



PLANNING COMMISSION MEETING

LOCATION: TOWNSHIP ANNEX, 7527 HIGHLAND ROAD, WHITE LAKE, MICHIGAN, 48383
(FORMER WHITE LAKE LIBRARY)
THURSDAY, APRIL 21, 2022 – 7:00 PM

White Lake Township | 7525 Highland Rd | White Lake, MI 48383 | Phone: (248) 698-3300 | www.whitelaketwp.com

AGENDA

1. CALL TO ORDER

2. ROLL CALL

3. PLEDGE OF ALLEGIANCE

4. APPROVAL OF AGENDA

5. APPROVAL OF MINUTES

A. Minutes of April 7, 2022

6. CALL TO THE PUBLIC (FOR ITEMS NOT ON THE AGENDA)

7. PUBLIC HEARING

A. **White Lake Hill LLC**

Property described as parcel number 12-20-101-003 (1085 Hill Road), located on the north side of Highland Road, west of Hill Road, consisting of approximately 68.96 acres. Property described as parcel number 12-20-126-006, located north of Highland Road, east of Hill Road, consisting of approximately 41.06 acres.

Requests:

1) Preliminary site plan approval

2) Rezoning request: Applicant requests to rezone parcel number 12-20-101-003 from (AG) Agricultural and (PB) Planned Business to (PD) Planned Development or any other appropriate zoning district, and parcel number 12-20-126-006 from (R1-A) Single Family Residential to (PD) Planned Development or any other appropriate zoning district.

Applicant: White Lake Hill, LLC

31550 Northwestern Highway

Farmington Hills, MI 48334

B. **Hypershine Car Wash**

Property described as parcel number 12-23-202-006 (9345 Highland Road), located on the south side of Highland Road, west of Fisk Road, consisting of approximately 4.91 acres.

Requests:

1) Preliminary site plan approval

2) Special land use approval

Applicant: EROP, LLC

2390 East Federal Drive

Decatur, IL 62526

8. CONTINUING BUSINESS

9. NEW BUSINESS

10. OTHER BUSINESS

11. LIAISON'S REPORT



12. DIRECTOR'S REPORT

13. COMMUNICATIONS

14. NEXT MEETING DATE: May 5, 2022 & May 19, 2022

15. ADJOURNMENT

Procedures for accommodations for persons with disabilities: The Township will follow its normal procedures for individuals with disabilities needing accommodations for effective participation in this meeting. **Please contact the Township Clerk's office at (248) 698-3300 X-164 at least two days in advance of the meeting.** An attempt will be made to make reasonable accommodations.

WHITE LAKE TOWNSHIP PLANNING COMMISSION

Township Annex, 7527 Highland Road
White Lake, MI 48383
April 7, 2022 @ 7:00 PM

CALL TO ORDER

Chairperson Anderson called the meeting to order at 7:01 PM and led the Pledge of Allegiance. Roll was called.

ROLL CALL

Steve Anderson
Merrie Carlock
Pete Meagher
Scott Ruggles
Matt Slicker
Robert Seeley
T. Joseph Seward

Absent: Mark Fine
Debby Dehart

Also Present: Sean O'Neil, Community Development Director
Mike Leuffgen, DLZ
Lisa Kane, Recording Secretary

Visitors: 15 members of the public were present

APPROVAL OF AGENDA

Commissioner Meagher moved to approve the agenda of the April 7, 2022 Planning Commission Meeting.

Commissioner Carlock supported and the **MOTION CARRIED** with a voice vote: 7 yes votes.

APPROVAL OF MINUTES

- a. Regular meeting minutes of March 17, 2022

Commissioner Seward moved to approve the Minutes of March 17, 2022

Commissioner Meagher abstained from voting.

Commissioner Seeley supported and the **MOTION CARRIED** with a voice vote: 6 yes votes.

CALL TO THE PUBLIC (FOR ITEMS NOT ON THE AGENDA)

Kristen Ostimer of 807 W Oxhill Drive is concerned about the Black Rock restaurant being built and the safety of the community with the traffic that will increase. Mrs. Ostimer shared pictures with the Board. '

Tracy Saputo of 616 E Oxhill Dr has concerns regarding Black Rock, specifically the traffic entering their subdivision, stormwater runoff and contamination from an existing nearby business, Brendels.

Kevin Ostimer of 807 W Oxhill Dr spoke regarding concerns of safety if the traffic increases in their neighborhood. He would like the Oakland County Road Commission perform a traffic study. Mr. Ostimer stated that the state tested a substance that is coming up from their sump pump which was determined to be run off from restaurants, Dave & Amy's and McDonalds. The substance was deemed not to be dangerous.

Commissioner Anderson explained that the process involved with a new development is lengthy and the recent decision was strictly changing the zoning of the parcel. There will be a traffic study and all of these concerns will be taken into consideration when the time comes to review development.

Brian Gennero of 615 E Oxhill Dr also has concerns about the increase of traffic if Black Rock opens at this location and believes that the addition of street lights would be beneficial.

Christian Cassel of 604 E Oxhill Dr asked if the Black Rock was a final deal.

Commissioner Anderson explained that the business has not applied for a site plan.

Kathy Ratliff of 691 Oxhill Ct asked if a traffic light has been considered for that intersection.

Director O'Neil explained that the Township does not have any jurisdiction over traffic lights and the traffic study process.

Commissioner Seely explained the process of requesting a traffic study be completed by M-DOT by citizen request.

PUBLIC HEARING

None

CONTINUING BUSINESS

A. Preserve at Hidden Lake

Property identified as parcel numbers 12-36-101-001.

Located on the west side of Union Lake Road, and south of Hutchins Road, consisting of approximately 38.33 acres. Currently zoned (PD) Planned Development.

Requests: **1) Amended final site plan approval**
2) Amended planned development agreement approval

Applicant: PH Homes (Craig Piasecki)
8255 Cascade Ave, Suite 110
Commerce Twp, MI 48382

Director O'Neil presented the request to amend the final site plan and planned development agreement approvals that were previously reviewed by the Township Board in January 2022. There were issues with the retention basin had some inconsistencies and setbacks for individual units that needed to be addressed. The revised plans change the units from townhomes to duplexes and reduced the total number of units. Some of the unit's patios encroach in the stormwater easement, therefore indemnification language to acknowledge this in the Master Deed is necessary. It will clearly state that

any future repairs will be the responsibility of the homeowner's association and not that of the Township. All amendments that were discussed in January are included in review documents.

Commissioner Carlock asked for clarification of which unit's patios were encroaching in the stormwater easement.

Commissioner Meagher asked Director O'Neil if he is comfortable with all of the issues being resolved administratively.

Director O'Neil stated that the applicant has agreed to resolve the issues.

Commissioner Anderson stated that the applicant has a positive history of complying with staff comments.

Director O'Neil stated that he does not have any reservations or concerns that the applicant will be able to meet the requests. The issues with the pond have been resolved by the Township Board and the Planning Commission only needs to address the site plan revisions and planned development agreement amendment.

Director O'Neil requested that the applicant add more trees to unit 97.

Applicant present: Craig Piasecki responded that they will add additional trees to unit 97.

Commissioner Carlock inquired the location of the trees at unit 97.

Mr. Leuffgen presented the engineering review and noted that not much is changing. He provided clarification of the review letter dated March 30, 2022 of the final site plan, and stated that the clarifications on all documentations are providing continuity, so that the final site plan matches the Master Deed. They recommend that the Master Deed be updated to include hold-harmless language regarding the stormwater easement and recommends approval subject to all documentation reflecting updates and clarifications.

Commissioner Seward inquired if the hold-harmless language should include personal liability.

Commissioner Meagher moved to forward a favorable recommendation to the Township Board, the amendment of the final site plan subject to all staff and consultants' review comments being addressed and the addition of trees at unit 97 for the property described as parcel number 12-36-101-001 Located on the west side of Union Lake Road, and south of Hutchins Road, consisting of approximately 38.33 acres. Currently zoned (PD) Planned Development.

Commissioner Seward supported, and the MOTION CARRIED with a roll call vote (7 yes votes): (Seely/yes, Slicker/yes, Meagher/yes, Anderson/yes, Seward/yes, Carlock/yes, Ruggles/yes)

Commissioner Seward moved to forward a favorable recommendation to the Township Board, the amendment of the planned development agreement subject to all staff and consultants' review comments being addressed and the addition of the personal liability hold-harmless indemnification for the property described as parcel number 12-36-101-001 Located on the west side of Union Lake Road, and south of Hutchins Road, consisting of approximately 38.33 acres. Currently zoned (PD) Planned Development.

Commissioner Carlock supported, and the MOTION CARRIED with a roll call vote (7 yes votes): (Seely/yes, Slicker/yes, Meagher/yes, Anderson/yes, Seward/yes, Carlock/yes, Ruggles/yes)

NEW BUSINESS

A. Oxbow Lake Private Launch Association

Property identified as parcel number 12-22-279-004, (10193 Highland Road) located on the south side of Highland Road between Lakeside Drive and Hilltop Drive, consisting of approximately 1.9 acres. Currently zoned (PD) Planned Development

Requests: **1) Final site plan approval**
2) Planned development agreement approval

Applicant: Oxbow Lake Private Launch Association, Inc.
10835 Oxbow Lakeshore Drive
White Lake, MI 48386

Director O'Neil presented the project, stating that final site plan includes changing the type of trees to deciduous trees along Highland Road. Director O'Neil also presented the planned development agreement which will include language that defers the applicant's obligation to install a sidewalk until a triggering event, such as a sidewalk project from M-DOT is proposed.

Commissioner Anderson inquired about a timeline or what would trigger the sidewalk needing to be installed and requested that a notation be added that indicates the cost that would be involved to the applicant.

Commissioner Seward inquired about the special conditions listed that indicate the easement would be maintained by the Township.

Director O'Neil stated that the only maintenance that the Township would be responsible for is in the event that the Township makes any improvements to the easement.

Commissioner Carlock asked for clarification on the material that will be used for the fence on Highland Road.

Commissioner Meagher moved to approve the final site plan subject to all staff and consultants' review comments being addressed for the property described as parcel number 12-22-279-004, (10193 Highland Road) located on the south side of Highland Road between Lakeside Drive and Hilltop Drive, consisting of approximately 1.9 acres. Currently zoned (PD) Planned Development Commissioner Seely supported, and the MOTION CARRIED with a roll call votes (7 yes votes): (Seely/yes, Slicker/yes, Meagher/yes, Anderson/yes, Seward/yes, Carlock/yes, Ruggles/yes)

Commissioner Seward moved to forward a favorable recommendation to the Township Board, the planned development agreement subject to all staff and consultants' review comments being addressed and that the Township would only be responsible for maintenance in the easement of improvements made by the Township for the property described as parcel number 12-22-279-004, (10193 Highland Road) located on the south side of Highland Road between Lakeside Drive and Hilltop Drive, consisting of approximately 1.9 acres. Currently zoned (PD) Planned Development. Commissioner Carlock supported, and the MOTION CARRIED with a roll call votes (7 yes votes): (Seely/yes, Slicker/yes, Meagher/yes, Anderson/yes, Seward/yes, Carlock/yes, Ruggles/yes)

OTHER BUSINESS

A. Eagles Landing

Property identified as parcel 12-33-100-008. Located on the east side of Bogie Lake Road, south of Cedar Island. Consisting of approximately 10 acres. Currently zoned (R1-C) Single Family Residential.

Request: **Final site plan extension request**

Applicant: Better Built Homes
Charles Burt
156 East Meadow Circle
White Lake, MI 48383

Director O'Neil presented the request for an extension of the final site plan to expire February 18, 2023.

Commissioner Anderson explained that this is not setting any precedent as extensions have been issued in the past based on particular circumstances.

Commissioner Carlock inquired how many extensions can be granted and if there is a limit to how many can be approved for one project.

Director O'Neil explained that there is a limit to how many extensions would be granted. Projects which have received extensions would be required to conform to all existing ordinances and ordinance changes which have occurred since the extension was granted.

Applicant present: Charles Burt stated that the issue with DTE was resolved and has been in contact with the Oakland County Health Department regarding the test wells.

Discussion occurred about easements being provided to retain access to the school and the utility easement.

Commissioner Seely moved to approve the extension of final site plan to expire on February 18, 2023 for the property described as parcel number 12-33-100-008. Located on the east side of Bogie Lake Road, south of Cedar Island. Consisting of approximately 10 acres. Currently zoned (R1-C) Single Family Residential.

Commissioner Meagher supported, and the MOTION CARRIED with a roll call votes (7 yes votes): (Seely/yes, Slicker/yes, Meagher/yes, Anderson/yes, Seward/yes, Carlock/yes, Ruggles/yes)

LIAISON'S REPORT

Commissioner Dehart: Zoning Board of Appeals has no report. Director O'Neil noted that a workshop is going to occur soon to discuss the sign ordinance.

Commissioner Carlock: The Parks & Rec Board has no report.

Commissioner Ruggles: There has not been a Township Board since the last Planning Commission meeting. Commissioner Ruggles participated in an Elections Committee meeting, there are three districts that will vote on a bond issue for the school district.

DIRECTOR'S REPORT

Director O'Neil reported that two public hearings will be presented at next meeting. The draft of the Request for Proposal for review of the future land use Master Plan is being prepared. The Parks and Rec

Board Master Plan is in development.

COMMUNICATIONS

Commissioner Slicker inquired if the Township would be able to assist the residents of the Suburban Knolls subdivision in requesting a traffic light to be installed by M-DOT.

Commissioner Seely informed that webinars from EGLE that will be available if any members are interested in participating.

NEXT MEETING DATES: April 21, 2022
May 5, 2022

ADJOURNMENT

Commissioner Anderson moved to adjourn the meeting at 8:43 PM
Commissioner Seward supported and the **MOTION CARRIED** with a voice vote: 7 yes votes

DRAFT

Director's Report

Project Name: Avalon (White Lake Hill, LLC)

Description: Preliminary site plan & rezoning

Date on Agenda this packet pertains to: April 21st, 2022

- Public Hearing
 Special Land Use
 Initial Submittal
 Rezoning
 Revised Plans
 Other: PDA
 Preliminary Approval
 Final Approval

Contact	Consultants & Departments	Approval	Denial	Approved w/Conditions	Other	Comments
Sean O'Neil	Planning Director	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Subject to all staff and consultant review comments being addressed.
John Holland	WLT Fire Chief	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See letter dated 04/14/2022
Jeanine Smith	WLT Assessor	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See memo dated 04/4/2022
DLZ	Engineering Consultant	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See letter dated 04/13/2022
Justin Quagliata	Staff Planner	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See letter dated 04/13/2022



Fire Department
Charter Township
of White Lake

Site / Construction Plan Review

To: Sean O'Neil, Planning Department Director

Date: 04/14/22

Project: The Avalon

File #: N/A

Date on Plans: 04/04/22

The Fire Department has the following comments with regards to the Revised site plan for the project known as The Avalon:

1. Multifamily phase.
 - a. The spacing between hydrants shall not exceed 300 feet. **Comment addressed**
 - b. The hydrants shall be arranged to provide adequate coverage for all buildings including #56 and #57 (additional hydrant to be added to this area). **Comment addressed**
 - c. Include a turn radius profile for units # 49-58. **Comment addressed**
 - d. The layout/configuration of the proposed street names assigned to this project are too closely grouped creating potential confusion to responders. **Pending**

Avoid the following:

- Name changes at jogs and curves.
- Duplicate names.
- Names that could be mispronounced or are difficult to pronounce.
- Names that are spelled or pronounced close to an existing street/road name.

Reference the Township map for guidance.

John Holland
Fire Chief
Charter Township of White Lake
(248)698-3993
jholland@whitelaketwp.com

Plans are reviewed using the International Fire Code (IFC), 2015 Edition and Referenced NFPA Standards.

