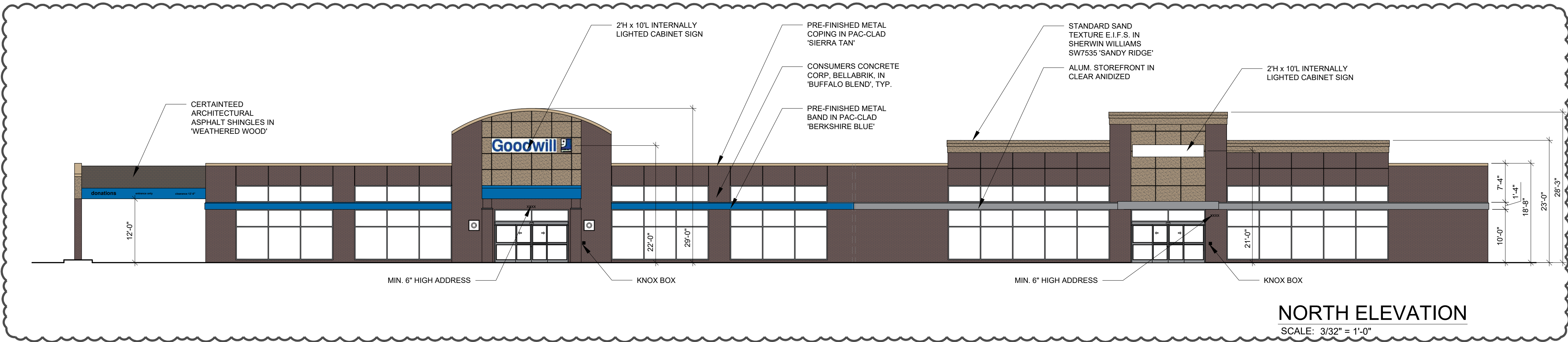
SOUTH ELEVATION

SCALE: 3/32" = 1'-0"



EAST ELEVATION

SCALE: 1/8" = 1'-0"



NORTH ELEVATION

SCALE: 3/32" = 1'-0"

WEST ELEVATION

SCALE: 3/16" = 1'-0"

Key Plan: NO SCALE

Client:
KN West, LLC
Bloomfield Township

Project:
Howell Retail
Development

3600 E. Grand River Avenue
Howell, Michigan 48843

Seal:



Date	Issued For
10/24/24	REVIEW
10/28/24	APPROVAL
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

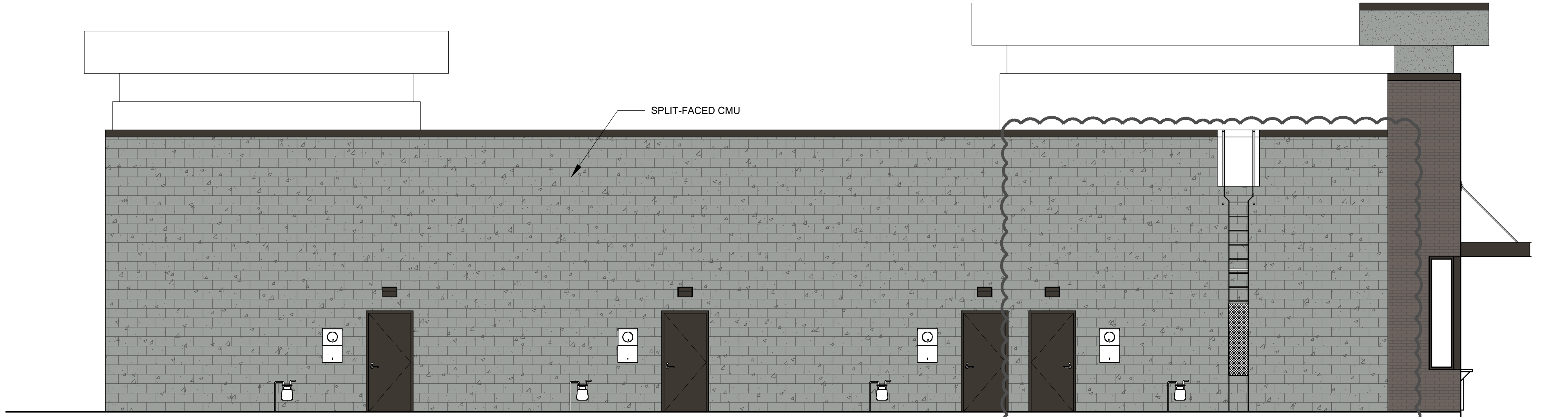
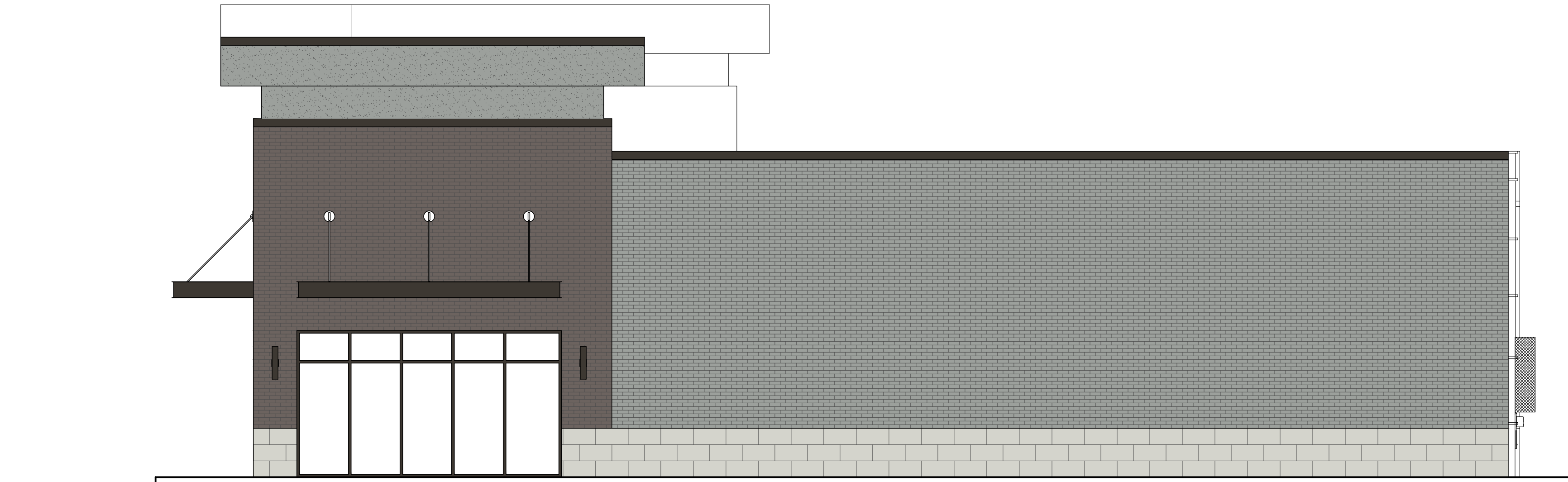
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Sheet Title:
BUILDING NO. 2
EXTERIOR
ELEVATIONS

Project No.: 24-141

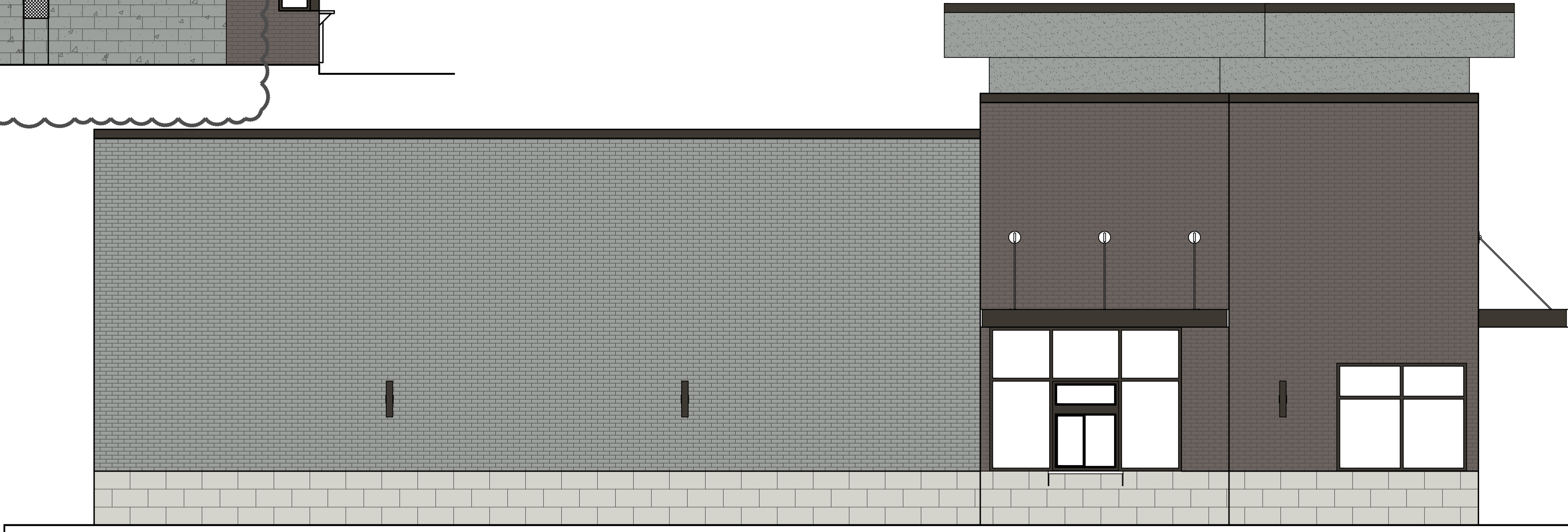
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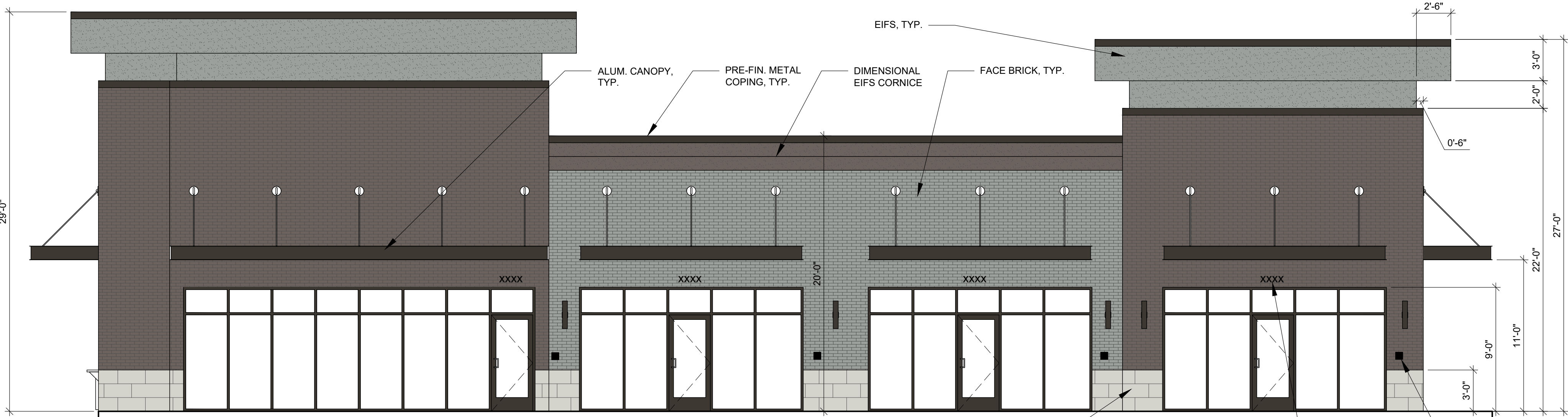
SOUTH ELEVATION

SCALE: 3/16" = 1'-0"



EAST ELEVATION

SCALE: 3/16" = 1'-0"



NORTH ELEVATION

SCALE: 3/16" = 1'-0"

SIGNAGE SIZES AND LOCATIONS T.B.D.