Assessing Department

Memo

To: Sean O'Neil, Planning

From: Jeanine A Smith

Date: 4/4/2022

Re: Project Name: Avalon

File No:

Parcel Number:12-20-101-003
12-20-126-006

Comments: This project crosses parcel lines.

No further comment.



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April 13, 2022

Sean O’ Neil
Community Development Department
Charter Township of White Lake
7525 Highland Road
White Lake, Michigan 48383

RE: The Avalon- f.k.a. White Lake Hill- Preliminary Site Plan Review – 3rd Review

Ref: DLZ No. 2145-7233-21 Design Professional: PEA Group

Dear Mr. O’ Neil,

Our office has performed the above mentioned Preliminary Site Plan review for the revised plan dated April 4, 2022. The plans were reviewed for feasibility based on general conformance with the Township Engineering Design Standards.

General Site Information

This site is located on the north side of M-59 and east of Ormond Road. The property is located on both sides of Hill Road: across from former Brooks Elementary School and West of Meijers. Total site acreage is approximately 110.02 acres.

Site Improvement Information:

- Construction of a Planned Development consisting of 87 single family condominium homes on the east side of Hill Road.
- Proposed paved and public road for the single family condominium homes with one point of access off Hill Road.
- Construction of a Planned Development consisting of 406 multi-family units for lease on the west side of Hill Road. Associated clubhouse and pool as part of multi-family development.



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WLT-White Lake Hill- PSP Review.03

April 13, 2022

Page 2 of 9

- For multi- family units: associated paved and curbed parking including ADA accessible parking spaces and maneuvering aisles for clubhouse and pool. Internal streets and drives are also proposed with a point of access off M-59 and a second point of access off Hill Road.
- Site to be serviced by watermain and sanitary sewer.
- Storm water runoff is proposed to be detained as follows: 1) Detention Pond at the northwest corner of Hill Road and M-59- to discharge to existing storm sewer just south. 2) Two detention ponds on the west side of Hill Road and located centrally in the multi-family portion- to discharge to existing culvert under Hill Road. 3) Detention ponds located on the southernmost portion of the single family phase- to discharge to existing watercourse located between the two ponds. 4) Detention pond located on the eastern portion of the single family phase- to discharge to the existing wetlands to the southwest.

We offer the following comments:

Note that comments from our March 15, 2022 review letter are in *italics*. Responses to those comments are in **bold**. New comments are in standard typeface.

The following items should be noted with respect to Planning Commission review:

- a) *Pond 2 located in the single family section of the development (see plan Sheet P-5.1) proposes discharge to the adjacent wetlands to the west. Clarify where drainage from this wetland shall be routed as it appears from existing topography that there is no outlet from this wetland. In addition, a portion of this wetland is located off site; an off-site drainage easement would be required. Additional topographical survey information will be required for the property to the south of the wetlands in order to clarify the drainage path.* **The design engineer has noted that the discharge from the proposed pond (now labeled as Pond 5) will discharge at an agricultural rate and follow its natural off site drainage course. The difference in pre and post development area discharging from proposed Pond 5 to the existing wetlands is an increase of 0.2 acres. We can consider this item complete for this level of review, however the capacity for the receiving wetland to accommodate the increased runoff volume will need to be demonstrated at the time of Final Site Plan.**
- b) *The multifamily exiting drive onto M-59 shows a width of 16 feet. Township Zoning Ordinance 5.11Q.v. requires a width of 20' for one way drives and a minimum width of 24' for two way drives.* **Dimensions have been clarified; DLZ defers further comment regarding compliance to Township Planning Department.**



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WLT-White Lake Hill- PSP Review.03

April 13, 2022

Page 3 of 9

- c) *We defer to the Township as to whether 6 foot wide sidewalk is required on both sides of Hill Road. None is proposed at this time. Township Zoning Ordinance 5.21 requires a minimum of 6 foot width for sidewalks along major roadways. Comment outstanding. We continue to defer to the Township with regard to this item. Note that an 8' wide path has now been added along a portion of the west side only of the Hill Road frontage and that two road crossings of the path have been proposed near the Hill Road entrances in order to connect the multi-family to the single-family units. The locations for the path crossings should be reviewed for proper pavement markings and pedestrian crossing signage. Comment addressed at this level of review. Per the design engineer, this item was discussed at a Township Zoom meeting on March 25, 2022. It was determined that an 8' wide path will be added along the western side of Hill Road from M-59 to the single family entrance. Paths are also now shown along the frontage for Units 81-84 and 85-87 only as the adjacent areas pose an issue with regulated wetlands and stream encroachment. The developer agreed at the meeting to make a contribution to the White Lake Sidewalk Fund to supplement pathway areas not installed along Hill Road.*

We note that portions of the proposed sidewalk along the western side of Hill Road are proposed outside the future ROW. This sidewalk locations shall be either adjusted to inside the future ROW or an easement shall be provided. In addition, our comment with respect to the proper pavement markings and pedestrian crossing signage for Hill Road crossing will need to be addressed at the time of FSP/FEP submittal.

- d) *Clarify ADA space number determination for ADA spaces associated with the clubhouse for the multi-family portion; are the four ADA spaces based on guest count of 79? Comment outstanding. Although design engineer states that the required ADA parking spaces are provided at the clubhouse for residents or visitors using the facilities, the basis for determining the 4 (four) required spaces for the clubhouse will need to be provided. Comment addressed. Basis for number of ADA spaces has now been provided.*
- e) *The following single family lots present conflicts with either the proposed house, required grading, or the potential deck/patio encroaching into the wetlands setback: 1, 27, 28, 40, 61, and 88. Impacts to the wetlands buffer will need to be removed. Comment outstanding. The wetlands setback/buffer for all wetlands was not shown on the initial Preliminary Site Plan submittal dated December 8, 2021. There are now units in the single family portion of this development as well as other areas of the development where grading is proposed in the wetlands setback/buffer which is not allowable. The following single family units will require revision with respect to grading in the wetlands setback: 1-7, 20, 27, 28, 39, 40, 52-54, 61, 75, 76, 84, 85, and 88. In addition, the proposed retaining wall adjacent*

grading to the northwest of multi-family Unit 19 will also require adjustment with respect to grading in the wetlands buffer. Since the units listed border EGLE regulated wetlands, our office concurs with the recommendation by Barr Engineering, Inc Wetland Delineation Report (dated February 9, 2022) recommending that Barr's wetland boundary determination and jurisdictional opinion be reviewed by EGLE prior to undertaking any activity near or within any identified wetlands; the proposed layout as submitted may require revision, in response to EGLE's review, to unit/ lot layout in the single family phase, thus impacting the preliminary site layout. **Comment addressed. Per a meeting with the Township on March 25, 2022, it was agreed that grading within the 25' wetland setback would be acceptable. A wetland restoration plan shall be required at the time of FSP/FEP submittal. Plan shall include a timeline for restoration of the wetland buffers. Note that the developer shall also be required to comply with all EGLE requirements with respect to grading and regulated wetlands. A note shall be provided on the FSP/FEP with regard to the wetland buffer restoration.**

- f) *Is the existing sidewalk along the M-59 road frontage being removed once the new 8' wide concrete sidewalk is installed? Please clarify. Comment partially addressed. The design engineer has indicated that the existing sidewalk shall remain and that the intent shall be for the developer to adhere to MDOT recommendations and requirements. Further clarification shall be required as to whether there will ultimately be two parallel running sidewalks along the M-59 frontage; redundancy with respect to the sidewalks should be avoided.* **Comment addressed. The existing sidewalk will be eliminated per the design engineer and a new walk placed 1' inside the ROW.**
- g) *All public roads are required to be built to RCOC standards.* **Comment remains as a notation.**
- h) *All drive widths adjacent to carports in the multi-family residential shall be specified and built in accordance with White Lake Township width requirements. Comment partially addressed. No carports are required, however the drive widths adjacent to all parking spaces shall be shown as some drive widths have not been provided.* **Comment addressed. All drive widths have now been provided.**
- i) *Specify the proposed width of the shared access driveways for Lots 81-84 and 85-88 of the single family portion. These drives shall be built to private access drive standards of White Lake as specified in the Zoning Ordinance Section 5.16. Section C. ii. requires two points of access for such drives to an adjacent public or private road. Section D. ii. requires that access driveways shall be able to accommodate emergency vehicles. Comment partially addressed. Two points of access for each of the drives are now proposed, however, Ordinance 5.16 C.i. requires a 30' wide easement width for an access drive; 25' is proposed for Lots 81-84 and 85-88. In addition, Zoning Ordinance Section 5.16 C. iii. regarding setbacks shall be met (Unit 85 is not in compliance). Also specify on plan that the 20' drive widths proposed are measured as 20' from the edge of the gutter line per Ordinance 5.16 C. v. Please also provide fire truck turning radius for these private access drives.* **Comment addressed, fire**

truck movements have been provided and show that while tight the trucks will be able to traverse the drives.

- j) *Clarify what is being done with the existing culvert that crosses under Hill Road and routes drainage through an existing ditch in front of the parking lot that is east of Hill Road and north of M-59. Comment outstanding. The design engineer has provided clarification with regard to the culvert under Hill Road that is adjacent to the proposed Detention Basin 3. The clarification request was however regarding the culvert at M-59 and Hill Road; this will require a response. **Comment addressed. Clarification has now been provided.***
- k) *Clarify if there is an existing drainage easement on the property south of the single family Detention Ponds 1 and 3. An easement will be required for discharge of drainage off site. In addition, the design engineer will be required to demonstrate that there will be no downstream impacts from the proposed development in terms of stormwater discharge flows. Engineer will need to demonstrate that adequate downstream capacity exists to handle post development flow. **Comment remains as a notation and can be further clarified at the time of FSP. Design engineer has stated in their February 15, 2022 review response letter: "There is not an easement in place. There is an existing stream which provides the historical drainage route through the said parcel to a box culvert under M-59. Since the development will have a 100-year detention basin and will discharge stormwater at an agricultural rate, the downstream ditch should have adequate capacity. A detail engineering analysis will be provided to the township and MDOT during the construction plan phase."***
- l) *End sections for the three detention basins proposed on the single family portion will be required to be located outside the wetland setback. Comment partially addressed. Our office finds the basin outlet locations acceptable and that the outlet pipes for Basins 4 and 5 shall be constructed within the wetlands setback and the land restored to its natural preconstruction condition. Note that location of the basin end sections shall be subject to review and approval by EGLE. EGLE may require revision of the end section locations. Our office recommends the Township require a wetland setback restoration plan and that the developer be required to post a bond amount to guarantee proper and timely completion of restoration of the wetland buffer setbacks in these two areas should EGLE approve the end section locations. **Comment addressed for this level of review. The design engineer notes a wetland setback restoration plan shall be provided at the time of FSP/FEP submittal. A note shall be provided on the FSP/FEP regarding wetland setback restoration.***
- m) *Extend the sanitary sewer to the north property line along Hill Road. Comment remains. Applicant indicated that the topography near the northern property restricts construction of the sanitary sewer at this location and would require a construction easement from the adjacent property owner. Township Ordinance requires extension to the limits of the property line and the sanitary sewer master plan indicates that gravity sanitary sewer is ultimately proposed north of this location. We defer*



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WLT-White Lake Hill- PSP Review.03

April 13, 2022

Page 6 of 9

to the Township if a variance can be granted on this requirement or if completion of this item will be a condition of approval. **Comment addressed. Discussion with the Township concluded that the sewer shall not be extended to the north property line and that an easement for future sanitary sewer extension shall be provided. In addition, the developer shall be required to deposit a monetary fee or escrow with the Township as assurance to supplement the future sewer extension.**

- n) *With nearly 60 feet of elevation change, the designer should ensure that sufficient pressure exists at the higher elevations for a bathroom on the 2nd story. The water may have to come from Pressure District 4 to service units with higher elevations as it appears that there will be insufficient pressure on the northern portions of the proposed development. To interconnect between the pressure districts, at least one PRV may be required. We suggest that the Township request escrow funds with regard to this item such that DLZ can model the water system to determine any deficiencies that may exist regarding water pressures and/or capacities. Our office has performed modeling of the proposed water system, see attached water model results; In all scenarios the area at the northeast corner of Aurora Circle experienced the lowest resulting pressure. There is a need for a handful of homes in this vicinity to have individual booster pumps to ensure adequate pressure given the various scenarios. It can also not be understated that the proposed design places an incredibly high criticality rating on the existing 16" watermain along M59. This is the only supply proposed to serve the nearly 500 residential units. If something were to happen to this watermain there is no second source or storage to feed this area temporarily. DLZ recommends a second water supply be installed to provide redundancy to the proposed distribution system. Please note that in order to stay within the same pressure district the source would need to be from south of the existing Pressure Reducing Valves that exist on either side of the existing Meijer store. **Comment addressed at this level of review. As a condition of the Township engineer's recommendation for Preliminary Site Plan approval, the developer acknowledges the critical issue of not having a redundant source of water supply for the proposed development. The design engineer has stated that a second supply connection is being researched.***
- o) *Sanitary sewage from this development is tributary to the existing Meijer sanitary sewer pump station located at the Northeast corner of Highland Road and Bogie Lake Road; an analysis will need to be provided that indicates there is sufficient capacity within the existing pump station, or if upgrades will be necessary to support the additional discharges. **Comment addressed and remains as a notation. Design engineer states in their review response letter dated February 15, 2022: "Since an 18" sewer has been stubbed to the Hill Road/M-59 intersection, it is our understanding that the pump station and forcemain were designed for future development along Hill Road and Ormond Roads. A detailed analysis will be conducted during the construction plan phase."***



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WLT-White Lake Hill- PSP Review.03

April 13, 2022

Page 7 of 9

- p) *Proposed future decks or patios for Lots 12,15,82, and 83 of the single family portion of the development appear to encroach into the proposed storm sewer easement. Please revise. **Comment outstanding. A 12' wide deck or patio would only allow for 5' of easement on one side of the storm sewer relative to Units 82 and 83; 6' minimum is required. In addition, Units 9-12 would have a similar issue. Unit 80- the deck or patio could only be placed on the NE area of the rear of the house. Units 85 and 86 would not have enough space for a deck or patio without storm sewer easement encroachment.***
- q) Parcel Area Table on Sheet P-2.0 of plans appears to be missing parcel data for Units 82,83,84,86, and 87. Please update.

The following comments can be addressed on the Final Site Plan/Final Engineering Plan:

Final Site Plan/Final Engineering Plan Comments-

General

1. Plan shall contain notes per White Lake Township Engineering Design Standards Section A. 8. a.-d.
2. Provide at least two permanent benchmarks on NAVD 88 datum. Benchmarks are required at least every 1,200 feet.
3. Provide soil boring reports that were prepared by CTI and McDowell.
4. The topographical survey shows existing overhead electrical lines on the parcel west of Hill Road. Clarify as to whether these lines shall remain or be relocated and as to whether an easement for the lines exists. In the event the lines are to be relocated, the easements (if existing) will need to be vacated.
5. A landscape plan showing all proposed trees relative to proposed storm sewer, sanitary sewer, and watermain shall be submitted. Note that 10' horizontal separation is required between proposed utilities noted and proposed trees.

Paving/Grading

1. ADA accessible ramps will be required on sidewalk adjacent to ADA parking spaces. Ramp slopes shall meet ADA requirements.
2. Structural wall calculations, that have been signed and sealed by a Registered Structural Engineer, verifying the wall integrity and the ability to support lateral and vertical stresses will need to be provided for retaining walls over 30" tall.



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

WLT-White Lake Hill- PSP Review.03

April 13, 2022

Page 8 of 9

3. Retaining walls >30" in height shall require a decorative fence or railing at the top that is a minimum of 36" in height.
4. Wetland buffers shall be clearly shown on all grading sheets.
5. Sheets 3.1-3.4 have Hill Road mislabeled as Highland Road. Please revise.

Watermain

1. We defer to the Fire Department regarding items related to fire suppression and hydrant coverage.
2. Show 20' wide easements for all watermain on plan.
3. Additional gate wells will be required to meet isolation requirements.
4. Radii of watermain appears to be too small at Units 40-41. Bends may be necessary.
5. There appears to be less than 10 feet of separation barrel to barrel between the storm sewer and watermain proposed in front of multifamily Unit 38. Please revise.

Sanitary Sewer

1. A manhole will need to be added along Hill Road southeast of multifamily Unit 28. There is 720 feet between manholes.
2. There appears to be less than 10 feet of horizontal separation to storm sewer in front of multifamily Unit 57. Please revise so minimum separation is achieved.
3. Modify sanitary sewer connection note on Sheet P-4.1 to read: "Connect proposed 10" **and 18"** sanitary to existing 18" sanitary stub."

Stormwater Management

1. We recommend that the proposed ditch end section tie into the MH southwest (adjacent to multi-family Detention Pond 3) be moved such that the end section ties into a separate manhole due south of the end section. This would eliminate the potential for four pipe connections into the same MH. See Sheet 4.2.
2. Show 12' easements for storm sewer on plan.
3. A minimum of 12" diameter sewer is required for storm sewer carrying surface drainage. Reference Sheet 4.4; proposed sewer for Lots 55-80 and 28-36 will need to be changed from 8" to 12".
4. Storm sewer shall be located no closer than a 10' horizontally from proposed buildings/structures. Reference Building #28 multi-family.



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

WLT-White Lake Hill- PSP Review.03

April 13, 2022

Page 9 of 9

Recommendation

Most of our previous comments have been addressed; the need for a redundant water source is a significant outstanding item that needs to be acknowledged by the applicant as a condition of PSP approval should the Planning Commission desire to make that motion. The storm sewer easement deck encroachments mentioned in Item p) above should be discussed as it may pose problems as units are built out. DLZ is confident the remaining items can be further clarified on the Final Site Plan submittals without significant modification to the site layout.

Please feel free to contact our office should you have any questions.

Sincerely,

DLZ Michigan

Michael Leuffgen, P.E.
Department Manager

Victoria Loemker, P.E.
Senior Engineer

Cc: Justin Quagliata, Community Development, *via email*
Hannah Micallef, Community Development, *via email*
Aaron Potter, DPS Director, White Lake Township, *via email*
John Holland, Fire Chief, White Lake Township, *via email*
Jason Hanifen, Fire Marshal, White Lake Township, *via email*

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WHITE LAKE TOWNSHIP PLANNING COMMISSION

REPORT OF THE COMMUNITY DEVELOPMENT DEPARTMENT

TO: Planning Commission

FROM: Sean O’Neil, AICP, Community Development Director
Justin Quagliata, Staff Planner

DATE: April 13, 2022

RE: The Avalon
Rezoning and Preliminary Site Plan – Review #3

White Lake Hill, LLC has submitted an approximately \$140,000,000 planned development (PD) proposal for a project identified as The Avalon. Overall, the 493-unit PD proposal includes the construction of 87 detached single-family site condominiums (The Residence at Avalon) on approximately 30.66 net acres located on the east side of Hill Road, north of Highland Road and the construction of 406 multiple-family units (The Avalon Apartment Homes) on approximately 64.82 net acres located on the west side of Hill Road, north of Highland Road. Site condominiums are units whereby a person owns their individual “lot” and shares ownership of common space with the rest of the owners in the development. Typically, an owner is responsible for maintaining their own “lot,” much like a traditional subdivision. The site condominium would be governed by a declaration of Covenants, Conditions and Restrictions (CCRs), which were provided with the application. The multiple-family development would be maintained by a management company.

The area proposed for a PD is comprised of two parcels, which would be required to be rezoned. The property west of Hill Road (1085 Hill Road; Parcel Number 12-20-101-003) is zoned PB (Planned Business) and AG (Agricultural), and the property east of Hill Road (Parcel Number 12-20-126-006) is zoned R1-A (Single-Family Residential). The parcels proposed for the PD are identified in the table below:

Property/Parcel Number	Acreage	Street Frontage
Parcel Number 12-20-126-006	41.06 gross acres 30.66 net acres	1,624.88 feet (Hill Road)
1085 Hill Road Parcel Number 12-20-101-003	68.96 gross acres 64.82 net acres	1,406.50 feet (at the chord – Highland Road) 2,443.61 feet (Hill Road)

The intent of the PD district is to permit greater flexibility and more creative design of residential developments than is possible under conventional zoning regulations. A PD allows a developer to propose a residential project with diverse housing types and different lot dimensions and yard setbacks as those prescribed in the standard residential districts. Lot size, yards, frontage requirements, setbacks, building height, and type and size of dwelling unit restrictions are generally waived in a PD. In exchange for the flexible standards, a public benefit must be provided to offset the impact(s) of development on the Township. The Developer is proposing to contribute \$100,000 to the Township Parks and Recreation Fund to be utilized at Stanley Park.

Overall, there would be 406 apartment units for rent among 58 buildings consisting of 17, twelve-unit buildings; 21, six-unit buildings; 5, five-unit buildings; 6, four-unit buildings; and 9, three-unit buildings. There would be 334 two-bedroom units and 72 three-bedroom units. The 12-plex buildings would be two-stories in height and all other building types would consist of ranch-style dwellings. The 87 site condominiums would consist of one- and two-story units. All of the single-family and multiple-family units would have an attached two-car garage. Some single-family products have an optional two-and-a-half car garage and/or three-car garage. There are no side-entry garages on either the single-family or the multiple-family units.

The apartments would have access to an approximately 6,658 square foot clubhouse consisting of a business center, fitness center, and leasing office. A patio (covered and uncovered) at the rear of the clubhouse is adjacent to a swimming pool. The conceptual clubhouse renderings state the building would be 5,132 square feet in size. The Developer must clarify the size of the clubhouse and revise the plans for consistency.

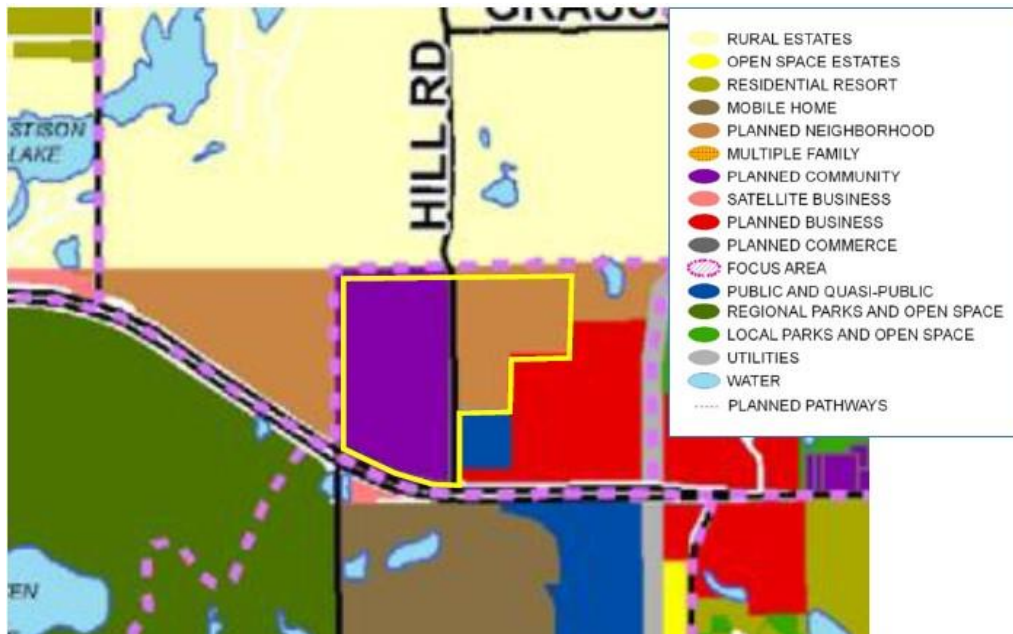
In total, the Developer estimates approximately 1,200 persons would reside within the overall development and anticipates the multiple-family apartments would lease for rates ranging from \$2,000 - \$2,700 per month and the single-family units would be for sale ranging from \$450,000 - \$500,000.

Master Plan

The Future Land Use Map from the Master Plan designates the subject site east of Hill Road in the Planned Neighborhood category, which is envisioned as a primarily residential land use of mixed densities and multiple product types, in a setting which may occasionally include a limited number of neighborhood retail, office, and personal service clusters. Connections to and segments of the Township community-wide pathway system are required as an integral part of all developments. All Planned Neighborhood development is intended to be served by Township sanitary sewers and either Township public water or community well systems. Net residential densities are anticipated to range between 2.0 and 8.0 units per acre, and nonresidential elements should not exceed 25 percent of the net land area after preservation of natural features. With 87 total units on approximately 30.66 net acres, density of the proposed site condominium is 2.8 dwelling units per acre (du/a).

The subject site west of Hill Road is designated as Planned Community on the Future Land Use Map. Planned Community is characterized by a mix of uses including higher residential densities and a variety of housing product types as well as a core area with retail, dining, entertainment, governmental, recreational, institutional, office and personal service establishments. Residential elements of a Planned Community may take the form of a freestanding neighborhood, or may be permitted on the upper floors of nonresidential development in the community core area. Multi-use/story buildings are expected to have two or three stories, however open space must be provided. Connections to and segments of the Township community-wide pathway system are required as an integral part of all developments. With 406 total units on approximately 64.82 net acres, density of the proposed multiple-family portion of the development is 6.3 du/a.

FUTURE LAND USE MAP



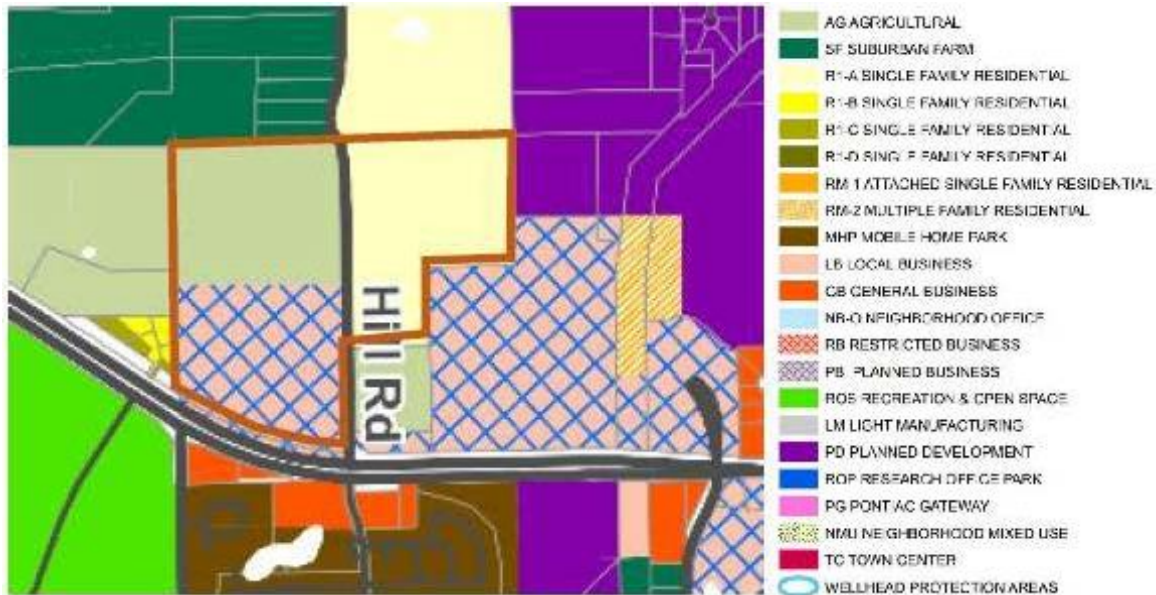
Zoning

The subject site west of Hill Road has split zoning; the south portion of the parcel is located in the PB (Planned Business) zoning district and the north portion of the parcel is located in the AG (Agricultural) zoning district. The subject site east of Hill Road is located in the R1-A (Single-Family Residential) zoning district. The following table illustrates the lot width and lot area standards for the existing and proposed zoning districts:

ZONING DISTRICT	LOT WIDTH	LOT AREA
AG	300 feet	5 acres
PB	No minimum	10 acres
R1-A	150 feet	1 acre

The properties proposed for development are requested to rezone to PD. A PD is allowed on properties a minimum of 10 acres in size. Any type and mix of housing (detached or attached single-family dwellings or multiple-family dwellings) are permitted in a PD. Various types of planned land use on large parcels held in common ownership, which includes preservation of open space, should characterize the PD district.

ZONING MAP



Physical Features

Currently the parcels are undeveloped and in parts are wooded with rolling topography. Wetlands on the properties were delineated by Barr Engineering Co. in March and April of 2021. There were 22 wetlands onsite, identified as A through V in the delineation report. According to the delineation report Wetlands I, J, K, O, R, and S appear to be regulated under Part 303 (Wetlands Protection, of the Michigan Natural Resources and Environmental Protection Act) because they are within 500 feet of the stream located east of Hill Road. Wetlands H and N may be regulated under Part 303 because they extend offsite and may be connected to a larger wetland complex, located west of the area of investigation that appears to be greater than five acres in size. Wetlands T and U may also be regulated under Part 303 because they are part of a larger wetland complex, located offsite, which is likely within 500 feet of the stream and likely five acres or more in size. Therefore, a Part 303 permit would likely be required from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to place fill, remove soil, drain surface water from, or make use of these specific wetlands. EGLE has regulatory authority regarding the wetland boundary location(s) and jurisdictional status of wetlands on this site. The Developer acknowledged prior to final site plan the wetland boundary determination and jurisdictional opinion shall be reviewed and verified by EGLE. The proposed unit layout may require revision in response to the EGLE review. Based on the submitted plans, 0.41-acre of wetland impact is proposed within the single-family portion of the development and 0.34-acre of wetland impact is proposed within the multiple-family portion of the development.

No building or structure can be located closer than 25 feet to any regulated wetland, submerged land, watercourse, pond, stream, lake or like body of water. The setback shall be measured from the edge of the established wetland boundary as reviewed and approved by the Township. Grading activities should also not occur in the Natural Features Setback (NFS) as the intent is to, as much as possible, leave said area in its natural state (i.e., not maintaining a lawn, not applying fertilizers or pesticides, native plantings only). In the single-family portion of the development, grading is proposed within the NFS. If grading is permitted to occur in the NFS, the area must be restored to its natural, undisturbed state. The Developer acknowledged a NFS restoration plan is required and must be submitted at final site plan, and also acknowledged the following must be conditions of any approval:

- Prior to any construction or grading on the site, the Developer shall install silt fencing at the upland edge of Natural Features Setbacks / limits of grading. The silt fencing shall be removed after construction once the area is stabilized and vegetation has been established.
- Wetland limits shall be clearly identified with permanent markers. The size, number, location, and language on the markers shall be subject to the approval of the Community Development Director.

Access

The site fronts on Highland Road and Hill Road. Highland Road (state trunkline) along the subject site is a four-lane divided highway designated as a Principal Arterial on the Township Thoroughfare Plan. Development of the subject site requires the installation of an eight-foot-wide sidewalk along the Highland Road property frontage (shown on plans; the existing paved shoulder is to be removed and converted to greenbelt). Hill Road is a gravel, two-lane public road without curb and gutter with a proposed 86-foot right-of-way requirement by the Road Commission for Oakland County (RCOC). The Developer will be required to dedicate (if not already completed) the additional portion of the future right-of-way to the RCOC. As part of the project, the Developer would pave Hill Road beginning approximately 140 feet from the northern extent of the condominium southward to Highland Road in accordance with the requirements of the RCOC.