THIN STONE
PANEL, TYP.
KNOX BOX, TYP.
MIN. 6" HIGH ADDRESS, TYP.



Date	Issued For
10/21/24	APPROVAL
10/22/24	APPROVAL
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

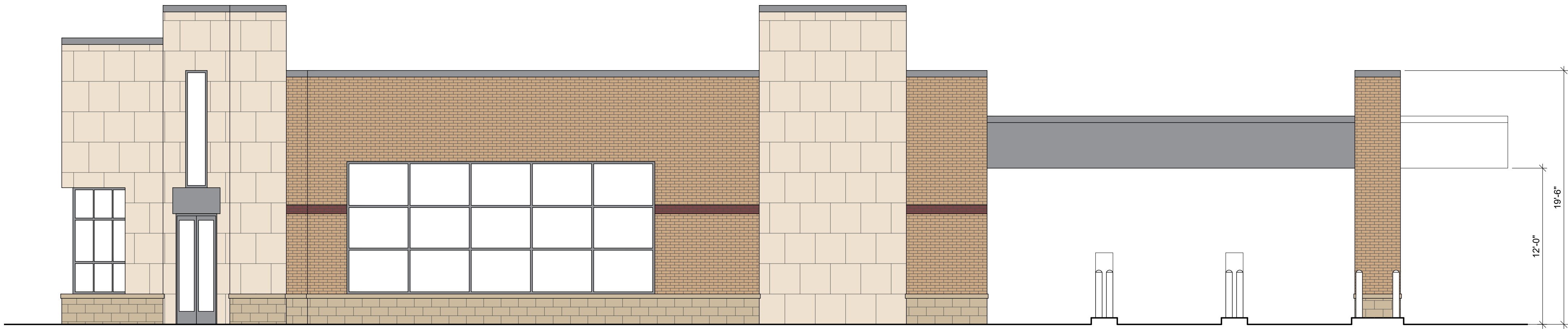
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Sheet Title:
BUILDING NO. 3
EXTERIOR
ELEVATIONS

Project No.: 24-141

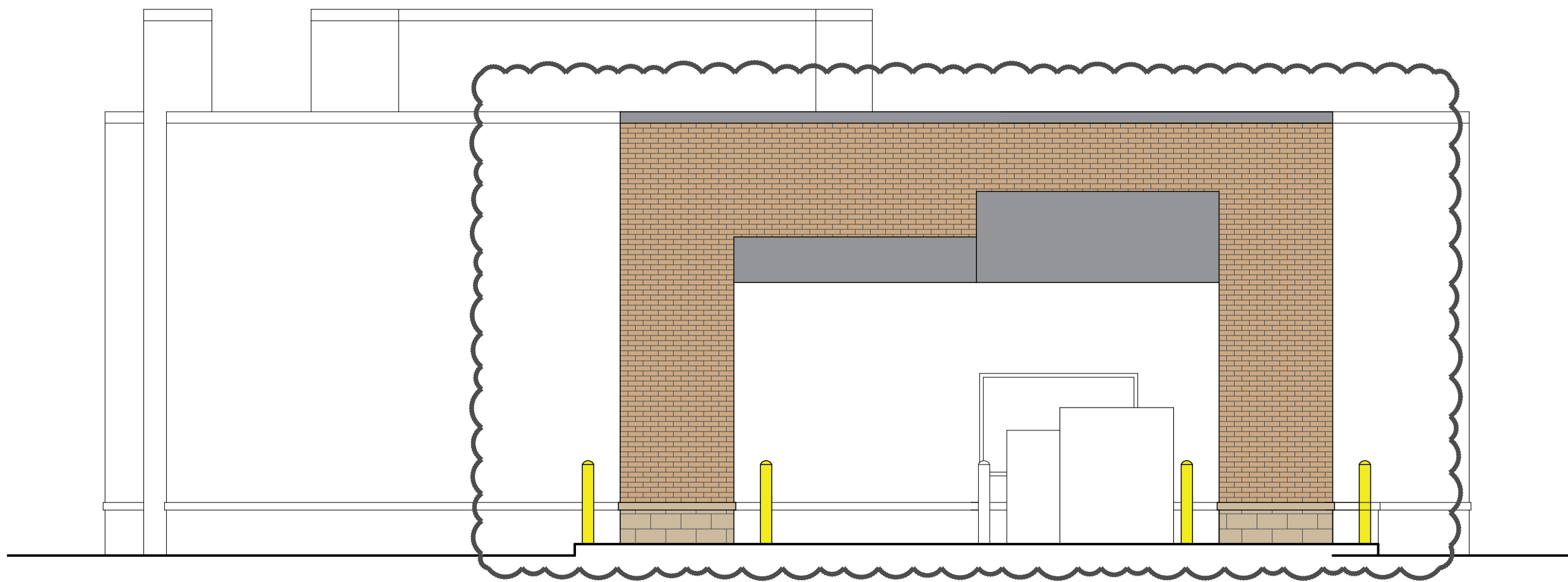
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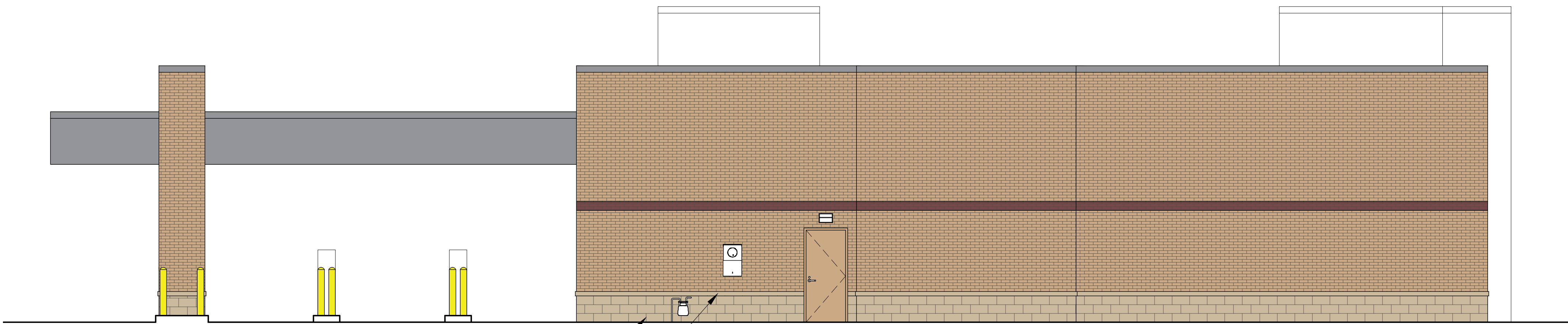
WEST ELEVATION

SCALE: 3/16" = 1'-0"



SOUTH ELEVATION

SCALE: 3/16" = 1'-0"



EAST ELEVATION

SCALE: 3/16" = 1'-0"

SPLIT FACED CMU IN 'FAWN'

STONE COPING TO MATCH CMU

PRE-FIN. MET.
COPING TO MATCH
CLEAR ANODIZED

FACE BRICK IN
'WHEATFIELD
VELOUR'

FACE BRICK IN
'RIVER RED VELOUR'

ALUM.
STOREFRONT IN
CLEAR ANODIZED

LIMESTONE
VENEER PANEL IN
'MOLEANOUS'

KNOX BOX

MIN. 6" HIGH ADDRESS

NORTH ELEVATION

SCALE: 3/16" = 1'-0"

**NOTE: THESE ELEVATIONS ARE
OF A 'GENERIC' FINANCIAL
INSTITUTION AND REPRESENT
THE GOAL OUTCOME. FINAL
ELEVATIONS WILL BE
DEVELOPED ONCE A SPECIFIC
INSTITUTION IS UNDER
CONTRACT.**

SIGNAGE SIZES AND LOCATIONS T.B.D.

KN HOWELL BUILDING NO. 3 (BANK) FAÇADE MATERIAL PERCENTAGES					
FAÇADE	MATERIAL	FAÇADE AREA (SQ. FT.)	ALLOWED PERCENTAGE	ACTUAL PERCENTAGE	PERCENTAGE LESS STOREFRONT
NORTH (FRONT) FACADE		1,163	-	-	-
	BRICK	508	100 ¹	44%	45%
	STONE	324	100	28%	33%
	SPLIT FACED CMU	108	25	9%	-
	METAL TRIMS AND COPINGS	41	25	4%	-
	NONREFLECTIVE STOREFRONT/DOORS	183	-	16%	
EAST FAÇADE		1,564	-		-
	BRICK	1,232	100 ¹	79%	80%
	STONE	0	100	0%	0%
	SPLIT FACED CMU	160	25	10%	-
	METAL TRIMS AND COPINGS	148	25	9%	
	NONREFLECTIVE STOREFRONT/DOORS	24	-	2%	-
SOUTH FAÇADE		1,020	-		-
	BRICK	762	100 ¹	75%	-
	STONE	0	100	0%	
	SPLIT FACED CMU	134	25	13%	-
	METAL TRIMS AND COPINGS	93	25	9%	-
	NONREFLECTIVE STOREFRONT/DOORS	31	-	3%	-
WEST FAÇADE		1,682	-		-
	BRICK	627	100 ¹	37%	46%
	STONE	454	100	27%	33%
	SPLIT FACED CMU	127	25	8%	-
	METAL TRIMS AND COPINGS	151	25	9%	-
	NONREFLECTIVE STOREFRONT/DOORS	323	-	19%	-
1 - in the RCD district all façades facing a road must be 75% brick.					

KN HOWELL BUILDING NO. 2 (GENERAL RETAIL) FAÇADE MATERIAL PERCENTAGES					
FAÇADE	MATERIAL	FAÇADE AREA (SQ. FT.)	ALLOWED PERCENTAGE	ACTUAL PERCENTAGE	PERCENTAGE LESS STOREFRONT
NORTH (FRONT) FACADE		2,388	-	-	-
	BRICK	1,224	100 ¹	51%	71%
	STONE	66	100	3%	4%
	EIFS	303	25	13%	-
	METAL TRIMS AND COPINGS	127	25	5%	-
	NONREFLECTIVE STOREFRONT/DOORS	668	-	28%	-
EAST FAÇADE		1,898	-		
	BRICK	1,338	100 ¹	70%	76%
	STONE	231	100	12%	13%
	EIFS	132	25	7%	-
	METAL TRIMS AND COPINGS	69	25	4%	-
	NONREFLECTIVE STOREFRONT/DOORS	128	-	7%	-
SOUTH FAÇADE		1,978	-		
	BRICK	103	100 ¹	5%	-
	SPLIT FACED CMU	1,676	25	85%	-
	EIFS	31	25	2%	-
	METAL TRIMS AND COPINGS	54	25	3%	-
	NONREFLECTIVE STOREFRONT/DOORS	114	-	6%	-
WEST FAÇADE		1,704	-		
	BRICK	1,201	100 ¹	70%	77%
	STONE	182	100	11%	12%
	EIFS	107	25	6%	-
	METAL TRIMS AND COPINGS	68	25	4%	-
	NONREFLECTIVE STOREFRONT/DOORS	146	-	9%	-
1 - in the RCD district all façades facing a road must be 75% brick.					