A traffic impact statement (TIS) is required if the proposed use(s) would generate 750 or more driveway trips per day, or 100 or more peak-hour, peak-direction driveway trips. An average day is the average 24-hour total of all vehicle trips counted to and from a study site from Monday through Friday. A peak hour of traffic is the hour of highest volume of traffic entering and exiting the site during the morning and afternoon hours. A TIS prepared by Rowe dated November 22, 2021 was submitted examining traffic generation, access management, safety, and sight distance for the proposed development. The study looks at existing, background (future traffic volumes without the traffic generated by the proposed development; there were no future background developments identified in the study), and future level of service (LOS) during the AM (7:00-9:00 a.m.) and PM (4:00-6:00 p.m.) peak hours at the following intersections around the project site:

- Highland Road and Hill Road
- Highland Road and Le Grand Court
- Westbound Highland Road and crossover east of Hill Road
- Eastbound Highland Road and crossover west of Hill Road
- Westbound Highland Road and crossover west of Hill Road
- Highland Road and Haven Road
- Hill Road and Driveway 1
 - Proposed driveway approximately 2,300 feet north of Highland Road
- Hill Road and Driveway 2
 - Proposed driveway approximately 1,600 feet north of Highland Road

The traffic study notes existing traffic at the studied intersections all operate at an acceptable LOS (LOS D or better) during the AM and PM peak hours, with the exception of westbound Highland Road and eastbound crossover (east of Hill Road). The study shows background traffic at the studied intersections will operate at an acceptable LOS during AM and PM peak hours, with the exception of Highland Road and Haven Road, and westbound Highland Road and eastbound crossover (east of Hill Road). For future traffic, the study indicates all studied intersections will continue to operate at an acceptable LOS during the AM and PM peak hours, with the exception of several movements at the following intersections:

- Westbound Highland Road and Eastbound Crossover (east of Hill Road)
 - The northbound left-turn movement would continue to operate at LOS F in the PM peak hour and experience a total 95th percentile queue length of 411 feet (17 vehicles).
- Highland Road and Hill Road
 - The southbound right turn movement would operate at LOS F in the PM peak hour and experience a 95th percentile queue length of 612 feet (25 vehicles).
- Eastbound Highland Road and Westbound Crossover (west of Hill Road)
 - The southbound left turn movement would operate at LOS E in the PM peak hour and experience a total 95th percentile queue length of 354 feet (14 vehicles).
- Highland Road and Haven Road
 - The southbound left turn movements would operate at LOS E in the PM peak hour and experience a total 95th percentile queue length of 91 feet (4 vehicles).

The 95th percentile queue lengths were reviewed at the studied intersections. Significant queues were observed in the simulation for the westbound Highland Road and eastbound crossover (east of Hill Road) that impacted the eastbound through movements. To mitigate those issues, the study recommends a traffic signal for the westbound Highland Road and eastbound crossover (east of Hill Road). A signal at this intersection would reduce delay for the northbound left turns experienced during the PM peak hour and reduce queues experienced at this intersection and the intersection of Highland Road and Hill Road. The results of the LOS analysis for future conditions with the improvement listed above results in the following:

- Westbound Highland Road and Eastbound Crossover (east of Hill Road)
 - The northbound left turn movement would continue to operate at LOS F in the PM peak hour with a reduction in delay from 239.5 seconds to 189.4 seconds and experience a total 95th percentile queue length of 217 feet (9 vehicles).
- Highland Road and Hill Road
 - The southbound right turn movement would continue to operate at LOS F in the PM peak hour and experience a 95th percentile queue length of 227 feet (9 vehicles).

With improvements, the 95th percentile queue lengths were reviewed at the studied intersections. No significant queue lengths were observed in the simulations and queue lengths did not block any study intersection. The study also suggests a right-turn lane is warranted for the driveway off of westbound Highland Road. The recommended improvements are shown on the plan.

The following table summarizes traffic generation estimates for the proposed project:

Land Use	Land Use Code	Units	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	
Single-family Detached Housing	210	88 Units	17	49	66	55	33	88	897
Multi-family Housing (Low-Rise)	220	406 Units	36	113	149	123	72	195	2,678
Total	-	-	53	162	215	178	105	283	3,575

Utilities

Municipal water and sanitary sewer are available in the vicinity of the subject site and would have to be extended to serve the proposed development. The location and capacity of utilities will be reviewed by the Director of Public Services and the Township Engineering Consultant.

The Developer intends to construct sanitary sewer along Hill Road to the furthest extent north possible. To supplement the shortened length (approximately 50 feet from north property line), the Developer will make a contribution to the Township Sanitary Sewer Fund. The amount of the proposed contribution must be provided and accepted by the Township. Additionally, a utility easement will be provided to the Township at north end of the property along Hill Road.

Staff Analysis

In considering any petition for an amendment to the zoning map, the Planning Commission and Township Board must consider the criteria from Article 7, Section 13 of the zoning ordinance in making its findings, recommendations, and decision. Review of the rezoning request should focus on whether the proposed PD zoning is appropriate for the site. When reviewing the preliminary site plan, the Planning Commission should consider if the project meets the design standards for Planned Developments found in Article 6, Section 7 (C) and (D) of the zoning ordinance, the appropriateness of the requested waivers, and the site standards and development procedures for a PD as outlined in Articles 5 and 6, respectively, of the zoning ordinance.

The Planned Development review process is summarized by the following steps:

1. **Preliminary Site Plan:** During this review, the number of units and road layout are established, the amount of open space is determined, and other project details are decided upon. The Planning Commission holds a public hearing on the rezoning, reviews the PD proposal, and makes a recommendation to the Township Board. The Township Board takes final action, approving or denying the preliminary site plan. The rezoning request is reviewed concurrently with the preliminary site plan and is decided by the Township Board.
2. **Final Site Plan:** At this time, building materials and colors are finalized and all conditions of preliminary site plan approval must be satisfied. The Planning Commission reviews and takes action to approve or deny the final site plan, and also reviews the proposed Development Agreement and makes a recommendation to the Township Board.
3. **Development Agreement:** Upon recommendation by the Planning Commission, the Township Board takes final action on the Development Agreement.

Following is a summary of the project’s consistency with the provisions of the zoning ordinance.

Open Space

Planned Developments are intended to include the preservation of open space. Common open space is land in an undeveloped state preserving natural resources, natural features, scenic or wooded conditions, agricultural use, or a similar use or condition. Land in an undeveloped state may include a recreational trail, picnic area, children’s play area, greenway, or linear park. Land in common open space is not required to be dedicated to the use of the public. With a total of 30.66 acres of developable area, the single-family portion of the development provides 5.93 acres (19.3% of the developable area) as open space. With a total of 64.82 acres of developable area, the multiple-family portion of the development provides 24.22 acres (37.4% of the developable area) as open space. Note the submitted open space plan does not clearly indicate if stormwater management areas are counted as open space. Clarification must be provided.

Parking

For multiple-family dwellings, the zoning ordinance requires two parking spaces for each dwelling unit plus ¼ of a space per bedroom for guest parking in common areas. With 406 multiple-family dwelling units consisting of 884 bedrooms, a total of 1,033 spaces would be required for the project (812 resident spaces and 221 guest spaces). A total of 1,297 spaces are proposed (812 resident spaces in garages, 406 guest spaces in driveways, and 79 guest spaces not associated with individual units). Parking calculations on Sheet P-2.0 shall be revised; the number of bedrooms, guest parking required, and total parking required are incorrect.

Phasing: The applicant indicated both the single-family and multiple-family portions of the project will be developed in one phase. Based on the magnitude and scope of the project, staff estimates 2025-2027 as the project build-out year.

Sidewalks: The zoning ordinance requires sidewalks for internal circulation with a minimum of five feet in width. The submitted site plan shows five-foot-wide sidewalks along both sides of each street in the single-family portion of the project and along at least one side of each street in the multiple-family portion of the project. A crosswalk connection is proposed across Hill Road between the entrances of both the single-family and multiple-family developments.

Streets/Circulation: All condominium subdivisions must be developed with public streets conforming to all minimum requirements, general specifications, typical cross-sections and other conditions set forth in the zoning ordinance and any other requirements of the RCOC. All streets must also be approved by and dedicated to the RCOC. In the event the Developer is unable to obtain approval from, and dedicate the proposed streets to the RCOC, a separate application for approval of private condominium streets must be filed with the Planning Commission. All private condominium streets must conform to the standards of the zoning ordinance. The Developer indicated the streets at The Residences at Avalon would be built to public standards and approved and dedicated to the RCOC. All streets in the multiple-family portion of the development would be private.

Building Architecture and Design

Generally, exterior building materials should be comprised primarily of high quality, durable, low maintenance material, such as masonry, stone, brick, glass, or equivalent materials. Buildings should be completed on all sides with acceptable materials. As shown on the preliminary architectural plans, the proposed building materials for the project are a mix of horizontal siding and brick veneer, with asphalt shingle roofing. Ranch units within the multiple-family portion of the project would have rear recessed covered patios. Most 12-plex units would also have a recessed covered patio; those units that do not would have a balcony (second-story). At final site plan, detailed elevations will be required to clearly indicate the exterior building materials to be used. Also, the architectural plans shall not identify the 12-plex units as condominiums, as condominiums are not a housing type but rather a form of ownership.

A sample board of building materials to be displayed at the Planning Commission meeting and elevations in color are required by the zoning ordinance and must be submitted at final site plan. Additionally, address (street number) locations must be shown on the buildings. Three-inch-tall numbers visible from the street are required. The address locations are subject to approval of the Township Fire Marshal.

An outdoor patio is located on the north side of the clubhouse building and around the pool. Details for the items to be located on the patio and details for the patio surfacing shall be provided at final site plan. An ornamental paving treatment should be required by the Planning Commission. The treatment should be something either decorative or something to provide aesthetic quality to the patio. Potential options for ornamental paving treatments include, but are not limited to, CMU pavers; brick; stone; or stamped, stained, and sealed concrete. Accessory items within the development such as railings, benches, trash receptacles, outdoor seating (such as tables and chairs), or sidewalk planters located in the vicinity of sidewalks and/or outdoor seating areas are required to be of commercial quality and complement the building design and style. These details must be provided at final site plan.

Landscaping and Screening

Landscaping must generally comply with the provisions of the zoning ordinance and should be designed to preserve existing significant natural features and to buffer service areas, parking lots, and dumpsters. A mix of evergreen and deciduous plants and trees are preferred, along with seasonal accent plantings. A landscape plan will be provided and reviewed in detail during final site plan if the preliminary site plan is approved.

Lighting

Site lighting is required to comply with the zoning ordinance. Information on site lighting will be reviewed in detail during final site plan.

Waivers

Generally, in a PD the standard requirements for lot size, yards, frontage, setbacks, building height, and type and size of dwelling unit are waived, provided the purpose and intent of the zoning ordinance are incorporated into the overall development plan. For PDs the zoning ordinance is intended to provide flexibility for the Planning Commission and Township Board to set appropriate standards during site plan review. Where modifications of zoning ordinance standards are requested, the Developer must provide a table which clearly compares each requested modification to the zoning ordinance standard to be modified. Unless variations are specifically requested and approved by the Planning Commission, the final site plan must comply with the appropriate standards of the Township. Based on the submitted site plan, the Developer is requesting the following waivers for the Avalon PD:

Recreation Space

Multiple-family developments are required to provide recreation space for the use of the residents therein. A formula is applied whereby 5,000 square feet for the first unit plus an additional 100 square feet for each additional unit determines such space required for recreation. For a 406-unit multiple-family development, 45,500 square feet of recreation space is required. The submitted open space plan shall be revised to note the correct recreation space requirement (10,700 square feet is incorrectly listed as required). 18,623 square feet of recreation space (clubhouse, pool, and dog park) is proposed in the multiple-family portion of the development; therefore, a waiver of 26,877 square feet is required for the amount of recreation space.

Parallel Plan

For any residential project, a parallel plan demonstrating the layout and density of residential uses that would be possible without use of the PD District is required. The Developer requested a waiver of this requirement, as the densities proposed are within the Master Plan guidelines.

Lot Area

The existing R1-A zoning district requires parcels have a minimum lot area of one acre. In the R1-D (Single-Family Residential) zoning district, the densest district in the Township, parcels are required to have a minimum lot area of 12,000 square feet. For the single-family portion of the project, the PD has “lots” ranging from 7,431.38 square feet to 17,750.68 square feet in size. The average “lot” size is 9,118.05 square feet. Staff suggests the Planning Commission consider requiring minimum lot area of at least 8,000 square feet.

Lot Frontage/Width

Lot width is the straight-line distance between parallel side lot lines, measured at the front setback line. Where side lot lines are not parallel, the width is measured at the front setback line parallel to the street or tangent to the curve of the street. The existing R1-A zoning district requires parcels have a minimum of 150 feet of lot frontage. In the R1-D zoning district, parcels are required to have a minimum lot width of 80 feet. Lots on a cul-de-sac or curvilinear street must have a minimum of 65 feet of frontage comply with the lot width requirement at the minimum front setback line. Additionally, corner lots in condominium subdivisions must be at least 20 feet wider than the minimum width required by the zoning ordinance. For the single-family portion of the project, the PD has “lots” ranging from 62 feet of lot width (including “lots” on a cul-de-sac or curvilinear street) to 107 feet. The average “lot” width is 68 feet. Staff suggests the Planning Commission consider requiring minimum lot width of at least 70 feet.

Setbacks and Lot Coverage

The yard setbacks and lot coverage for the existing R1-A zoning district, R1-D zoning district, PD zoning district, and the proposed PD (single-family) are summarized in the table below.

	R1-A zoning	R1-D zoning	PD zoning	Proposed PD
Front yard setback	35 feet	30 feet	40 feet	25 feet
Side yard setback	25 feet	10 feet	25 feet	10 feet
Rear yard setback	40 feet	30 feet	TBD	35 feet**
Max. lot coverage	20%*	20%*	TBD	35%

*A maximum 30% lot coverage may be approved administratively by the Community Development Director or his designee on existing lots of record where the lot has sanitary sewer service and the proposed building complies with all setback requirements.

**A 45-foot rear yard setback is prescribed for Units 8-13.

Buildings within a multiple-family development must have a minimum setback of 25 feet from the back of sidewalk or 25 feet from back of curb (if no sidewalk is present). A five-foot waiver is requested to allow a 20-foot front setback.

The Planning Commission may consider the proposed setbacks and lot coverage and determine whether they are appropriate or whether additional setbacks or less lot coverage should be established. The submitted plan notes no deck or patio would encroach into any setback.

Decks, Porches, and Patios

The zoning ordinance states “In no instance shall a deck, porch, patio or paved terrace be located in any recorded easement...” As noted in the DLZ review letter dated April 13, 2022 decks and patios attached to several single-family units would likely encroach into the proposed storm sewer easement. Staff is concerned about deck/patio encroachment into the storm sewer easement. Maintenance activities within the easement could potentially damage decks/patios in the vicinity. While the storm system is private and must be maintained by the condo association (after assignment by the Developer), if the association fails to maintain the storm sewer and the Township exercises its right to maintain/repair/replace the system (as would be outlined in the development agreement and master deed) correcting resulting damage to private decks/patios should not be the responsibility of the Township. Hold harmless language, subject to approval by the Township Attorney, would need to be incorporated into the development agreement and master deed if a waiver was granted to allow deck/patio encroachment into the storm sewer easement. There is an alternative to not install decks/patios on the rear of units where encroachment into the storm sewer easement would occur. The decks/patios on the units in question could potentially be relocated to the sides of units and/or reduced in size.

Separate from the waiver request, the note under the typical lot layout on Sheets P-2.3 and P-2.4 of the site plan shall be revised to add the word “within” following the word “encroaching.” Also, the words “wetland buffer” shall be replaced with the words “natural features.”

Additionally, the Developer shall clarify its correspondence to the Township dated April 4, 2022. In said communication, the Developer requested a waiver to allow decks/patios to encroach within the Natural Features Setback on Units 1, 4, 9, 27, and 40. Such a request for waiver is inconsistent with the submitted preliminary site plans.

Driveway Access

One-way drives must be a minimum of 20-feet-wide. Furthermore, for boulevard-style driveways, the minimum required entering road width is 20 feet and the minimum required exiting road width is 22 feet. The exiting drive onto Highland Road is 16 feet in width. DLZ deferred compliance regarding this matter (Item B, Page 2 of the DLZ review letter dated April 13, 2022) to the Community Development Department. The aforementioned item was not addressed. The site plan measures the drive width to the back of curb; the road measurement surface is taken between the edges of the gutter pan. A waiver of six feet is required to allow the Highland Road exit drive to consist of a 16-foot-wide road surface. Additionally, the Hill Road boulevard access (both entering and exiting drives appear to be 19 feet in width) to the multiple-family portion of the development is noncompliant and waivers (1 foot for entrance; 3 feet for exit) are needed to allow a reduction of the required road surface width.

Parking

The zoning ordinance requires each individual parking space be delineated by dual stripes, two feet apart centered on the dividing lines and painted white. A waiver is requested to allow single stripes. Separate from the waiver request, a “Van Accessible” sign detail for the barrier-free parking shall also be provided on Sheet P-7.0 of the site plan.

Street Layouts and Blocks

The maximum length of cul-de-sac streets and maximum length of blocks within condominium subdivisions cannot exceed 1,500 feet. The Developer is seeking a 930-foot waiver to allow maximum block length of 2,430 feet. Topography, steep grades, and natural features on the site were the stated reasons for the requested waiver. The Fire Department has reviewed the length of the streets and blocks and is satisfied with accommodations for emergency access.

Sidewalks

The zoning ordinance requires a minimum six-foot-wide sidewalk placed one-foot from the inside edge of the right-of-way along both the east and west Hill Road property frontages, which the applicant is required to install as part of the project. The submitted site plan shows an eight-foot concrete sidewalk along the west side of the Hill Road property frontage from Highland Road to the south side of the single-family access (across the street). Portions of this sidewalk are proposed outside of the future right-of-way; the sidewalk must be relocated inside the road right-of-way or an easement be provided. Right-of-way/easement widths for public walkways when not adjacent to or a part of street rights-of-way must be at least 15 feet and dedicated to the use of the public. Sidewalks on the east side of Hill Road are proposed along the frontage of Units 81-84 and Units 85-87. There are regulated wetlands and a stream along the remaining portion of Hill Road north of Units 81-84; therefore, the Developer is requesting a waiver to not install sidewalks in this location. However, the Developer offered to make a contribution to the Township Sidewalk Fund to supplement the pathway areas not installed along Hill Road. The amount of the proposed donation must be provided and accepted by the Township.

Signs

The zoning ordinance requires the area, quantity, location, and dimensions of all signs to be provided with the preliminary site plan. The site plan shows the location of a monument sign (at the corner of Highland Road and Hill Road) setback eight feet from the Highland Road right-of-way line. Development entry signs not placed within a boulevard entrance must be setback at least 10 feet from the road right-of-way. Therefore, a two-foot waiver is requested for the aforementioned sign.

One monument sign, not more than 30 square feet in area, may be maintained at or adjacent to the principal entrance to a residential development. One additional sign may be permitted if the residential development has access to two thoroughfares or the development has more than one boulevard street entrance from an existing arterial or it has at least 250 dwellings. The signs may not exceed a height of six feet. The multiple-family portion of the development would contain more than 250 units, so a second development entry sign is permitted by right. A waiver is requested to install a third sign (determined to be the sign at the corner of Highland Road and Hill Road). For the multiple-family portion of the development, the other monument signs are proposed within the boulevard entrances on Highland Road and Hill Road. One monument sign is proposed within the boulevard entrance to the single-family portion of the development.

While signage details were not provided, staff can administratively review and approve the sign design. The monument signs would be required to comply with residential district sign regulations, including not more than 30 square feet in area and six feet in height.

Trash Collection

All units would be served by individual trash carts provided by the waste collection company. A 10-foot by 20-foot dumpster pad/enclosure is located east of the clubhouse building. The zoning ordinance requires dumpsters to be surrounded by a six-foot-tall wall on three sides and an obscuring wood gate on a steel frame on the fourth side, located on a six-inch concrete pad extending 10 feet in front of the gate, with six-inch concrete-filled steel bollards to protect the rear wall and gates. As proposed, the pad does not extend 10 feet in front of the gate; therefore, a 10-foot waiver is required. The zoning ordinance also states dumpsters and trash storage enclosures shall be constructed of the same decorative masonry materials as the buildings to which they are accessory. Brickform concrete (simulated brick pattern) or stained, decorative CMU block are not permitted where the principal building contains masonry. Plain CMU block is also prohibited. As a condition of site plan approval, the dumpster enclosure shall match the same brick veneer/cultured stone veneer as the facade of the clubhouse with a steel-backed wood gate painted a complementary color to the brick veneer/cultured stone veneer. A trash enclosure detail shall be provided on Sheet P-7.0 of the site plan showing the finished face on the outside walls of the enclosure and indicate the color of the gate.

An updated list of all requested waivers shall be provided by the Developer. Furthermore, PD modifications 2, 4, and 5 shall be removed from the table on Sheet P-2.0 of the site plan. Said waivers are not needed.

Planning Commission Options / Recommendation

The Planning Commission may recommend approval or denial of the rezoning request, or it may recommend a different zoning designation than proposed by the applicant to the Township Board. The Planning Commission may recommend approval, approval with conditions, or denial of the preliminary site plan to the Township Board. **The proposed rezoning and planned development are both compatible with the Master Plan and with surrounding land uses. Staff recommends approval of the rezoning, and approval of the preliminary site plan subject to the items identified in this report being addressed prior to final site plan.**

The following notations summarize the preliminary site plan review:

- Recommendation of approval is in accordance with the preliminary site plans prepared by PEA Group (revision date April 4, 2022), subject to revisions as required. The utility, grading, and storm drainage plans for the site are subject to the approval of the Township Engineering Consultant and shall be completed in accordance with the Township Engineering Design Standards.
- Recommendation of approval is in accordance with the preliminary ranch unit building elevations and floor plans prepared by Alexander V. Bogaerts & Associates, P.C. dated March 29, 2022, subject to revisions as required and with the preliminary 12-plex elevations and floor plans prepared by Burmann Associates Inc. dated June 27, 2018 and July 17, 2018, subject to revisions as required.

Attachments:

1. Rezoning application dated December 6, 2021.
2. Site plan review application dated December 10, 2021.
3. Community Impact Statement prepared by Developer dated February 25, 2022.
4. Traffic Impact Statement prepared by Rowe dated February 18, 2022.
5. Wetland Delineation Report prepared by Barr Engineering Co. dated February 9, 2022.
6. Preliminary site plans prepared by PEA Group (revision date April 4, 2022).
7. Preliminary ranch unit building elevations and floor plans prepared by Alexander V. Bogaerts & Associates, P.C. dated March 29, 2022.
8. Preliminary 12-plex elevations and floor plans prepared by Burmann Associates Inc. dated June 27, 2018 and July 17, 2018.
9. Preliminary clubhouse rendering and floor plan prepared by TK Design & Associates dated November 13, 2021.
10. Single-family architectural plans prepared by MJC Companies.

CHARTER TOWNSHIP OF WHITE LAKE
COMMUNITY DEVELOPMENT DEPARTMENT
7525 Highland Road, White Lake, Michigan 48383-2900
248-698-3300, Ext. 163

APPLICATION TO REZONE PROPERTY

Date: 12/6/21

Applicant: White Lake Hill, LLC

Address: 31550 Northwestern Hwy, Farmington Hills, MI 48334

Phone No.: 248.687.9290 Fax No.: _____

E-mail: dcucco@mshapirorealestate.com

Applicant's Interest in Property: Owner

Property Owner: White Lake Hill, LLC

Owner's Address: 31550 Northwestern Hwy, Farmington Hills, MI 48334

Phone No.: 248.687.9290 Fax No.: _____

Location of Property: North of Highland Road at Hill Road

Sidwell No(s): 12-20-101-003, 12-20-126-006

Total area of change: 110.02 acres

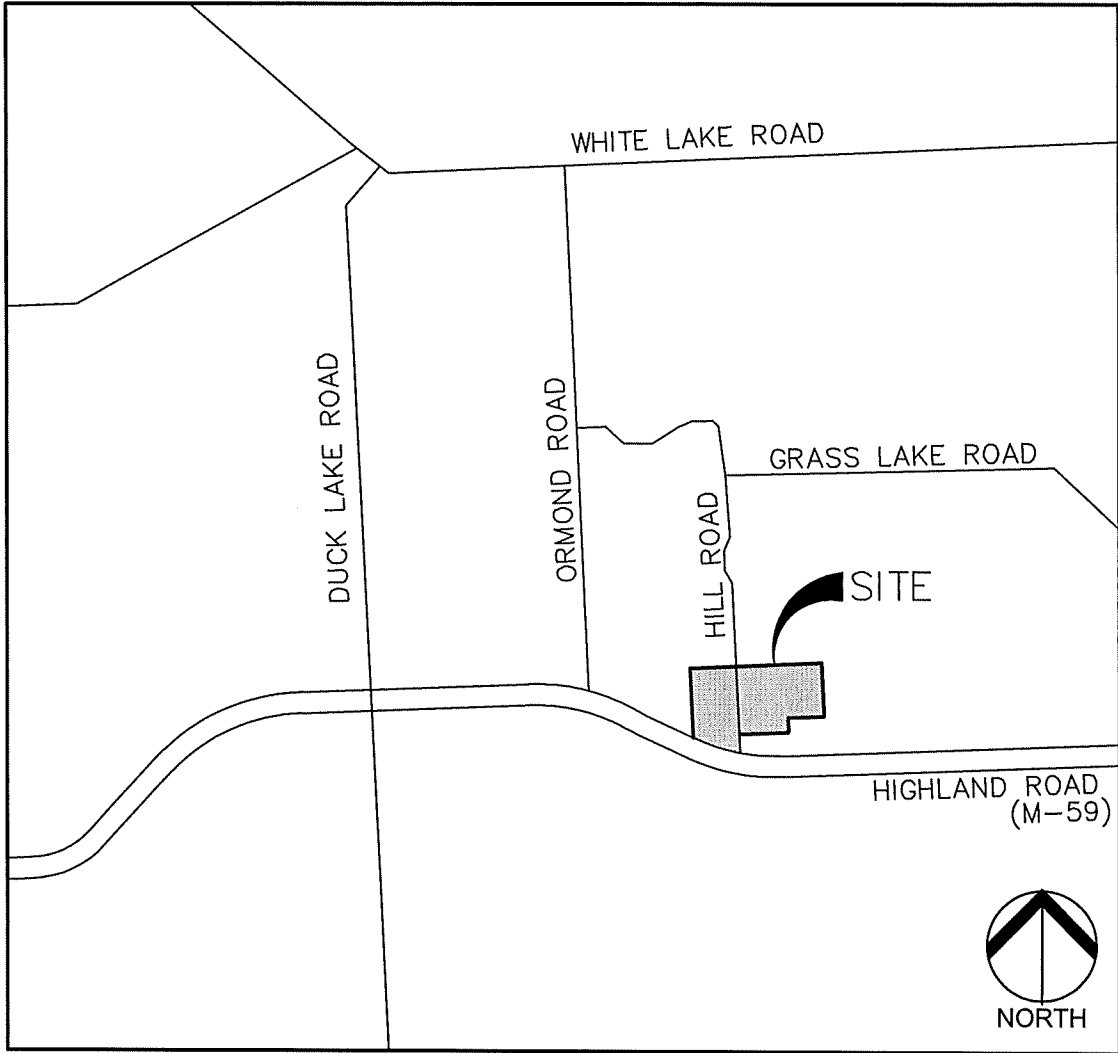
I, the undersigned (owner, attorney, or option holder) hereby request that this property now classified as PB, AG & R1-A District, be reclassified as PD - Planned Development District.

Applicant's Signature: _____
(If owner does not sign application, attach letter signed by owner, requesting zoning change.)

Please Print Name: James Galbraith

Required Attachments:

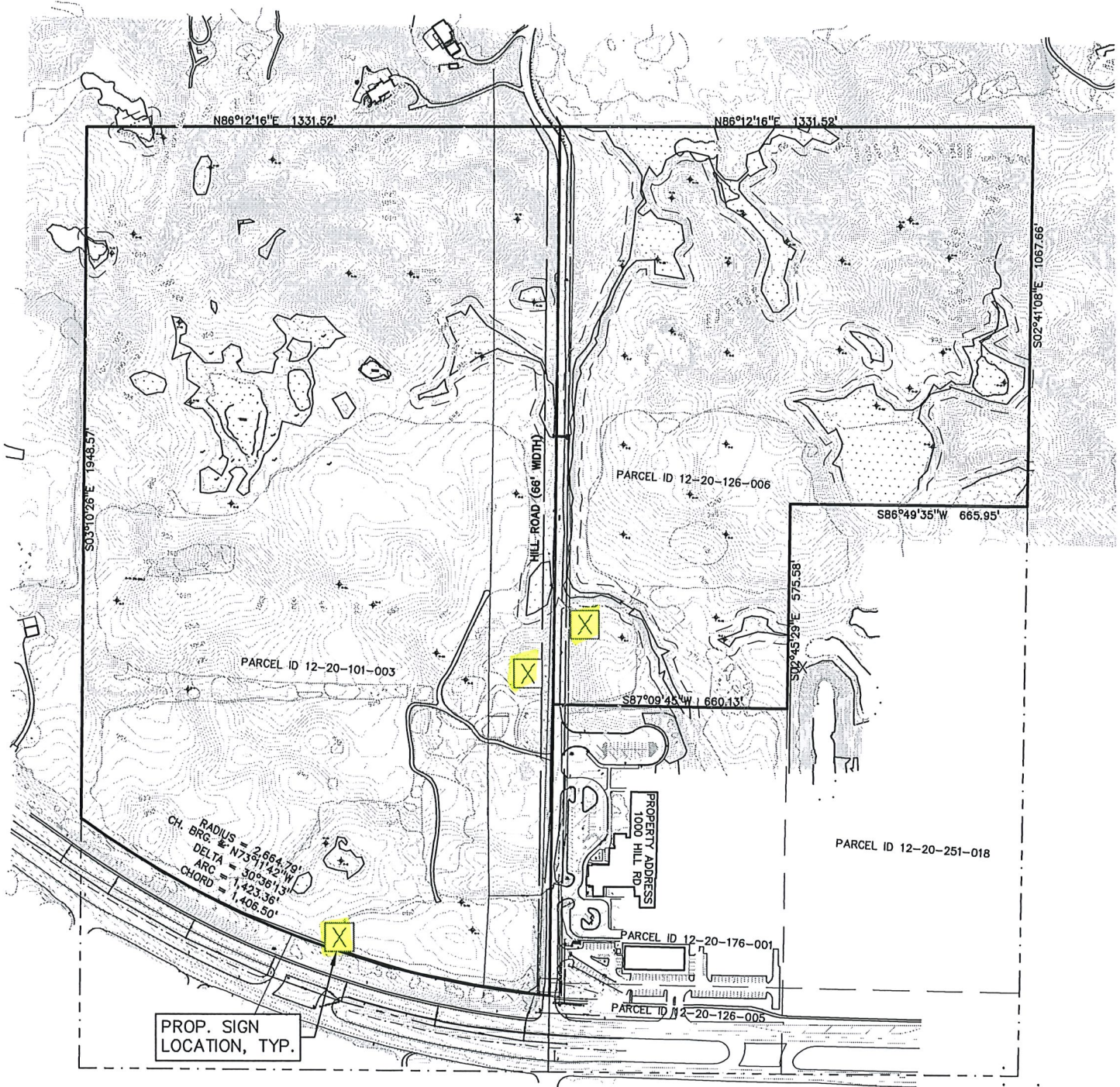
- 1. Legal description of the property proposed to be rezoned.
- 2. Location map
- 3. Rezoning sign location map
- 4. Statement indicating why change is requested
- 5. Review fee (check payable to the Charter Township of White Lake)



LOCATION MAP



t: 844.813.2949
www.peagroup.com



REZONING SIGN LOCATIONS



PEA
GROUP



t: 844.813.2949
www.peagroup.com

LEGAL DESCRIPTION

(Per Hubbell, Roth & Clark, Inc.)