KN HOWELL BUILDING NO. 1 (GOODWILL) FAÇADE MATERIAL PERCENTAGES					
FAÇADE	MATERIAL	FAÇADE AREA (SQ. FT.)	ALLOWED PERCENTAGE	ACTUAL PERCENTAGE	PERCENTAGE LESS STOREFRONT
NORTH (FRONT) FACADE		5,407	-	-	-
	BRICK	2,560	100 ¹	47%	75%
	EIFS	452	25	8%	-
	METAL TRIMS AND COPINGS	417	25	8%	-
	NONREFLECTIVE STOREFRONT/DOORS	1,978	-	37%	-
EAST FAÇADE		2,434	-		
	BRICK	1,678	100 ¹	69%	81%
	EIFS	228	25	9%	-
	METAL TRIMS AND COPINGS	171	25	7%	-
	NONREFLECTIVE STOREFRONT/DOORS	357	-	15%	-
SOUTH FAÇADE		4,678	-		
	BRICK	4,136	100 ¹	88%	-
	EIFS	6	25	0%	-
	METAL TRIMS AND COPINGS	232	25	5%	-
	NONREFLECTIVE STOREFRONT/DOORS	304	-	6%	
WEST FAÇADE		1,985	-		-
	BRICK	1,865	100 ¹	94%	94%
	EIFS	30	25	2%	-
	METAL TRIMS AND COPINGS	90	25	5%	-
	NONREFLECTIVE STOREFRONT/DOORS	D	-	0%	-
1 - in the RCD district all façades facing a road must be 75% brick.					

Consultant:

Key Plan: NO SCALE

Client:
KN West, LLC
Bloomfield Township

Project:
Howell Retail
Development

3600 E. Grand River Avenue
Howell, Michigan 48843

Seal:



Date	Issued For
02/15/25	PUD SUBMITTAL
03/20/25	PUD SUBMITTAL

Drawn:	RLJ
Checked:	RLJ
Approved:	RLJ

Sheet Title:
FAÇADE
CALCULATIONS



GENOA CHARTER TOWNSHIP APPLICATION Sketch Plan Review

TO THE GENOA TOWNSHIP PLANNING COMMISSION:

APPLICANT NAME & ADDRESS: Symmetry Management, 812 South Main St, Ste 200, Royal Oak, MI 48067

If applicant is not the owner, a letter of Authorization from Property Owner is needed.

OWNER'S NAME & ADDRESS: Howell Family Ventures LLC, 29592 Beck Road, Wixom, MI 48393

SITE ADDRESS: 3599 E Grand River Ave PARCEL #(s): 4711-05-400-031

APPLICANT PHONE: (248) 465-0200 OWNER PHONE: ()

LOCATION AND BRIEF DESCRIPTION OF SITE: The site is currently known as Grand River Plaza and sites on the north side of Grand River, just west of Latson Road. Site is currently all paved parking lot with an existing drive-up ATM in the parking lot.

BRIEF STATEMENT OF PROPOSED USE: Relocation of the existing drive-up ATM in the parking lot to a new location on site.

THE FOLLOWING IMPROVEMENTS ARE PROPOSED: Creation of a new drive-up lane for the relocation of the existing ATM facility within the parking lot.

I HEREBY CERTIFY THAT ALL INFORMATION AND DATA ATTACHED TO AND MADE PART OF THIS APPLICATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

BY: 

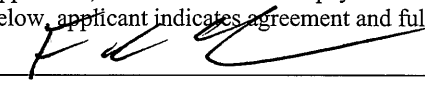
ADDRESS: 812 South Main Street, Suite 200, Royal Oak, MI 48067

Contact Information - Review Letters and Correspondence shall be forwarded to the following:

1.) Scott Tousignant, PE of Boss Engineering at scottt@bosseng.com
Name Business Affiliation Email Address

FEE EXCEEDANCE AGREEMENT

All sketch plans are allocated one (1) consultant review and one (1) Planning Commission meeting. If additional reviews or meetings are necessary, the applicant will be required to pay the actual incurred costs for the additional reviews. If applicable, additional review fee payment will be required concurrent with submittal for a Land Use Permit. By signing below, applicant indicates agreement and full understanding of this policy.

SIGNATURE:  DATE: _____
PRINT NAME: Frank Jarbou PHONE: 248-465-0200

LIVINGSTON COUNTY TREASURER'S CERTIFICATE

I hereby certify that there are no TAX LIENS OR TITLES held by the State or any individual against the within description, and all TAXES are same as paid for five years previous to the date of this instrument or appear on the records in this office except as stated.

5-2-2022 Jennifer M. Nash, Treasurer

2022 Taxes not examined Certificate # 28812

2022R-013060

RECORDED ON

05/02/2022 02:58:08 PM

BRANDON DENBY

REGISTER OF DEEDS

LIVINGSTON COUNTY, MI 48843

RECORDING: 26.00

REMON: 4.00

PAGES: 6

AFFIDAVIT

Warranty Deed

6
NOW ALL MEN BY THESE PRESENTS: that GR Plaza LLC ("Grantor"), whose address is 92 Emerson Place, Brooklyn, NY 11205 for such consideration as set forth on the Real Estate Transfer Tax Valuation Affidavit filed ~~herewith~~, hereby conveys and warrants to Howell Family Ventures, LLC, a Michigan limited liability company, whose address is 29592 Beck Road, Wixom Michigan 48393 a seventy (70%) percent interest in the Property and GR Howell LLC, a Michigan limited liability company, whose address is 812 S. Main, Suite 200, Royal Oak Michigan 48067, a thirty (30%) percent interest in the Property as tenants in common ("Grantee"), in that certain real property located in the Township of Genoa, Livingston County Michigan, legally described on Exhibit A attached hereto and incorporated herein by reference (the "Property"), subject only to the exceptions listed on Exhibit B attached hereto and incorporated herein by reference (collectively, the "Permitted Encumbrances.").

The Property may be located within the vicinity of farm land or a farm operation. Generally accepted agricultural and management practices which may generate noise, dust, odors, and other association conditions may be used and are protected by the Michigan Right to Farm Act.

Grantor grants to Grantee the right to make all division(s) under Section 108 of the Land Division Act, Act No. 288 of Public Acts of 1967, as amended.

[Remainder of page intentionally left blank.]

2 MAY '22 AM 10:11
RCUD

① 47-21812220-SCM



2 SETC

G

IN WITNESS WHEREOF, Grantor has executed this Warranty Deed on the date set forth below.

Grantor:

GR Plaza LLC, a Delaware LLC

By: 

Name: Abraham Brach

Title: Managing Member

STATE OF NEW YORK }
 } ss.:
COUNTY OF KINGS }

On the 11 day of April in the year 2022 before me, the undersigned, a Notary Public in and for said State, personally appeared Abraham Brach, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/he/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s) or the person upon behalf of which the individual(s) acted, executed the instrument.

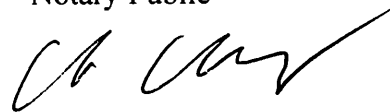
Drafted by:

Allen A. Herman, Esq.
614 Hempstead Gardens Drive
West Hempstead, NY 11552

When recorded return to:

Christopher Baker, Esq.
Varnum LLP
101 N. Main St., Suite 525
Ann Arbor, Michigan 48104

Notary Public



CHAYA ABELESZ
NOTARY PUBLIC, State of New York
No. 01AB6139487
Qualified in Kings County
Commission Expires January 09, 2026

Send subsequent tax bills to: Grantee

Recording Fee: _____

Transfer Tax: See Real Estate Transfer Tax Valuation Affidavit

Exhibit A Legal Description

Fee Parcel

A part of the West 1/2 of the Southeast 1/4 of Section 5, Town 2 North, Range 5 East, Genoa Township, Livingston County, Michigan, more particularly described as follows: Commencing at the South 1/4 corner of said Section; thence along the North-South 1/4 line of said Section 5 North 02 degrees 00 minutes 53 seconds West 1927.04 feet; thence along the centerline of Grand River Avenue South 64 degrees 46 minutes 02 seconds East (previously recorded as South 60 degrees 26 minutes 30 seconds East) 168.42 feet to the Point of Beginning of the parcel to be described; thence North 25 degrees 13 minutes 58 seconds East 109.22 feet; thence North 02 degrees 56 minutes 41 seconds West 187.64 feet; thence South 87 degrees 03 minutes 19 seconds West 196.72 feet; thence along the North-South 1/4 line of said Section 5 North 02 degrees 00 minutes 53 seconds West 540.07 feet to the center of Section 5; thence along the East-West 1/4 line of said Section 5 (as previously surveyed) North 87 degrees 03 minutes 19 seconds East 1284.64 feet (previously recorded as East 1320 feet more or less); thence along the East line of the West 1/2 of the Southeast 1/4 of said Section 5 South 02 degrees 02 minutes 30 seconds East 1422.56 feet (previously recorded as South 1408.00 feet); thence along the centerline of Grand River Avenue North 65 degrees 06 minutes 26 seconds West 143.10 feet; thence North 25 degrees 14 minutes 17 seconds East 169.26 feet; thence North 02 degrees 02 minutes 30 seconds West 217.61 feet; thence South 87 degrees 03 minutes 19 seconds West 225.17 feet; thence South 02 degrees 56 minutes 41 seconds East 60.00 feet; thence South 13 degrees 16 minutes 24 seconds West 81.74 feet; thence South 24 degrees 53 minutes 34 seconds West 125.00 feet; thence along said centerline of Grand River Avenue North 65 degrees 06 minutes 26 seconds West 53.00 feet; thence North 24 degrees 53 minutes 34 seconds East 132.65 feet; thence North 11 degrees 43 minutes 57 seconds East 79.42 feet; thence North 02 degrees 56 minutes 41 seconds West 94.14 feet; thence South 87 degrees 03 minutes 19 seconds West 246.93 feet; thence South 02 degrees 56 minutes 41 seconds East 36.62 feet; thence South 25 degrees 13 minutes 58 seconds West 145.40 feet; thence along said centerline of Grand River Avenue North 64 degrees 46 minutes 02 seconds West (previously recorded as North 60 degrees 26 minutes 30 seconds West) 51.00 feet; thence North 25 degrees 13 minutes 58 seconds East 141.07 feet; thence North 02 degrees 56 minutes 41 seconds West 104.48 feet; thence South 87 degrees 03 minutes 19 seconds West 287.12 feet; thence South 02 degrees 56 minutes 41 seconds East 110.70 feet; thence along said centerline of Grand River Avenue North 64 degrees 46 minutes 02 seconds West (previously recorded as North 60 degrees 26 minutes 30 seconds West) 261.42 feet to the Point of Beginning.