PARCEL ID 12-20-101-003

That part of the West $\frac{1}{2}$ of the Northwest $\frac{1}{4}$ of Section 20, Township 3 North, Range 8 East, White Lake Township, Oakland County, Michigan, lying northerly of Highland Road (M-59), more particularly described as: BEGINNING at the Northwest corner of said section; thence South 89 degrees 39 minutes 41 seconds East 1331.52 feet along the north section line; thence South 01 degrees 14 minutes 20 seconds West 2443.61 feet to the northerly right of way line of Highland Road (M-59); thence along said right of way and a curve to the right 1423.36 feet, said curve having a radius of 2664.79 feet, a central angle of 30 degrees 36 minutes 14 seconds, and a chord bearing North 69 degrees 03 minutes 39 seconds West 1406.50 feet to the west section line; thence North 01 degrees 01 minutes 40 seconds East 1948.57 feet along said section line to the POINT OF BEGINNING. Said property contains 68.96 acres, more or less.

PARCEL ID 12-20-126-006

Part of the Northwest $\frac{1}{4}$ of Section 20, Township 3 North, Range 8 East, White Lake Township, Oakland County, Michigan, described as: BEGINNING at the North $\frac{1}{4}$ corner of said section; thence South 01 degrees 26 minutes 55 seconds West 1067.66 feet along the North-South $\frac{1}{4}$ line of said section; thence North 89 degrees 02 minutes 22 seconds West 665.95 feet; thence South 01 degrees 22 minutes 34 seconds West 575.58 feet; thence North 88 degrees 42 minutes 12 seconds West 660.13 feet; thence North 01 degrees 14 minutes 20 seconds East 1624.88 feet to the north line of said section; thence South 89 degrees 39 minutes 41 seconds East 1331.52 feet along said north line to the POINT OF BEGINNING. Said property contains 41.06 acres, more or less.

PEA
GROUP

t: 844.813.2949
www.peagroup.com

CHARTER TOWNSHIP OF WHITE LAKE

SITE PLAN AND PLAT REVIEW APPLICATION

White Lake Township Community development Department, 7525 Highland Road, White Lake Michigan 48383 (248)698.3300 x163

APPLICANT AND PROPERTY INFORMATION

Applicant: White Lake Hill, LLC

Phone: 248.687.9290 Fax: _____

Address: 31550 Northwestern Hwy. Farmington Hills MI 48334
(Street) (City) (State) (Zip)

Applicant's Legal Interest in Property: Owner

Property Owner: White Lake Hill, LLC Phone: 248.687.9290

Address: 31550 Northwestern Hwy. Farmington Hills MI 48334
(Street) (City) (State) (Zip)

PROJECT INFORMATION

Project Name: White Lake Residential P.D. Parcel I.D. No.: 12-20-101-003, 12-20-126-006

Proposed Use: Planned Development (PD) Current Zoning: PB, AG & R1-A

Existing Use: Vacant Parcel Size: 68.96 & 41.06 acres Floor Area / No. of Units 494

TYPE OF DEVELOPMENT

Subdivision Site Condominium Commercial

Multiple Family Special Land Use Industrial

Adult Entertainment

SITE PLAN SUBMITTAL CHECKLIST

PDF File and One Paper Copy (sealed) as required by Zoning Ordinance 58

Application Review Fees

* PLANS WILL NOT BE ACCEPTED UNLESS FOLDED *

REQUIRED SIGNATURES

 (Signature of Property Owner) 12/10/21
(Date)

JAMES GALBRAITH
FOR WHITE LAKE HILL LLC

 (Signature of Applicant) 12/10/21
(Date)

COMMUNITY IMPACT STATEMENT

- 1.0 General Project Information
 - 1.1 Project Overview
 - 1.2 Master Plan Analysis
 - 1.3 Surrounding Uses

- 2.0 Community and Facilities Services
 - 2.1 Police and Fire Demand
 - 2.2 Utilities
 - 2.3 Stormwater Management

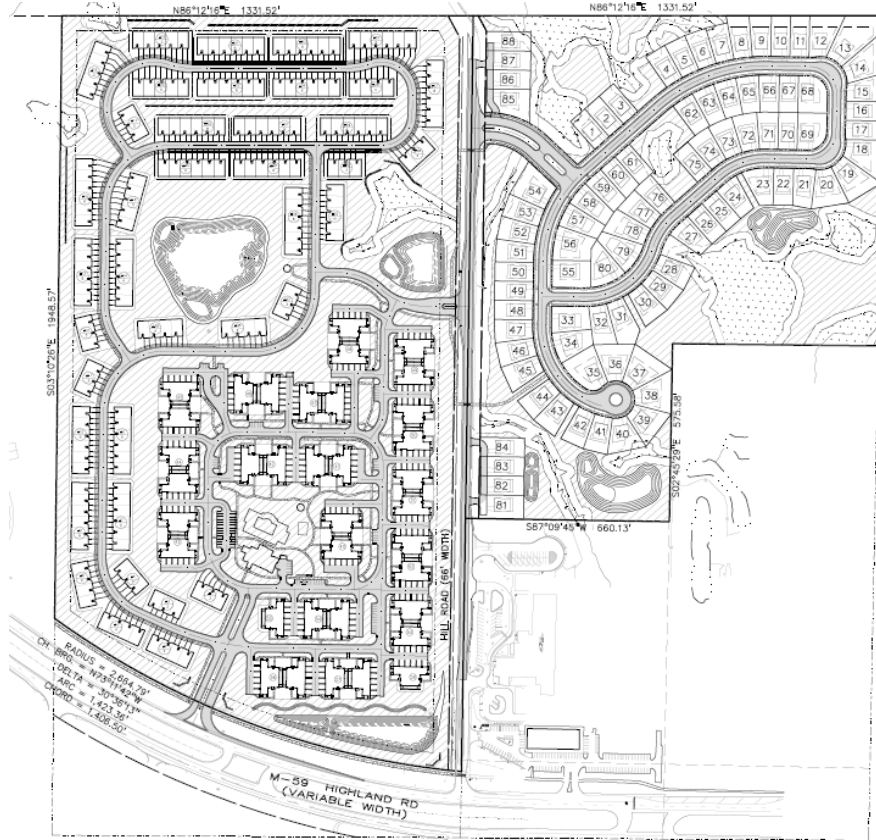
- 3.0 Economics
 - 3.1 Tax Revenues Analysis
 - 3.2 Job Analysis

- 4.0
 - 4.1 Natural resources Analysis
 - 4.2 Hazardous Materials
 - 4.3 Air Quality Impact
 - 4.4 Groundwater Impact
 - 4.5 Noise

- 5.0 Traffic

- 6.0 Development Statement

WHITE HILL LAKE, LLC



The Avalon

APARTMENT HOMES

&

The Residences at Avalon

PRELIMINARY PD SITE PLAN

APPLICATION & COMMUNITY IMPACT STATEMENT

SECTION 1: GENERAL PROJECT INFORMATION

1.1 Project Overview

Avalon is a proposed residential community consisting of 88 single-family homes on the east side of Hill Road and 406 attached apartment units on the west side of Hill Road with an associated clubhouse/pool and other amenities. The project shall include open space and other elements as set forth in the PD plan. The project will include approximately 30.1 acres of total open space. This site is currently designated as vacant and is zoned AG -Agricultural, PB-Planned Business, and R-1A -single-family residential and currently petitioning to be rezoned to PD, Planned Development.

The proposed land use consists of multi-family and single-family residential units. The project total 494 units and will have 4.49 units per acre for the total acreage of the Property.

Unit counts for the proposed The Avalon Apartment Homes and The Residences at Avalon uses are as follows:

Multi-Family Units (64.82 Net Acres):	406 units
<u>Single-Family Units (30.66 Net Acres):</u>	<u>88 units</u>
(95.48 Net Acres)	494 units

The Residences at Avalon Planned Development (PD) proposes single-family condominium homes with a density of 2.8 du/acre, which is consistent with the Township Master Plan for residential densities anticipated to range between 2.0 and 8.0 units per acre. The Township Master Plan for multi-family residential development densities are expected to range between 6.0 and 10.0 units per acre and Avalon’s Planned Development (PD) proposes 6.3 du/acre which is also consistent.

1.2 Master Plan Analysis

- **Value communities and neighborhoods** – The Avalon will be an exclusive neighborhood community targeting demographics of all ages. The development will focus on quality building materials and attention to architecture details.
- **Walkable neighborhoods** – In addition to sidewalks proposed on both sides of the planned internal roadways, the development will also have a system of winding pathways within the extensive open space areas.

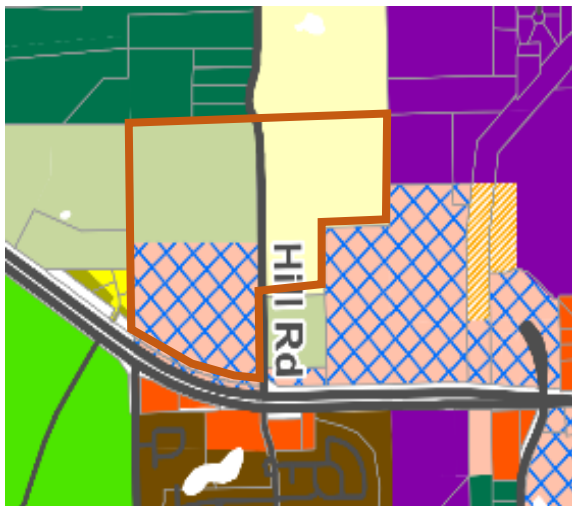
- **Variety of recreational facilities** – The Avalon proposed sidewalks and interconnectivity within the community, dog park, gazebo, benches, clubhouse, pool and fitness center consisting of a Yoga room, business center, dog wash to accommodate residents of all ages, interests, and physical abilities.

Refer to the Preliminary Site Plan for additional information of the neighborhood layout and representative architectural details.

1.3 Existing Surrounding Uses

The existing surrounding uses for the subject site are residential land uses of varying densities. These existing uses are as follows:

Location	Existing Land Use	Master Plan	Existing Zoning
Site	Vacant	Planned Community & Planned Neighborhood	Agricultural and PB Planned Business on the west side of Hill Rd & R-1A, Single Family Residential on the east side of Hill Rd
North	Single-Family Residential	Planned Neighborhood and Rural Estates	SF, Suburban Farm & R-1A Single-Family Residential
East	Vacant School Building	Planned Business	PD, Planned Development, PB, Planned Business and AG, Agricultural
South	Single family residential	Mobile Home	MHP, Mobile Home Park
West	Vacant, public institutional and single-	Planned Neighborhood	AG, Agricultural and R-1B, Single Family Residential



SECTION 2: COMMUNITY AND FACILITY SERVICES

2.1 Police and Fire Demand

This Development has been reviewed by both Public Safety and the Fire Department. A fiscal impact statement is prepared and attached to the CIS to determine the annual tax revenue. The additional annual tax revenue at full buildout will be approximately \$1,760,000.

2.2 Utilities

Utility services will be provided by existing public water and sewer systems in the area. The development proposes a total of 88 single-family homes and 406 attached apartment unit connections to the existing public utilities. We estimate of 36,500 gallons per year per person, based on the 10 States Standards Calculations.

All Utility lines, structures, and trenches shall be constructed in accordance with the standards and requirements of White Lake Township, the County of Oakland and EGLE. All hydrants will be a minimum of 5' from back of curb.

Water main extensions to the existing mains will be constructed on-site to provide for a looped system in accordance with the Township standards and placed within a public easement, with connections to existing proposed 12" watermain to connect to existing stub along Hill Rd. There is a proposed 18" sanitary, 16' water main along Highland Road. There will be 10" sanitary sewer along Hill Road for future connection.

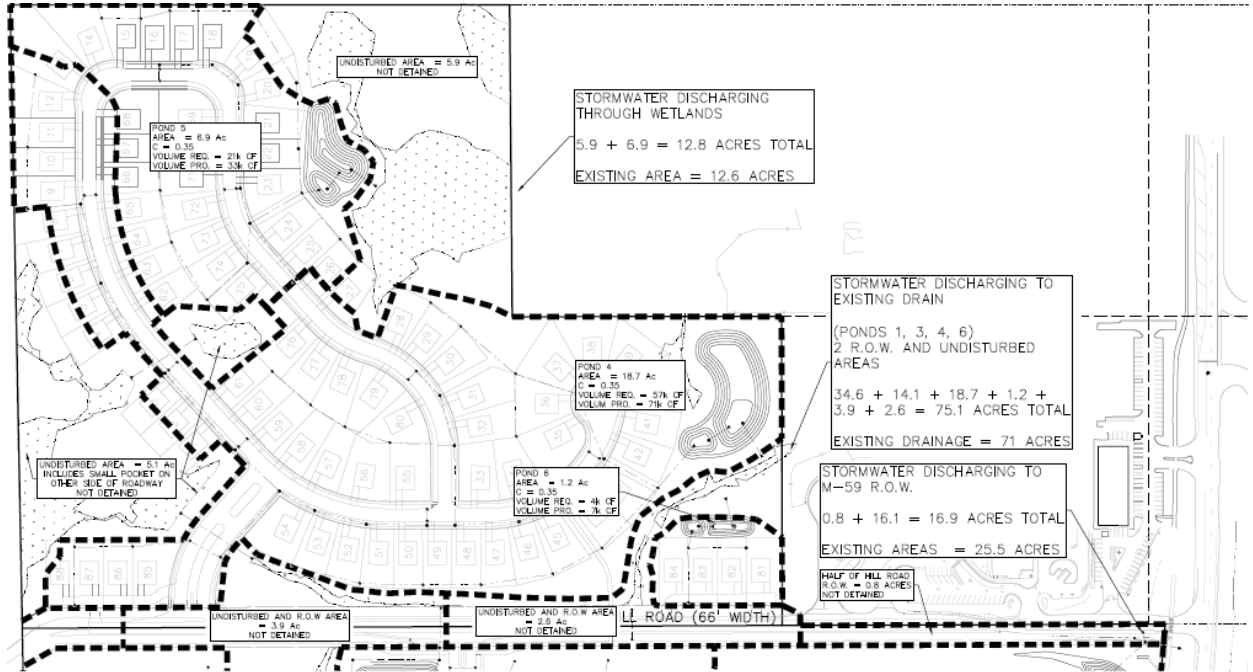
2.3 Stormwater Management

Stormwater management for quality treatment and storage will be provided in proposed detention basin optimally located at the southeast end of Highland Rd. These basins will be designed and approved in accordance with the Township and Oakland County Water Resource Commissioner (OCWRC) standards to accommodate a 100-year frequency storm runoff from the proposed development.