Easement Parcel

Together with a perpetual non-exclusive easement for parking as created, limited and defined in that certain Declaration of Easement recorded in Liber 1609, Page 346, Livingston County Records, said easement being more particularly described as a strip seventeen (17) feet wide along the Northern property line of the following described property: A part of the West 1/2 of the Southeast 1/4 of Section 5, Town 2 North, Range 5 East, Genoa Township, Livingston County, Michigan, more particularly described as follows: Commencing at the South 1/4 corner of said Section; thence along the North-South 1/4 line of said Section North 02 degrees 00 minutes 53 seconds West 1927.04 feet to the Point of Beginning of the parcel to be described; thence continuing along said North-South 1/4 line North 02 degrees 00 minutes 53 seconds West 204.41 feet; thence North 87 degrees 03 minutes 19 seconds East 196.72 feet; thence South 02 degrees 56 minutes 41 seconds East 187.64 feet; thence South 25 degrees 13

minutes 58 seconds West 109.22 feet; thence along the centerline of Grand River Avenue North 64 degrees 46 minutes 02 seconds West (previously recorded as North 60 degrees 26 minutes 30 seconds West) 168.42 feet to the Point of Beginning.

Parcel(s): 4711-05-400-031 and 4711-05-400-032

Exhibit B

Permitted Exceptions

- Lessee's interest of The TJX Companies and the terms conditions and provisions contained in the lease between DDR Michigan II LLC, as lessor and The TJX Companies, as lessee, as disclosed by Memorandum of Lease recorded in Instrument No. 2006R-028597, Livingston County Records.
- Lessee's interest of Officemax North America, Inc. and the terms conditions and provisions contained in the lease between DDR Michigan II, LLC, as lessor and Officemax North America, Inc., as lessee, as disclosed by Memorandum of Lease recorded in Instrument No. 2007R-019283, Livingston County Records.
- Terms and Conditions of Gas Storage Agreement and Oil and Gas Lease in favor of Panhandle Eastern Pipe Line Company, recorded in Liber 313, Page 184, as affected by Affidavit of Notice of Intention to Retain Mineral Rights recorded in Liber 694, Page 44, Livingston County Records.
- Terms and Conditions of Gas Storage Agreement and Oil and Gas Lease in favor of Panhandle Eastern Pipe Line Company recorded in Liber 332, Page 259, as affected by Affidavit of Notice of Intention to Retain Mineral Rights recorded in Liber 694, Page 20, Livingston County Records.
- Right of Way in favor of Michigan Bell Telephone Company recorded in Liber 653, Page 401, Livingston County Records.
- Right of Way in favor of Michigan Bell Telephone Company recorded in Liber 653, Page 410, Livingston County Records.
- Right of Way in favor of Michigan Bell Telephone Company recorded in Liber 653, Page 411, Livingston County Records.
- Right of Way in favor of Michigan Bell Telephone Company recorded in Liber 653, Page 412, Livingston County Records.
- Right of Way in favor of The Detroit Edison Company recorded in Liber 1059, Page 138, Livingston County Records.
- Right of Way in favor of The Detroit Edison Company recorded in Liber 1059, Page 142, Livingston County Records.
- Declaration of Restrictions recorded in Liber 1491, Page 247, Livingston County Records.
- Terms and Conditions of Joint Underground Residential Distribution Right of Way Agreement in favor of The Detroit Edison Company and Michigan Bell Telephone Company, recorded in Liber 1494, Page 389, Livingston County Records.

- Terms and Conditions of Agreement for Grant of Cross Easements between R.G. Properties, Inc. and Birgit Lorentzen recorded in Liber 1497, Page 365, Livingston County Records.
- Declaration of Standards, Covenants, Easements, Conditions and Restrictions recorded in Liber 1503, Page 51, Livingston County Records.
- Declaration of Restrictive Covenant recorded in Liber 1503, Page 852, Livingston County Records.
- Access Easement over subject property as disclosed by Boss Engineering Survey No. 90542-D dated June 6, 1991 and recorded in Liber 1507, Page 968, Livingston County Records.
- Terms and Conditions of Agreement between Livingston County Drain Commissioner and R.G. Properties regarding Latson Road Drain Drainage District recorded in Liber 1519, Page 854, Livingston County Records.
- Declaration of Easement recorded in Liber 1609, Page_346, Livingston County Records.
- Highway Easement Release recorded in Liber 1676, Page 932, Livingston County Records.
- Access, Utility and Storm Drainage Easement Agreement recorded in Liber 1742, Page 139, Livingston County Records.
- Easement for water supply main purposes vested in Township of Genoa recorded in Liber 1847, Page 651, Livingston County Records.
- Easement for water supply main purposes vested in Township of Genoa recorded in Liber 1868, Page 386, Livingston County Records.
- Easement for Nonexclusive Sidewalk/Bike Path Easement purposes vested in Township of Genoa recorded as Instrument No. 2008R-026268, Livingston County Records.
- Agreement dated June 4, 2018 by and between Genoa Charter Township and GR Plaza LLC and recorded June 11, 2018 as Instrument No. 2018R-015426, Livingston County Records.
- Rights of the public and of any governmental unit in any part of the land taken, used or deeded for Grand River Avenue.
- Outstanding oil, gas and mineral rights whether recorded or unrecorded.

April 9, 2025

Planning Commission
Genoa Township
2911 Dorr Road
Brighton, Michigan 48116

Attention:	Amy Ruthig, Planning Director
Subject:	Grand River Plaza ATM Relocation – Sketch Plan Review
Location:	3599 Grand River Avenue – north side of Grand River Avenue, west of Latson Road
Zoning:	RCD Regional Commercial District

Dear Commissioners:

At the Township’s request, we have reviewed the sketch plan submittal for relocation of an existing stand-alone ATM at the Grand River Plaza (plans dated 3/13/25).

A. Summary

1. The Commission should consider any comments provided by the Township engineering consultant with respect to the slight increase in the impervious surface ratio (and may wish to request updated calculations).
2. We request the applicant identify any differences between the existing ATM and associated structures and those proposed. If there are differences, details must be provided.
3. Our main concern with the proposal is that vehicles exiting the ATM aisle will be very near the intersection of two main driveways, one of which provides direct access to/from Grand River Avenue.
4. We defer to the Township engineering consultant for review and comment on vehicular circulation (including the concern noted above).
5. The Commission may request lighting details (particularly if they differ from existing).
6. We request the applicant identify the surfacing of the area between drive aisles and provide landscaping within it.
7. The applicant must identify any new signage associated with the project.

B. Proposal/Process

The applicant proposes relocation of an existing stand-alone ATM at the Grand River Plaza.

Table 7.02 allows stand-alone automatic drive-up teller machines with special land use approval in the RCD. The existing ATM obtained special land use and site plan approval in 2015. At this time, the request is simply to relocate the existing equipment/structures.

Per Section 19.06, the proposal entails a minor amendment to an existing special land use, which does not require a new special land use review. However, sketch plan review by the Planning Commission is required.

As a side note, the sketch plan for the relocation also depicts the recently approved amended site plan for the entire Grand River Plaza.

We have not reviewed the details of the plan outside of the ATM relocation and any action by the Planning Commission does not alter the previous site plan approval. If there are additional revisions proposed on the plan, the applicant must identify them for review and Commission consideration.



Aerial view of site and surroundings (looking north)

C. Sketch Plan Review

- 1. Dimensional Requirements.** The proposal complies with the setback requirements of the RCD.

While the project does entail a slight increase in the impervious surface ratio, it is negligible in relation to the size of the property. However, the Commission should consider any comments provided by the Township engineering consultant with respect to this item and may request updated calculations.

- 2. Building Design and Materials.** The project does not include any new buildings, but does include several associated structures. More specifically, the plan includes a canopy over the ATM, a height bar for vehicles entering the drive, protective bollards on each side of the machine, and relocation of a light pole.

The submittal includes a photo of the existing machine and associated structures. As such, it is our understanding that the proposal will either utilize the existing machine and structures or provide replacements consistent with existing.

If there are any differences between the existing and proposed machine and structures, we request the applicant identify them and provide details for the Commission's consideration.

- 3. Vehicular Circulation.** The project includes a one-way drive aisle for access to/from the ATM.

Our main concern with the placement of the ATM and drive aisle is that vehicles exiting the ATM aisle will be very near the intersection of two main driveways, one of which provides direct access to Grand River Avenue.

We defer to the Township engineering consultant for review and comment on site circulation, including this potential issue.

- 4. Parking.** The project does not impact the amount of parking required or provided, but does include 3 stacking spaces.

- 5. Exterior Lighting.** The submittal identifies a relocated light pole and 2 canopy fixtures.

If deemed necessary, the Commission may request details, though it is our impression that these items match the existing site conditions.

- 6. Landscaping.** The submittal does not identify any landscaping associated with the project nor does it depict the surfacing of the island between the main drive aisle and proposed ATM drive aisle.

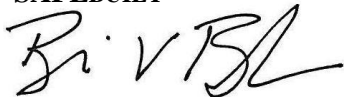
We request the applicant identify the surfacing of this area and provide landscaping within it.

- 7. Signage.** The applicant must identify any new signage associated with the project.

Should you have any questions concerning this matter, please do not hesitate to contact our office.

Respectfully,

SAFEBUILT

A handwritten signature in black ink, appearing to read "B. V. Borden".

Brian V. Borden, AICP
Michigan Planning Manager



April 8, 2025

Ms. Amy Ruthig
Genoa Township
2911 Dorr Road
Brighton, MI 48116

**Re: Grand River Plaza ATM Relocation
Sketch Plan Review No. 1**

Dear Ms. Ruthig:

Tetra Tech conducted a review of the sketch plan submittal for Grand River Plaza ATM Relocation last dated March 13, 2025. The site plan was prepared by Boss Engineering for Symmetry Management. The site is located on the north side of Grand River Avenue, just west of Latson Road in the existing Grand River Plaza. The improvements include the relocation of the existing drive through ATM.

The proposed ATM location offers a dedicated lane for accessing the ATM, which is an improvement from the previous location adjacent to on-site parking. The proposed improvements to the site meet Township Engineering Standards, therefore we have no engineering related concern to the proposed sketch plan. Please call or email if you have any questions.

Sincerely,

A handwritten signature in blue ink that reads 'Shelby Byrne'.

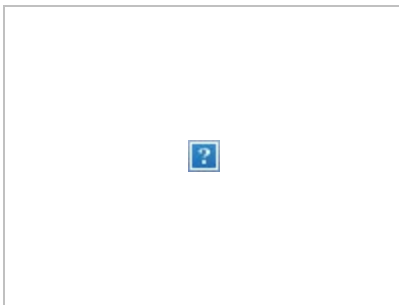
Shelby Byrne, P.E.
Project Engineer

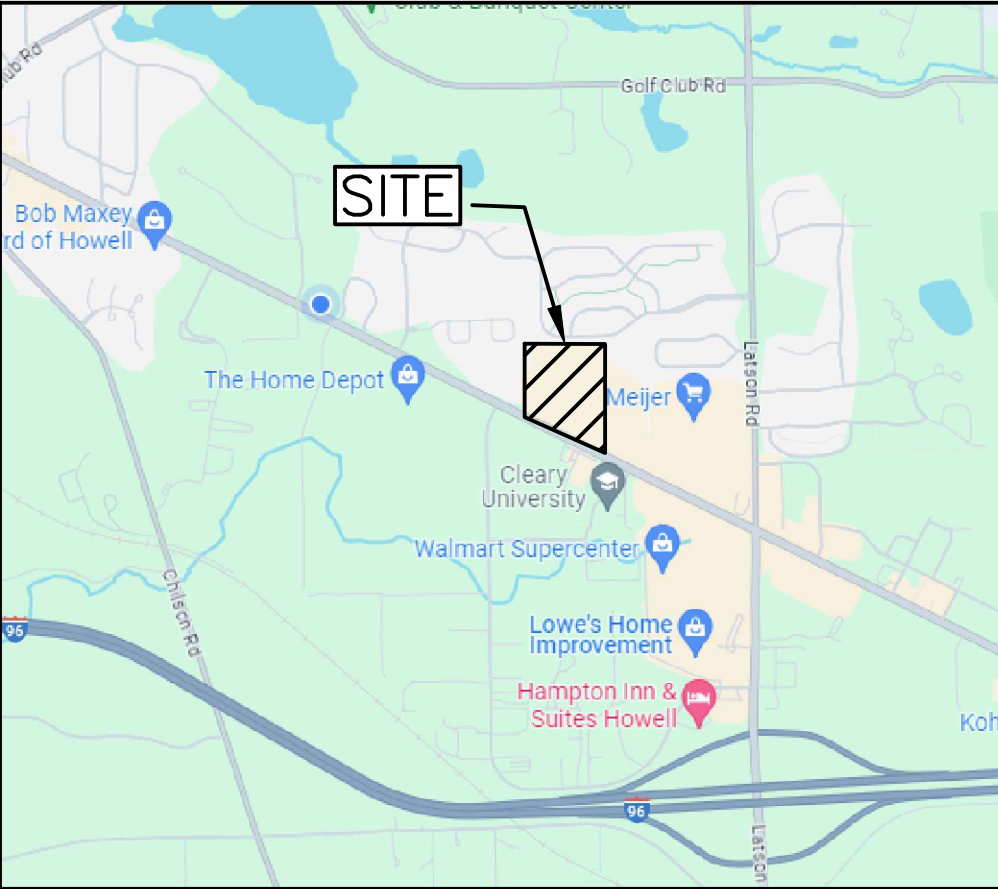
From: [Rick Boisvert](#)
To: [Sharon Stone-Francis](#); [Amy Ruthig](#)
Subject: Grand River Plaza ATM relocate
Date: Thursday, March 20, 2025 2:10:42 PM

Good afternoon,
I do not have any issues or comments on the new proposed ATM location at Grand River Plaza. I am not going to draft a letter unless you need to. Please advise if you do.

Cordially,

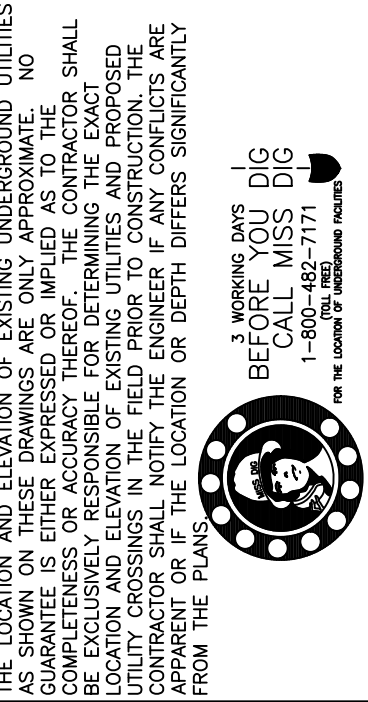
Rick Boisvert, FM, CFPS
Fire Marshal
Brighton Area Fire Authority
615 W. Grand River
Brighton, MI 48116
O:(810)229-6640 D:(810)299-0033
F:(810)229-1619 C:(248)762-7929
rboisvert@brightonareafire.com





PROPERTY DESCRIPTION:
PER BOSS ENGINEERING MORTGAGE SURVEY, JOB NO. 90542-B, LAST REVISED 7-11-91:
26.62 ACRE PARCEL (REVISED 6/20/91):
A part of the West 1/2 of the Southeast 1/4 of Section 5, T2N-R5E, Genoa Township, Livingston County Michigan, more particularly described as follows: Commencing at the South 1/4 Corner of said Section; thence along the North-South 1/4 line of said Section 5, N 02°00'53" W, 1927.04 feet; thence along the centerline of Grand River Ave, S 64°46'02" E (previously recorded as S 60°26'30" E), 168.42 feet to the Point of Beginning of the Parcel to be described; thence N 25°13'58" E, 109.22 feet; thence N 02°56'41" W, 187.64 feet; thence S 87°03'19" W, 196.72 feet; thence along the North-South 1/4 line of said Section 5, N 02°00'53" W, 540.07 feet to the Center of Section 5; thence along the East-West 1/4 line of said Section 5 (as previously surveyed) N 87°03'19" E, 1284.64 feet (previously recorded as East 1320± feet); thence along the East line of the West 1/2 of the Southeast 1/4 of said Section 5, S 02°02'30" E, 1422.56 feet (previously recorded as South, 1405.00 feet); thence along the centerline of Grand River Avenue N 65°06'26" W, 143.10 feet; thence N 25°14'17" E, 169.26 feet; thence N 02°02'30" W, 217.61 feet; thence S 87°03'19" W, 225.17 feet; thence S 02°56'41" E, 60.00 feet; thence S 13°16'24" W, 81.74 feet; thence S 24°53'34" W, 125.00 feet; thence along said centerline of Grand River Avenue, N 65°06'26" W, 53.00 feet; thence N 24°53'34" E, 132.65 feet; thence N 11°43'57" E, 79.42 feet; thence N 02°56'41" W, 94.14 feet; thence S 87°03'19" W, 246.93 feet; thence S 02°56'41" E, 36.62 feet; thence S 25°13'58" W, 145.40 feet; thence along said centerline of Grand River Avenue N 64°46'02" W (previously recorded as N 60°26'30" W), 51.00 feet; thence N 25°13'58" E, 141.07 feet; thence N 02°56'41" W, 104.48 feet; thence S 87°03'19" W, 287.12 feet; thence S 02°56'41" E, 110.70 feet; thence along said centerline of Grand River Avenue N 64°46'02" W (previously recorded as N 60°26'30" W), 261.42 feet to the Point of Beginning, containing 26.62 acres, more or less, and subject to the rights of the public over the existing Grand River Avenue (100 Feet Wide Right-of-Way). Also subject to other easements or restrictions of record, if any.

DEVELOPMENT NOTE:
PROPOSED ONSITE SITEMWORK PER BOSS SITE PLANS APPROVED BY GENOA TOWNSHIP 10-31-2024 FOR 3599 AND 3669 GRAND RIVER AVENUE - GRAND RIVER PLAZA.

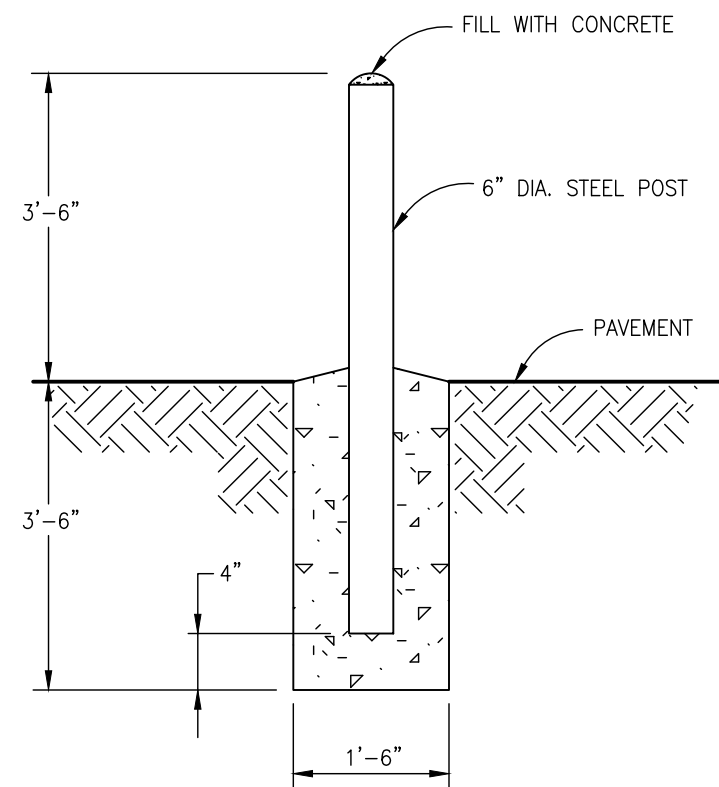


BOSS Engineering
Engineers Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

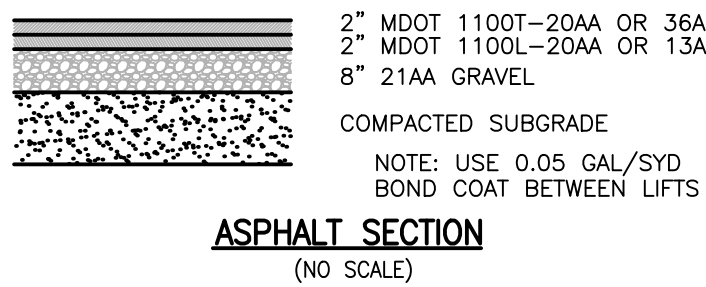
ATM RELOCATION SKETCH PLAN
PROJECT: ATM RELOCATION SKETCH PLAN
PREPARED FOR: SYMMETRY MANAGEMENT
812 SOUTH MAIN STREET, SUITE 200
ROYAL OAK, MI 48067
248-465-0200

OVERALL SITE PLAN
TITLE: OVERALL SITE PLAN

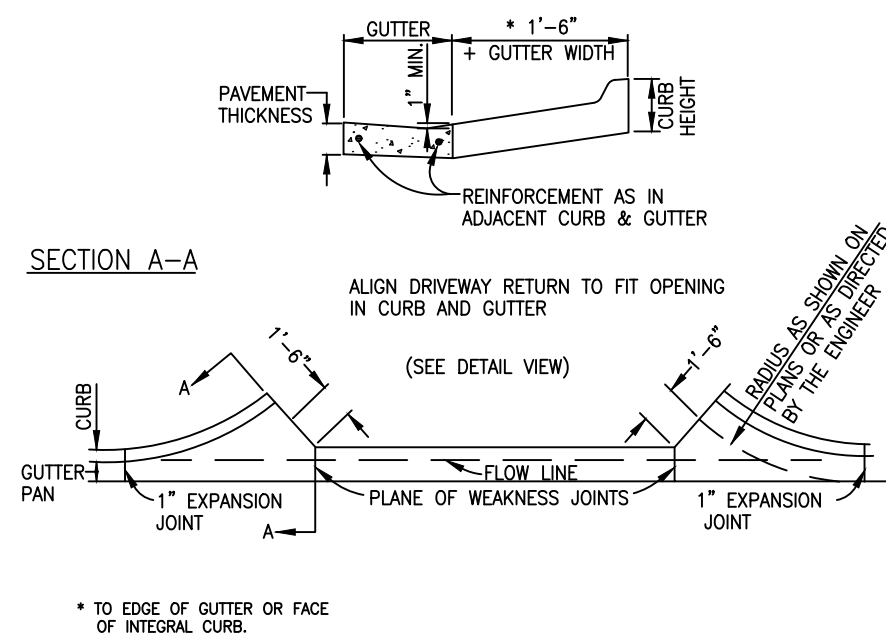
DESIGNED BY:	ST
DRAWN BY:	MJD
CHECKED BY:	
SCALE:	1" = 60'
JOB NO:	22-262-1
DATE:	3/13/25
SHEET NO.	1 OF 2