Stormwater management is outlined in the attached site plan. Stormwater runoff is proposed to have three detention ponds in the multi-family site at the northwest corner of Hill Road and M-59 and to discharge to existing storm sewer just south. Three detention ponds on the west side of Hill Road and located centrally in the multi-family portion. (**refer to figure 2.3a and 2.3b*)

The culvert will be removed. A new storm sewer will be constructed which provides an outlet for ponds 1 and 3 of the multi-family development on Hill Road drainage. A new culvert will be constructed at the low point of the road.

Fig. 2.3a

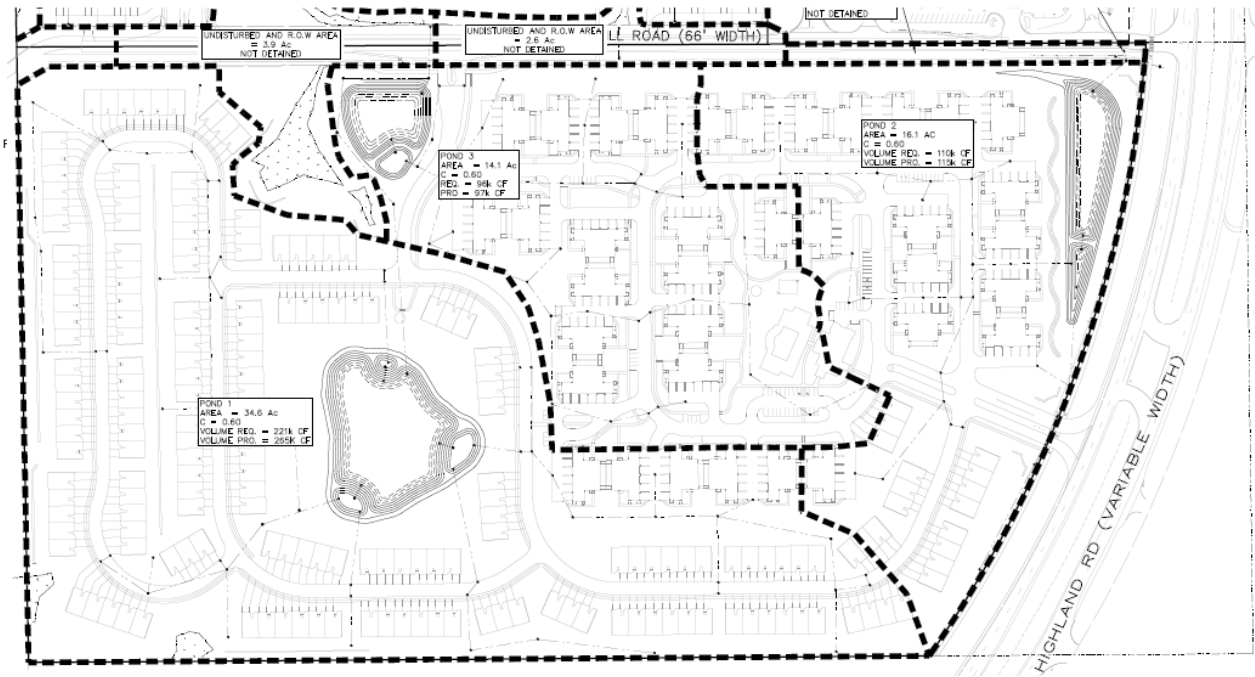


*Drainage calculations -Single Family
*Refer to a clear version on Preliminary Engineering Plan

Pond 4		
Total Area: (A1)	39.48 acre	
Drainage Area (A)	17.20 acre	
Weighted Coefficient of Runoff (C)	0.35	
Pretreatment		
Forebay: V _f = (545)CA	3,281 cf	
CPVC: Channel Protection Volume		
V _{cpvc} = (4,719)CA	28,408 cf	
CPRC: Channel Protection Rate Control Volume		
V _{cpvc} = (6897)CA (Extended Detention)	41,520 cf	
100-Year Allowable Outlet Rate (Q_{allow})		
Since 2<A1<100, Q100all = A1 x (0.207xln(A1)+1.1055)		
Q100all =	0.34 cfs/ac	
100-Year Peak Allowable Discharge (Q_o)		
Q _o = Q _{allow} (A)	5.93 cfs	
Rainfall Intensity		
Time of Concentration (T _c)	20 min	
I100 = 83.3/(T _c +9.17) ^{0.81}	5.42 in/hr	
100-Year Peak Inflow (Q_i)		
Q _i = C _i (I/A)	32.63 cfs	
100-Year Runoff Volume (V_r)		
V _r = (18,985)CA	114,260 cf	
Storage Ratio (V_r/V_s)		
V _r /V _s = 0.206-0.15 x ln(Q _o /Q _i)	0.4619	
100-Year Storage Volume (V_s)		
V _s = V _r /Storage Ratio	52,286 cf	

Pond 5		
Total Area: (A1)	39.48 acre	
Drainage Area (A)	8.70 acre	
Weighted Coefficient of Runoff (C)	0.35	
Pretreatment		
Forebay: V _f = (545)CA	1,660 cf	
CPVC: Channel Protection Volume		
V _{cpvc} = (4,719)CA	14,369 cf	
CPRC: Channel Protection Rate Control Volume		
V _{cpvc} = (6897)CA (Extended Detention)	21,001 cf	
100-Year Allowable Outlet Rate (Q_{allow})		
Since 2<A1<100, Q100all = A1 x (0.207xln(A1)+1.1055)		
Q100all =	0.34 cfs/ac	
100-Year Peak Allowable Discharge (Q_o)		
Q _o = Q _{allow} (A)	3.00 cfs	
Rainfall Intensity		
Time of Concentration (T _c)	20 min	
I100 = 83.3/(T _c +9.17) ^{0.81}	5.42 in/hr	
100-Year Peak Inflow (Q_i)		
Q _i = C _i (I/A)	16.51 cfs	
100-Year Runoff Volume (V_r)		
V _r = (18,985)CA	57,809 cf	
Storage Ratio (V_r/V_s)		
V _r /V _s = 0.206-0.15 x ln(Q _o /Q _i)	0.4619	
100-Year Storage Volume (V_s)		
V _s = V _r /Storage Ratio	26,200 cf	

Pond 6		
Total Area: (A1)	39.48 acre	
Drainage Area (A)	1.20 acre	
Weighted Coefficient of Runoff (C)	0.35	
Pretreatment		
Forebay: V _f = (545)CA	229 cf	
CPVC: Channel Protection Volume		
V _{cpvc} = (4,719)CA	1,982 cf	
CPRC: Channel Protection Rate Control Volume		
V _{cpvc} = (6897)CA (Extended Detention)	2,897 cf	
100-Year Allowable Outlet Rate (Q_{allow})		
Since 2<A1<100, Q100all = A1 x (0.207xln(A1)+1.1055)		
Q100all =	0.34 cfs/ac	
100-Year Peak Allowable Discharge (Q_o)		
Q _o = Q _{allow} (A)	0.41 cfs	
Rainfall Intensity		
Time of Concentration (T _c)	10 min	
I100 = 83.3/(T _c +9.17) ^{0.81}	7.62 in/hr	
100-Year Peak Inflow (Q_i)		
Q _i = C _i (I/A)	3.20 cfs	
100-Year Runoff Volume (V_r)		
V _r = (18,985)CA	7,974 cf	
Storage Ratio (V_r/V_s)		
V _r /V _s = 0.206-0.15 x ln(Q _o /Q _i)	0.5129	
100-Year Storage Volume (V_s)		
V _s = V _r /Storage Ratio	4,089 cf	



*Drainage calculations -Single Family
 *Refer to a clear version on Preliminary Engineering Plan

Pond 1		
Total Area: (A1)	66.52 acre	
Drainage Area (A):	34.60 acre	
Weighted Coefficient of Runoff (C):	0.60	
Pretreatment		
Forebay: V _f = (545)CA		11,314 cf
CPVC: Channel Protection Volume		
V _{cpvc} = (4,719)CA		97,966 cf
CPRC: Channel Protection Rate Control Volume		
V _{cpvc} = (6897)CA (Extended Detention)		143,182 cf
100-Year Allowable Outlet Rate (Qallow)		
Since 2-A1<100, Q100all= A1 x (-0.207xln(A1)+1.1055)		0.24 cfs/ac
Q100all =		
100-Year Peak Allowable Discharge (Qo)		
Qo=Qallow(A)		8.19 cfs
Rainfall Intensity		
Time of Concentration (Tc)	20 min	
100=83.3/(Tc+9.17) ^{0.81}		5.42 in/hr
100-Year Peak Inflow (Qi)		
Qi=Ci(A)		112.53 cfs
100-Year Runoff Volume (Vr)		
Vr=(18,985)CA		394,129 cf
Storage Ratio (Vr/Vs)		
Vr/Vs = 0.206-0.15 x ln(Qo/Qi)		0.5991
100-Year Storage Volume (Vs)		
Vs =Vr*Storage Ratio		236,124 cf

Pond 2		
Total Area: (A1)	66.52 acre	
Drainage Area (A):	16.10 acre	
Weighted Coefficient of Runoff (C):	0.60	
Pretreatment		
Forebay: V _f = (545)CA		5,265 cf
CPVC: Channel Protection Volume		
V _{cpvc} = (4,719)CA		45,586 cf
CPRC: Channel Protection Rate Control Volume		
V _{cpvc} = (6897)CA (Extended Detention)		66,625 cf
100-Year Allowable Outlet Rate (Qallow)		
Since 2-A1<100, Q100all= A1 x (-0.207xln(A1)+1.1055)		0.24 cfs/ac
Q100all =		
100-Year Peak Allowable Discharge (Qo)		
Qo=Qallow(A)		3.81 cfs
Rainfall Intensity		
Time of Concentration (Tc)	20 min	
100=83.3/(Tc+9.17) ^{0.81}		5.42 in/hr
100-Year Peak Inflow (Qi)		
Qi=Ci(A)		52.36 cfs
100-Year Runoff Volume (Vr)		
Vr=(18,985)CA		183,395 cf
Storage Ratio (Vr/Vs)		
Vr/Vs = 0.206-0.15 x ln(Qo/Qi)		0.5991
100-Year Storage Volume (Vs)		
Vs =Vr*Storage Ratio		109,873 cf

Pond 3		
Total Area: (A1)	66.52 acre	
Drainage Area (A):	14.10 acre	
Runoff (C):	0.60	
Pretreatment		
Forebay: V _f = (545)CA		4,611 cf
CPVC: Channel Protection Volume		
V _{cpvc} = (4,719)CA		39,923 cf
CPRC: Channel Protection Rate Control Volume		
V _{cpvc} = (6897)CA (Extended Detention)		58,349 cf
100-Year Allowable Outlet Rate (Qallow)		
Since 2-A1<100, Q100all= A1 x (-0.207xln(A1)+1.1055)		0.24 cfs/ac
Q100all =		
100-Year Peak Allowable Discharge (Qo)		
Qo=Qallow(A)		3.34 cfs
Rainfall Intensity		
Time of Concentration (Tc)	20 min	
100=83.3/(Tc+9.17) ^{0.81}		5.42 in/hr
100-Year Peak Inflow (Qi)		
Qi=Ci(A)		45.86 cfs
100-Year Runoff Volume (Vr)		
Vr=(18,985)CA		160,613 cf
Storage Ratio (Vr/Vs)		
Vr/Vs = 0.206-0.15 x ln(Qo/Qi)		0.5991
100-Year Storage Volume (Vs)		
Vs =Vr*Storage Ratio		96,224 cf

SECTION 3: ECONOMICS

3.1 Tax Revenue Analysis

A fiscal impact analysis was prepared to determine the anticipated annual tax revenue to be generated as a result of the development. Based on this analysis, we anticipate Avalon will have a taxable value of approximately \$70,000,000 and will generate an annual revenue gain to the Township of approximately \$1,760,000.

3.2 Jobs Created

Avalon will be a residential development. Avalon will create construction jobs during the installation of the infrastructure and the construction of the homes on the site. In addition, MJC Homes will employ sales staff. Avalon Apartment Homes will create permanent leasing, management, and maintenance jobs.

SECTION 4: ENVIRONMENT

4.1 Natural Resources Analysis

The site of the proposed development is vacant with existing open areas. The site contains a significant amount of rolling topography with approximately 70 feet of elevation change across the site. There are no adjacent subdivisions to connect to. The topography and natural features would limit the stubbing of future connection to the adjoining property; furthermore, the multi-family site is self-contained.

The site is located in Flood Zone X per FEMA FIRM PANEL 26125C0318F, effective 9/29/2006, and area of minimal flooding. Thus, impact to regulated floodplain or special flood areas are not anticipated to occur with the proposed development.

Storm water runoff for the site will be detained and treated in accordance with applicable Township, County and State requirements prior to discharge from the site. No significant impact or pollution to offsite water bodies is anticipated with the development.

The proposed development will seek to preserve existing wooded areas around the perimeter of the development where grading would allow, to serve as a buffer between the development and neighboring properties. New trees will be planted in the proposed development in accordance with an approved Landscaping Plan.

4.2 Hazardous Materials

No hazardous materials will be manufactured, used, or stored on site.

4.3 Air Quality Impact

Avalon is a residential development and will not plan to have any significant impact to the air quality of the area. No quantifiable type or quantities of pollutants are expected to be released in the air. During construction, special measures will be included within the Soil Erosion and Sedimentation (SESC) Plan to mitigate any potential dust creation during dryer site conditions, including the use of water trucks.

4.4 Groundwater Impact

Avalon is a residential development that will utilize connections to the existing public utilities in the area. The development fits within the master planned unit density for the area and does not plan to have any significant impact to the groundwater levels within the area.

4.5 Noise

Avalon is a residential development that does not plan to have any significant impact to the increased noise in the area. During construction, the development intends to minimize noise as reasonable and follow the Township's ordinance regarding hours of allowed construction operation.

SECTION 5: TRAFFIC

Avalon is a residential project consisting of a multi-family and single-family units that are proposed to have access off Highland Road in addition to Hill Road. The main access to Avalon Apartment Homes will be from a boulevard off Highland Road which is a State Road. In addition to the main access off Highland Road, Avalon Apartment Homes will have a secondary access off of Hill Road.

The Residences at Avalon will have access via a boulevard off of Hill Road which is a County Road. The exiting drive width along Highland Road has been revised to meet the width required by Article 5, Section 11.Q.v. The Developer will pave Hill Road from Highland Road to the north, just prior to the curve on Hill Road.

A Traffic Impact Study (TIS) has been prepared in accordance with the Township Ordinance Section 6.3 to determine if any improvements would be necessary to mitigate any traffic impacts to the adjacent road network.

The proposed development is forecast to generate 215 new trips during the AM peak hour and 283 new trips during the PM peak hour. The report was completed in accordance with the requirements specified by the Michigan Department of Transportation (MDOT), the Road Commission for Oakland County (RCOC), and White Lake Township. The majority, if not all these

trips, would be attributed to small vehicles. Large truck daily trips and axle loading impacts to the existing roads as a result of Avalon and The Residences at Avalon development are not to be anticipated. The operational analysis indicated that most approaches of the study intersections will operate at acceptable levels of service during both the AM and PM peak hours of the future traffic conditions.

Refer to *Appendix G* for the Traffic Impact Statement prepared by Rowe.

DEVELOPER'S STATEMENT

Avalon will be developed by White Lake Hill LLC whose member/managers are Mickey Shapiro and Mike Chirco. White Lake Hill has owned the property since 2005.

Site development will be managed by the M. Shapiro Real Estate Group. MJC Homes will handle the construction of the Avalon Apartment Homes and the Single-Family Homes. MJC Homes will also be responsible for home sales.

The M. Shapiro Real Estate Group will manage the Avalon Apartment Homes.