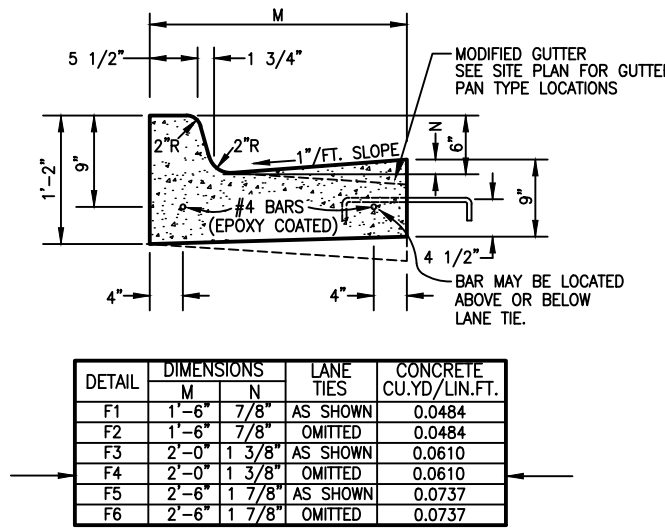
BOLLARD_DETAIL
(NO SCALE)



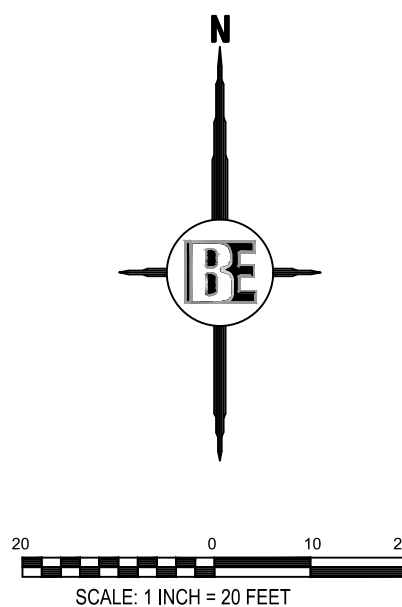
ASPHALT SECTION
(NO SCALE)



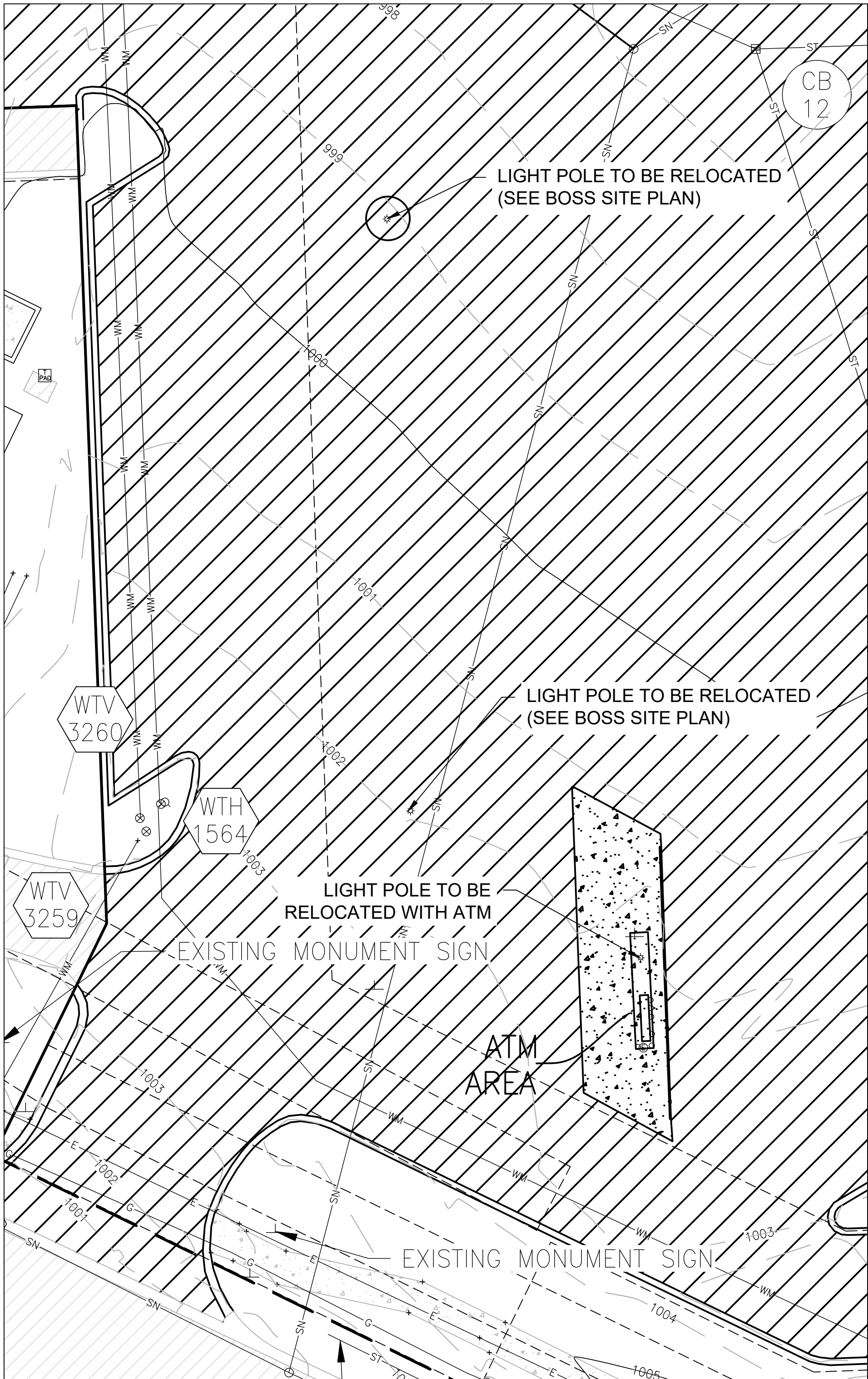
CONCRETE DRIVEWAY OPENING -
MDOT STANDARD II-42, DETAIL "M"
(NO SCALE)



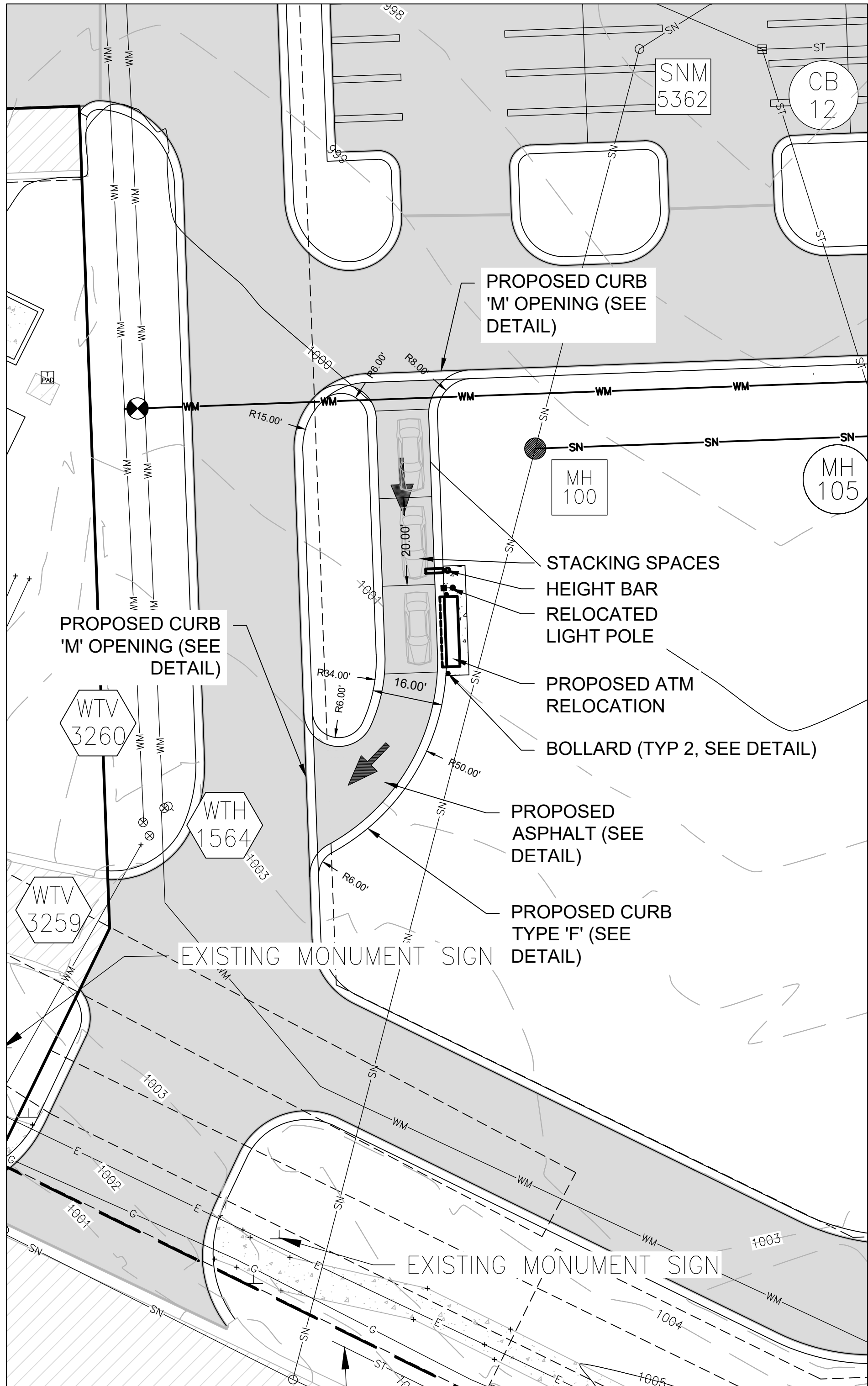
CONCRETE CURB & GUTTER
TYPE F
(NO SCALE)



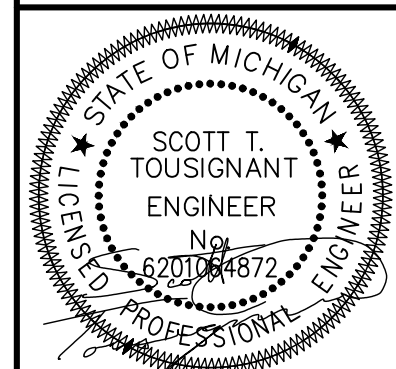
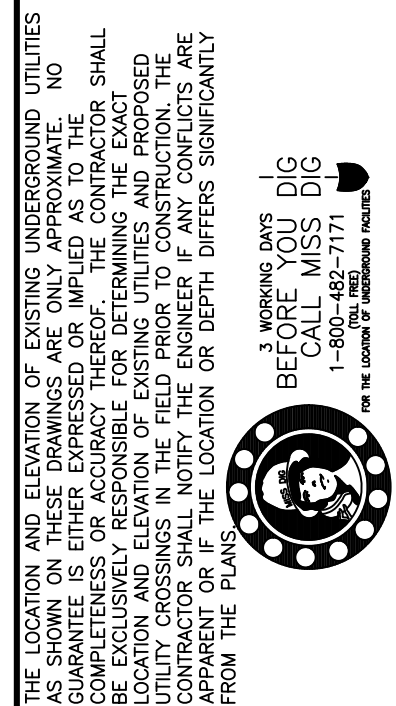
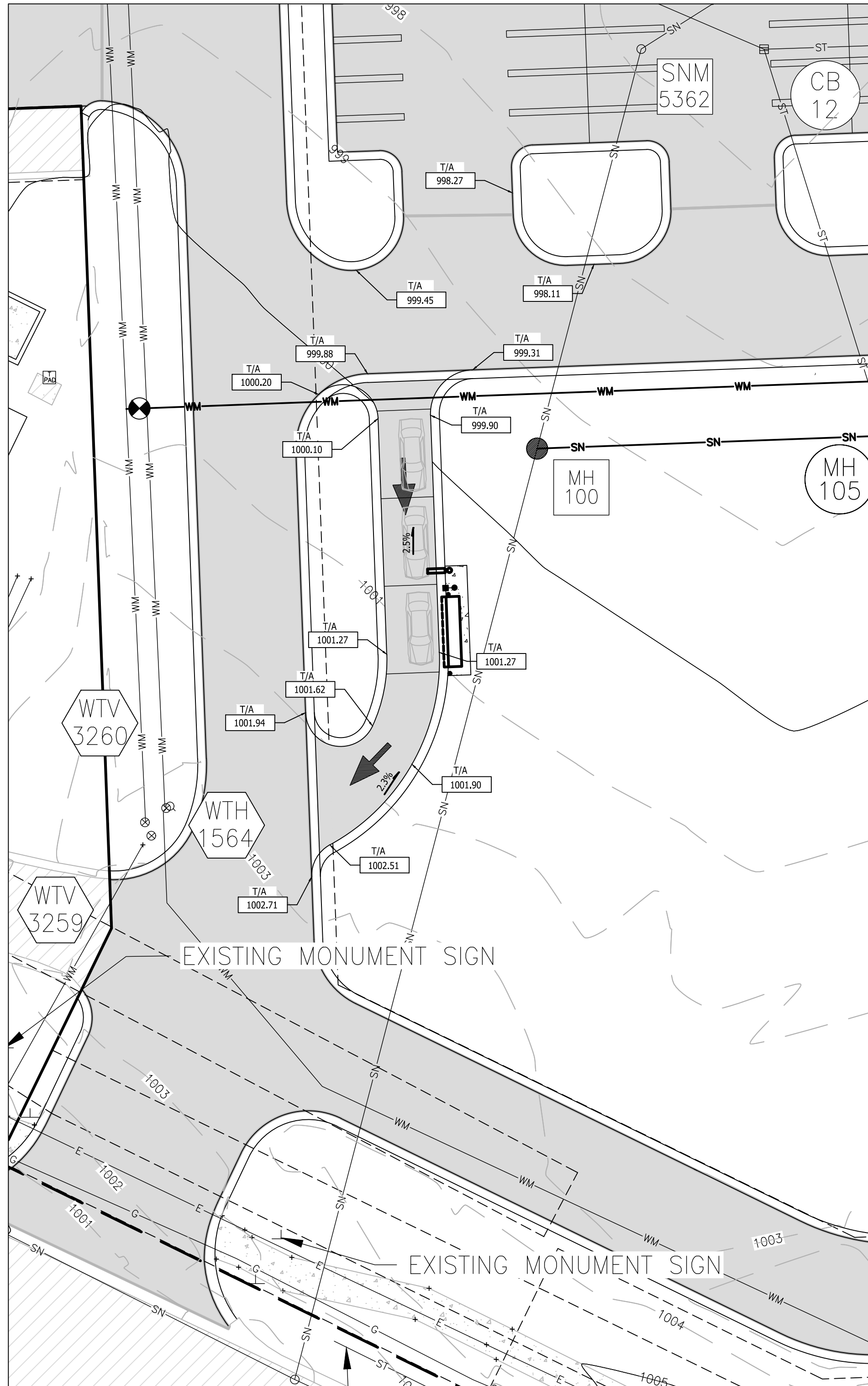
EXISTING & DEMOLITION PLAN



SITE PLAN



GRADING PLAN



BEBOSS
Engineering
Engineers Surveyors Planners Landscape Architects
3121 E. GRAND RIVER AVE.
HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

PROJECT: ATM RELOCATION SKETCH PLAN
PREPARED FOR: SYMMETRY MANAGEMENT
812 SOUTH MAIN STREET, SUITE 200
ROYAL OAK, MI 48067
248-465-0200
TITLE: ATM EXISTING & DEMO PLAN, SITE PLAN, & GRADING PLAN

DESIGNED BY:	ST
DRAWN BY:	MJD
CHECKED BY:	
SCALE:	1" = 20'
JOB NO:	22-262-1
DATE:	3/13/25
SHEET NO.	2 OF 2

Existing ATM Elevation View



**GENOA CHARTER TOWNSHIP
PLANNING COMMISSION
PUBLIC HEARING
March 10, 2025**

MINUTES

CALL TO ORDER: Chairman Grajek called the meeting of the Genoa Charter Township Planning Commission to order at 6:30 p.m. Present were Chris Grajek, Tim Chouinard, Glynis McBain, Marianne McCreary, Greg Rassel, and Eric Rauch. Absent was Bill Reiber. and. Also present were Planning Director Amy Ruthig, Brian Borden of Safebuilt, and Shelby Byrne of Tetra Tech

PLEDGE OF ALLEGIANCE: The pledge of allegiance was recited.

APPROVAL OF AGENDA:

Moved by Commissioner Rauch, supported by Commissioner McCreary, to approve the agenda as presented. **The motion carried unanimously.**

DECLARATION OF CONFLICT OF INTEREST: None

CALL TO THE PUBLIC:

The call to the public was made at 6:31 pm.

Ms. Debra Beattie of 3109 Pineview Trail asked how to contact the Planning Commission members. Ms. Ruthig advised communications should be sent to her and she will forward it to the members.

The call to the public was closed at 6:32 pm.

OPEN PUBLIC HEARING #1... Consideration of an amendment to the Summerfield Pointe Planned Unit Development agreement, final condominium site plan and environmental impact assessment to convert the project from (140-units) attached condominiums to single family detached homes (108-units). The project is located on Lawson Drive, north of Grand River Avenue. The request is petitioned by Healy Homes of Summerfield, LLC.

- A. Recommendation of PUD agreement
- B. Recommendation of Environmental Impact Assessment (02-14-25)
- C. Recommendation of Final Site Plan (02-14-25)

Mr. Wayne Perry of Desine Engineering and Mr. Garret Steel, representing the developer, were present. Mr. Perry stated they are requesting final approval to convert the attached condominium units to single-family site condominiums. They have addressed the comments made by the consultants.

Mr. Borden reviewed his letter dated March 5, 2025 noting that his previous comments have been addressed.

Private Road Review (Section 15.05):

1. There are conditions present that warrant consideration of a private road (as opposed to public), which may be allowed via the PUD.
2. The applicant must address any comments provided by staff or the Township Attorney with respect to the Private Road Maintenance Agreement.
3. The PUD Agreement seeks dimensional deviations from conventional private road requirements for easement width, horizontal curve radius, and roadway width.
4. The design and construction requirements are subject to review and comment by the Township Engineer and Brighton Area Fire Authority.
5. The applicant must maintain 15 feet of overhead tree clearance within the width of the pavement.

Final Condominium Plan Review:

1. The applicant must address any comments from staff or the Township Attorney on condominium documents and/or PUD Agreement (our previous comments have been addressed).
2. The plans are consistent with the amended and approved PUD.
3. The Commission should consider any comments provided by the Township Engineer and/or Brighton Area Fire Authority.

Ms. Byrne reviewed her letter dated March 3, 2025.

1. The labeling on the grading, utility, and utility easement plans should be reviewed. There appears to be hydrant and manhole labels where no hydrants or manholes are proposed, and some valves seem to be mislabeled.
2. Rim elevation for MH 505, MH 511, and MH 501 should be shown and checked. MH 505 and MH 501 appear to have different elevations than stated in the storm sewer calculations.
3. The Livingston County Drain Commissioner (LCDC) has provided comments on the proposed final site plan. Approval from the LCDC should be obtained and provided to the Township for their records.
4. An additional valve will need to be added along Summer Ridge Drive to ensure no more than two hydrants will be put out of service when isolating a section of water main. Maximum distance between valves should be 800 feet per MHOG requirements.
5. After final site plan approval, the petitioner will be required to submit private road construction plans to the Township for review and approval. Engineering Design Standards allow a minimum horizontal curve radius of 150 feet for roads with a posted speed limit of twenty-five miles per hour or less. The proposed speed limit should be addressed in the plans.

The Brighton Area Fire Authority Fire Marshal's letter dated March 3, 2025 states the applicant has addressed all his previous concerns.

Commissioner McCreary asked when the Master Deed and by-laws need to be submitted to the Township. Ms. Ruthig stated the final documents must be submitted to her prior to the Board meeting. Any changes requested by the Planning Commission should be stated this evening.

Commissioner Rauch advised the public that the Township has not seen this project in approximately 1 ½ years, but there were significant reviews and discussions with the applicant in the past. In 2022 and 2023 it was reviewed and discussed three times by the Planning Commission and then the Township Board reviewed and approved the preliminary submittal.

Mr. Perry showed the proposed site plan and explained what will be built. There will now be three separate condominium associations; the original one, one for the 102 single-family homes, and then one for the three new condominium buildings that will be built.

The call to the public was opened at 6:47 pm.

Ms. Jamie Schingeck of 4441 Aster Boulevard thanked the Planning Commission and Mr. Healy for listening to her concerns in 2022 and 2023. One item was that lawn maintenance would only be done one day per week. She is still concerned how a lawn maintenance company is going to be able to maintain all of those properties doing it only once per week,

Ms. Maria Belcher of 4082 Hampton Ridge, who is on their board, is concerned with the area on the map labeled Open Space. There will be some trees planted, but because of the different lifestyles of the two communities, they are requesting that a fast-growing hedgerow be planted. She also requested that they trim the oak trees in the winter. She asked where the snow will be placed. She does not want it pushed to the open space and put on top of the storm drains.

The call to the public was closed at 6:53 pm.

Commissioner McCreary asked when construction would begin. Mr. Perry stated there are additional permits that will be required, so it could be six to seven months. She asked what assurance can be given that any oak trees will only be trimmed in the winter months. Ms. Byrne stated they are only allowed to cut oak trees during the permitted times.

Commissioner McBain is concerned with only three buildings being their own association. There will be less residents to share the costs. It will be disproportionate from the other associations. She asked if those three buildings could be added to the existing one. She also asked that one trash removal company be contracted for all of the residents. Ms. Ruthig advised that language is in the documents; however, at this time, trash removal is done by the township.

Commissioner Rauch asked if the petitioner would plant 14 conifer trees instead of the tulips and maples proposed so it can offer year-round visual protection from the adjacent community. Mr. Perry agreed to change the type of trees that are planted.

Moved by Commissioner Rauch, supported by Commissioner Rassel, to recommend to the Township Board approval of the PUD Agreement for Summerfield Point Planned Unit Development as this Planning Commission finds that the private road requirements of Section 15.05 of the zoning ordinance are met. This recommendation is made with the following condition:

- The comments in the PUD Agreement shall become codified prior to the final submittal.

The motion carried unanimously.

Moved by Commissioner Rauch, supported by Commissioner Rassel, to recommend to the Township Board approval of the Environmental Impact Assessment dated February 14, 2025 for Summerfield Point Planned Unit Development. **The motion carried unanimously.**

Moved by Commissioner Rauch, supported by Commissioner Rassel, to recommend to the Township Board approval of the Final Site Plan dated February 14, 2025 for the Summerfield Point Planned Unit Development, with the following conditions:

- The site plan shall be updated with the comments from the Township Engineer's letter dated March 3, 2025.
- The requirements of the Brighton Area Fire Authority and the Livingston County Drain Commissioner shall be met prior to the issuance of a land use permit.
- The 14 trees proposed to be planted in the open space in the northwest corner of the development shall be swapped for 14 coniferous trees.
- The easement deviation, the road width deviation, and the horizontal curve deviation are acceptable to the Planning Commission

The motion carried unanimously.

Chairman Grajek thanked the applicant for working with the neighbors and the Township.

OPEN PUBLIC HEARING #2.... Consideration of a special use, site plan and environmental impact assessment for a proposed 15,231 building addition and parking lot of improvements for Three 60 Roto. The property is located at 741 Victory Drive, on the east side of Victory Drive, south of Grand River Avenue. The request is submitted by Neil Ganshorn, Rand Construction.

A. Recommendation of Special Use Application

B. Recommendation of Environmental Impact Assessment (01-21-25)

C. Recommendation of Site Plan (02-18-25)

Mr. Neil Ganshorn of Rand Construction and Jeff Osliger, representing the applicant, were present. They are proposing to expand the rear of their existing building. Mr. Ganshorn showed the site plan and described the proposed changes. They will be changing the grading to help with stormwater management so they will be removing and replacing the existing asphalt.

Mr. Borden reviewed his letter dated February 28, 2025.

1. The special land use standards of Section 19.03 are generally met, though the applicant must address any comments provided by the Township engineering consultant or Brighton Area Fire Authority.
2. There is more siding proposed for the addition than what is allowed. The Commission may modify the building material requirements for metal siding since it will match the existing building.
3. The applicant should be prepared to present material and color samples for the Commission's consideration. Colored renderings were shown.
4. The existing building lights do not comply with current standards, so the Commission may require upgrades as part of this project.
5. There is a single photometric reading above the Ordinance maximum of 10 footcandles.
6. He is requesting the applicant provide the required buffer zone plantings; however, he is recommending that the wall/berm requirement be waived based on the preservation of existing mature vegetation.
7. The landscape plan requires correction for the location of one tree, which is shown to be inside the building.
9. The Commission may allow the waste receptacle location to remain as an existing nonconforming condition and not require this to be redone to comply. He noted that the site has a lot of vegetation and is well screened.

Ms. Byrne stated the petitioner has addressed her concerns from her previous review; however, she reviewed her notes from her March 3, 2025 letter.

Parking Lot

1. Genoa Township Engineering Standards require that concrete curb and gutter should be a minimum of 2-foot wide, but a 1.5-foot curb is proposed. Since the existing parking lot is being repaved and the proposed curb detail matches existing conditions we have no concern with the proposed curb detail.

Drainage and Grading

1. The proposed improvements include a water quality control pond to collect storm flow from a portion of the site and detain flow prior to outletting to the existing wetlands to the north. Since the existing parking lot and impervious surface is remaining mostly unchanged, the proposed pond improvements should be adequate to address any storm impacts from the proposed improvements.
2. The applicant will need to obtain approval for the water main that will be installed for the fire hydrant in the northeast corner as required by the Brighton Area Fire Department.

The Brighton Area Fire Authority Fire Marshal's letter dated February 26, 2025 states the applicant has addressed all his previous concerns.

The call to the public was opened at 7:29 pm with no response.

Commissioner Rauch stated this is an example of the right business in the right location with the right amount of buffering. He noted that the property is well kept.

Moved by Commissioner Rauch, supported by Commissioner Chouinard, to recommend to the Township Board approval of the Special use Application for the 15,231 square foot building addition and parking lot of improvements for Three 60 Roto of 741 Victory Drive. **The motion carried unanimously.**

Moved by Commissioner Rauch, supported by Commissioner Chouinard, to recommend to the Township Board approval of the Environmental Impact Assessment dated January 21, 2025 for the 15,231 square foot building addition and parking lot of improvements for Three 60 Roto of 741 Victory Drive. **The motion carried unanimously.**

Moved by Commissioner Rauch, supported by Commissioner Chouinard, to recommend to the Township Board approval of the Site Plan dated February 18, 2025 for the 15,231 square foot building addition and parking lot of improvements for Three 60 Roto of 741 Victory Drive, with the following conditions:

- This Planning Commission finds that the building materials and the deviation requested tonight are acceptable as they match the existing building facade and are in a location where the addition is completely screened from public view.
- Updates shall be made to the landscape plan, including the depiction of the one tree located inside the building.
- This Planning Commission that a deviation from the wall and berm requirements in the landscape ordinance is not necessary due to existing topography and vegetation on the site.
- The landscaping plan be updated to meet the ordinance with regard to the number and location. Of plantings
- The existing building-mounted site lights shall be brought into compliance.
- The photometric plan shall be updated to address the one area of over exposure
- The existing waste receptacle location is satisfactory as it is in the back of a property and outside the view of the public.
- The curb and gutter details are acceptable as they match the existing, even though they do not meet the Township's engineering standards.

The motion carried unanimously.

OPEN PUBLIC HEARING #3... Consideration of Zoning Ordinance text amendments to Article 7 "Commercial and Service Districts", Article 14 "Parking and Loading-Unloading Standards" and Article 18 "Site Plan Review" in regards to drive through restaurants.

A. Recommendation of Zoning Ordinance Amendment to Article 7 "Commercial and Service Districts", Article 14 "Parking and Loading-Unloading Standards" and Article 18 "Site Plan Review".

Ms. Ruthig stated the changes were made based on the Planning Commission's comments at the previous meeting. Mr. Borden reviewed the changes, and the Commission requested one change.

The call to the public was made at 7:41 pm with no response.

Moved by Commissioner McCreary, supported by Commissioner Chouinard, to recommend to the Township Board approval of the Zoning Ordinance Amendment to Article 7 "Commercial and Service Districts", as submitted and amended this evening, changing "residential" to "residential zoning". **The motion carried unanimously.**

Moved by Commissioner McCreary, supported by Commissioner Chouinard, to recommend to the Township Board approval of the Zoning Ordinance Amendment to Article 14 "Parking and Loading-Unloading Standards". **The motion carried unanimously.**

Moved by Commissioner McCreary, supported by Commissioner Chouinard, to recommend to the Township Board approval of the Zoning Ordinance Amendment to Article 18 "Site Plan Review". **The motion carried unanimously.**

OPEN PUBLIC HEARING (REQUEST TO BE POSTPONED TO THE APRIL 14, 2025 PLANNING COMMISSION MEETING)... Consideration of a Zoning Ordinance text, amendments to Article 13 entitled "Environmental Protection Regulations".

A. Recommendation of Zoning Ordinance Amendments to Article 13 entitled "Environmental Protection Regulations".

Moved by Commissioner Rassel, supported by Commissioner Chouinard, to postpone the Consideration of a Zoning Ordinance text, amendments to Article 13 entitled "Environmental Protection Regulations" until the April 14, 2025 Planning Commission meeting. **The motion carried unanimously.**

OPEN PUBLIC HEARING #5... Review and comment of Master Plan Update Scope and Community Engagement Strategy.

Ms. Ruthig stated that the Township Board has approved a budget to spend on the Master Plan Update. They are looking for feedback on how to do the public engagement before a final proposal is provided, reviewed and approved.

Ms. Jill Bahn of Giffels Webster was present. She stated that the plan is being opened up to review a specific area of the Township; however, the Board would like them to look at other items in the plan. Instead of having a town hall meeting, she suggested making the engagement part a short survey that residents can do on their phones or computers. It will be put out to the community to get a more broad-based participation. They have developed an online platform to be used for the Master Plan review process.

The Commission, staff and Ms. Bahn discussed the different tools that can be used for community engagement. Commissioner Rauch would like to see a communications plan, including what tools will be used at what time during the process, and what is the goal of the engagement. He suggested having a free give-away for completing the survey and including a map showing the Genoa Township boundaries would be helpful.

Commissioner Rauch thanked Ms. Bahm and her firm for the hard work that was done on the previous Master Plan.

The call to the public was opened at 8:08 pm

Mr. Jeff Dhaenens of 5494 Sharp Drive stated there is a group who is very concerned about Latson Road, so there will be a lot of engagement. The challenge would be to receive input from other people regarding other parts of the Township.

Ms. Melanie Johnson of 3990 Chilson Road wants more people involved. She suggested the Township speak to the Livingston County Economic Council for assistance.

Ms. Debra Beattie stated that Supervisor Spicher would like to see at least 2,000 residents respond to a survey. She noted that the new My Genoa App will be forthcoming and that it could be used to engage more people.

The call to the public was closed at 8:13 pm.

Commissioner McBain stated that the public says what they do not want in the Township, but they do not say what they want. She liked the original PUD that was planned for Latson Road instead of homes, which would bring more traffic and more burden on the school system.

ADMINISTRATIVE BUSINESS:

Staff Report

Ms. Ruthig stated there will be two items on next month's agenda.

Approval of the February 10, 2025 Planning Commission meeting minutes

Moved by Commissioner McCreary, seconded by Commissioner Chouinard, to approve the minutes of the February 10, 2025 Planning Commission Meeting as presented. **The motion carried unanimously.**

Member Discussion

Chairman Grajek and Commissioner Rauch will be at the Town Hall Meeting on Wednesday. Commissioner McBain suggested having minutes or notes taken at the Town Hall for people who are unable to attend.

Adjournment

Moved by Commissioner Rassel, seconded by Commissioner Rauch, to adjourn the meeting at 8:32 pm. **The motion carried unanimously.**

Respectfully Submitted,

Patty Thomas, Recording Secretary