The Manager/Members of White Lake Hill, LLC have over forty-years in the development and building industry. Recent examples of Apartment Home Communities developed by MJC and the M. Shapiro Real Estate Group are as follows:

- Barrington Apartment Homes -located in Commerce Township consisting of 300 units offering luxury living in a woodland setting, at Pontiac Trail and Martin Parkway.
- ShearWater Apartment Homes -consisting of 200 units nestled in Commerce Township, located at the prominent intersection of Maple and Beck Road.
- Huntley Manor Apartment Homes -privately-gated 200-unit-apartment-homes, located in Novi at Meadowbrook and Grand River.





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Memorandum

To: Mr. James Galbraith

From: Michael J. Labadie, PE and Jill M. Bauer, PE, PTOE

Date: November 22, 2021

RE: Traffic Impact Study for Mixed Use Residential Development in White Lake Township, MI

ROWE Professional Services Company has completed a Traffic Impact Study (TIS) related to the proposed mixed-use residential development to be located in the northwest quadrant of Highland Road (M-59) and Hill Road, in White Lake Township, MI. The current site plan (included in the materials attached to this report) shows 88 single-family condominiums and 406 multi-family units with an anticipated opening date in 2023. This TIS was prepared to determine if any improvements would be necessary to mitigate any traffic impacts to the adjacent road network. This report has been completed in accordance with the requirements specified by the Michigan Department of Transportation (MDOT), the Road Commission for Oakland County (RCOC), and White Lake Township.

TRAFFIC IMPACT STUDY

Traffic Counts

Turning movement counts (TMCs) were collected during the weekday AM (7 a.m. to 9 a.m.) and PM (4 p.m. to 6 p.m.) peak periods on September 30, 2021, at the intersections of:

- Highland Road (M-59) and Hill Road
- Highland Road (M-59) and Le Grand Court
- Westbound Highland Road (M-59) and crossover east of Hill Road
- Eastbound Highland Road (M-59) and crossover west of Hill Road
- Westbound Highland Road (M-59) and crossover west of Hill Road
- Highland Road (M-59) and Haven Road

Due to the impact of COVID-19, historical traffic data from the Southeast Michigan Council of Governments (SEMCOG) website was compared to the TMCs completed in 2021 and no adjustment factor was needed or used for the AM or PM peak hour.

All studied intersections are shown in Figure 1 attached to this memorandum. All traffic counts used in this study are attached to this memorandum. The existing adjusted peak hour traffic volumes are shown in Figure 2 attached to this memorandum.

Background Traffic Scenario

Historical traffic data from the SEMCOG website was referenced to determine the applicable growth rate for the existing traffic volumes for the project build-out year in 2027. Based on this review, a background growth rate of 0.5 percent was utilized. There were no future background developments identified for this study.

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Mr. James Galbraith
 November 22, 2021
 Page 2

Trip Generation

Using the information and methodologies specified in the latest version of Trip Generation (Trip Generation Manual, 11th Edition, 2021), ROWE forecast the weekday AM and PM peak hour trips associated with the proposed development. The results of the trip generation forecasts are provided below in Table 1.

Table 1: Trip Generation for Proposed Development

Land Use	Land Use Code	Units	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	
Single-family Detached Housing	210	88 Units	17	49	66	55	33	88	897
Multi-family Housing (Low-Rise)	220	406 Units	36	113	149	123	72	195	2,678
Total	-	-	53	162	215	178	105	283	3,575

Trip Distribution

The existing traffic volumes were used to develop a trip distribution model for the AM and PM peak hours for the new traffic that will be generated by the proposed development. Table 2 provides the probable distribution based on the existing traffic patterns.

Table 2: Trip Distribution

Direction	Via	AM Peak Hour		PM Peak Hour	
		To	From	To	From
North	Hill Road	2%	2%	1%	2%
East	Highland Road (M-59)	60%	40%	45%	55%
West	Highland Road (M-59)	38%	58%	54%	43%
Total		100%	100%	100%	100%

The trip distribution for the site is shown in Figure 4 attached to this memorandum. The background traffic volumes were combined with the site generated traffic volumes to obtain the total future traffic volumes, which are shown in Figure 5 attached to this memorandum.

Level of Service Analysis

Level of service (LOS) analyses for existing, background, and total future (build) conditions for the AM and PM peak hours were performed for the intersections of:

- Highland Road (M-59) and Hill Road
 - Unsignalized Intersection
- Highland Road (M-59) and Le Grand Court
 - Unsignalized Intersection
- Westbound Highland Road (M-59) and crossover east of Hill Road
 - Unsignalized Intersection
- Eastbound Highland Road (M-59) and crossover west of Hill Road
 - Unsignalized Intersection
- Westbound Highland Road (M-59) and crossover west of Hill Road
 - Unsignalized Intersection
- Highland Road (M-59) and Haven Road
 - Unsignalized Intersection
- Hill Road and Driveway 1
 - Proposed driveway approximately 2,300 feet north of Highland Road (M-59)
- Hill Road and Driveway 2
 - Proposed driveway approximately 1,600 feet north of Highland Road (M-59)

Mr. James Galbraith
November 22, 2021
Page 3

- Hill Road and Driveway 3
 - Proposed driveway approximately 1,150 feet north of Highland Road (M-59)
- Highland Road (M-59) and Driveway 4
 - Proposed driveway approximately 950 feet west of Hill Road and 50 feet west of Highland Road (M-59) crossover

According to the most recent (6th) edition of the Highway Capacity Manual (HCM), LOS is a qualitative measure describing operational conditions of a traffic stream or intersection. LOS ranges from A to F, with LOS A being the best and LOS D generally being considered acceptable. Table 3 presents the criteria for defining the various LOS for signalized and unsignalized intersections. LOS D is considered acceptable in urban/suburban areas.

Table 3: LOS Criteria

LOS	Average Stopped Delay/Vehicle (seconds)	
	Signalized Intersection	Unsignalized Intersection
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

The results of the LOS analyses for the intersections listed above are summarized in Table 4 through Table 7. Full LOS output reports are attached to this memorandum.

Existing Conditions

The results of the LOS analysis for existing conditions reveals that most approaches and movements of the studied intersections operate at LOS D or better during the AM and PM peak hours, with the following exception:

- Westbound Highland Road (M-59) and Eastbound Crossover (east of Hill Road)
 - The northbound left movement operates at LOS F in the PM peak hour and experiences a total 95th percentile queue length of 208 feet (8 vehicles).

The 95th percentile queue lengths were reviewed at the studied intersections. No significant queue lengths were observed in the simulations. The queue lengths did not block any study intersections.

The operational results for existing conditions are presented in Table 4.

Mr. James Galbraith
 November 22, 2021
 Page 4

Table 4: LOS Analysis for Existing Conditions

Intersection	Control Type	Approach	AM Peak	PM Peak
WB Highland Road and EB Crossover (E of Hill Road)	Free	Westbound	A (0.0)	A (0.0)
	Stop	Northbound	B (13.8)	F (66.8)
	TWSC	Overall	A (0.9)	A (1.3)
Highland Road and Le Grand Court	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Northbound	D (26.3)	C (24.4)
	TWSC	Overall	A (2.3)	A (1.9)
Highland Road and Hill Road	Free	Westbound	A (0.0)	A (0.0)
	Stop	Southbound	B (13.9)	D (29.1)
	TWSC	Overall	A (1.0)	A (1.1)
EB Highland Road and WB Crossover (W of Hill Road)	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Southbound	C (19.7)	D (25.3)
	TWSC	Overall	A (0.8)	A (2.2)
WB Highland Road and EB Crossover (W of Hill Road)	Free	Westbound	A (0.0)	A (0.0)
	Stop	Northbound	B (12.7)	C (21.1)
	TWSC	Overall	A (0.2)	A (0.2)
Highland Road and Haven Road	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Northbound	C (16.1)	C (16.8)
		Southbound	D (33.9)	D (31.9)
	TWSC	Overall	A (0.4)	A (1.1)

XX.X Average seconds of delay per vehicle

Background Conditions

The results of the LOS analysis for background conditions reveals that most approaches and movements of the studied intersections would continue to operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Highland Road (M-59) and Haven Road
 - The southbound approach would operate at LOS E in the AM peak hour and experiences a 95th percentile queue length of 40 feet (2 vehicles)
- Westbound Highland Road (M-59) and Eastbound Crossover (E of Hill Road)
 - The northbound left movement would continue to operate at LOS F in the PM peak hour and experiences a total 95th percentile queue length of 275 feet (11 vehicles).

The 95th percentile queue lengths were reviewed at the studied intersections. No significant queue lengths were observed in the simulations. The queue lengths did not block any study intersection.

The operational results for background conditions are presented in Table 5.

Mr. James Galbraith
November 22, 2021
Page 5

Table 5: LOS Analysis for Background Conditions

Intersection	Control Type	Approach	AM Peak	PM Peak
WB Highland Road and EB Crossover (E of Hill Road)	Free	Westbound	A (0.0)	A (0.0)
	Stop	Northbound	B (14.1)	F (78.0)
	TWSC	Overall	A (1.0)	A (1.6)
Highland Road and Le Grand Court	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Northbound	D (28.6)	D (26.2)
	TWSC	Overall	A (2.5)	A (2.0)
Highland Road and Hill Road	Free	Westbound	A (0.0)	A (0.0)
	Stop	Southbound	B (14.2)	D (31.1)
	TWSC	Overall	A (1.0)	A (1.1)
EB Highland Road and WB Crossover (W of Hill Road)	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Southbound	C (20.6)	D (27.2)
	TWSC	Overall	A (0.8)	A (2.4)
WB Highland Road and EB Crossover (W of Hill Road)	Free	Westbound	A (0.0)	A (0.0)
	Stop	Northbound	B (12.8)	C (22.0)
	TWSC	Overall	A (0.2)	A (0.2)
Highland Road and Haven Road	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Northbound	C (16.6)	C (17.4)
		Southbound	E (36.1)	D (33.9)
	TWSC	Overall	A (0.5)	A (1.1)

XX.X Average seconds of delay per vehicle

Future Conditions

The results of the LOS analysis for future conditions reveals that most approaches and movements of the studied intersections would continue to operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Westbound Highland Road (M-59) and Eastbound Crossover (east of Hill Road)
 - The northbound left turn movement would continue to operate at LOS F in the PM peak hour and experiences a total 95th percentile queue length of 411 feet (17 vehicles).
- Highland Road (M-59) and Hill Road
 - The southbound right turn movement would operate at LOS F in the PM peak hour and experiences a 95th percentile queue length of 612 feet (25 vehicles).
- Eastbound Highland Road (M-59) and Westbound Crossover (west of Hill Road)
 - The southbound left turn movement would operate at LOS E in the PM peak hour and experiences a total 95th percentile queue length of 354 feet (14 vehicles).
- Highland Road (M-59) and Haven Road
 - The southbound left turn movements would operate at LOS E in the PM peak hour and experiences a total 95th percentile queue length of 91 feet (4 vehicles).

The 95th percentile queue lengths were reviewed at the studied intersections. Significant queues were observed in the simulation for the Westbound Highland Road (M-59) and Eastbound Crossover (east of Hill Road) that impacted the eastbound through movements.

The operational results for future conditions are presented in Table 6.

Mr. James Galbraith
 November 22, 2021
 Page 6

Table 6: LOS Analysis for Future Conditions

Intersection	Control Type	Approach	AM Peak	PM Peak
WB Highland Road and EB Crossover (E of Hill Road)	Free	Westbound	A (0.0)	A (0.0)
	Stop	Northbound	B (14.9)	F (239.5)
	TWSC	Overall	A (1.3)	A (8.3)
Highland Road and Le Grand Court	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Northbound	D (33.8)	D (29.4)
	TWSC	Overall	A (2.8)	A (2.1)
Highland Road and Hill Road	Free	Westbound	A (0.0)	A (0.0)
	Stop	Southbound	C (21.3)	F (74.5)
	TWSC	Overall	A (3.8)	A (5.3)
EB Highland Road and WB Crossover (W of Hill Road)	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Southbound	D (28.5)	E (35.7)
	TWSC	Overall	A (2.1)	A (3.5)
WB Highland Road and EB Crossover (W of Hill Road)	Free	Westbound	A (0.0)	A (0.0)
	Stop	Northbound	B (13.4)	D (26.0)
	TWSC	Overall	A (0.3)	A (0.6)
Highland Road and Haven Road	Free	Eastbound	A (0.0)	A (0.0)
	Stop	Northbound	C (16.9)	C (18.3)
		Southbound	D (31.2)	E (37.3)
TWSC	Overall	A (1.0)	A (1.5)	
Hill and Driveway 1	Stop	Westbound	A (9.4)	A (9.3)
	Free	Northbound	A (0.0)	A (0.0)
		Southbound	A (0.0)	A (0.1)
TWSC	Overall	A (2.4)	A (1.7)	
Hill and Driveway 2	Stop	Eastbound	A (9.1)	A (8.9)
	Free	Northbound	A (1.5)	A (3.3)
		Southbound	A (0.0)	A (0.0)
TWSC	Overall	A (2.7)	A (2.9)	
Hill and Driveway 3	Stop	Westbound	B (10.0)	B (10.1)
	Free	Northbound	A (0.0)	A (0.0)
		Southbound	A (0.0)	A (0.0)
TWSC	Overall	A (0.2)	A (0.1)	
WB Highland Road and Driveway 4	Free	Westbound	A (0.0)	A (0.0)
	Stop	Southbound	B (14.0)	D (25.8)
	TWSC	Overall	A (0.7)	A (0.5)

XX.X Average seconds of delay per vehicle

Future Conditions – With Improvements

The following observations were made, and improvements were recommended at the following intersections due to future traffic conditions:

- Westbound Highland Road (M-59) and Eastbound Crossover (east of Hill Road)
 - Traffic signal warrants were reviewed at this location. The intersection meets Warrant 3 – Peak Hour Vehicular Volume, Condition B for two (2) hours. The full signal warrant analysis is included as an attachment to this memorandum.
 - Based on meeting the peak hour warrant, the intersection was modeled with a two-phase traffic signal utilizing a 120-second cycle length.

The results of the LOS analysis for future conditions with the improvement listed above results in the following:

Mr. James Galbraith
 November 22, 2021
 Page 7

- Westbound Highland Road (M-59) and Eastbound Crossover (east of Hill Road)
 - The northbound left turn movement would continue to operate at LOS F in the PM peak hour with a reduction in delay from 239.5 seconds to 189.4 seconds and experiences a total 95th percentile queue length of 217 feet (9 vehicles).
- Highland Road (M-59) and Hill Road
 - The southbound right turn movement would continue to operate at LOS F in the PM peak hour and experiences a 95th percentile queue length of 227 feet (9 vehicles).

The 95th percentile queue lengths were reviewed at the studied intersections. No significant queue lengths were observed in the simulations. The queue lengths did not block any study intersection.

The operational results for future conditions – with improvements are presented in Table 7.

Table 7: LOS Analysis for Future Conditions - With Improvements

Intersection	Control Type	Approach	AM Peak	PM Peak
WB Highland Road and EB Crossover (E of Hill Road)	Signalized	Westbound	A (5.2)	D (53.4)
		Northbound	D (47.3)	F (189.4)
		Overall	A (8.8)	E (58.1)
Highland Road and Hill Road	Free	Westbound	A (0.0)	A (0.0)
	Stop	Southbound	C (21.3)	F (74.5)
	TWSC	Overall	A (3.8)	A (5.3)

Right Turn Lane Warrant Analysis

The proposed driveway on WB Highland Road (M-59) was analyzed to see if any right turn warrants were met for the westbound approach. The warrant analysis resulted in a full right turn lane being warranted for the driveway due to the PM peak hour traffic volumes. The analysis is provided as an attachment to this memorandum.

Conclusions and Recommendations for the Traffic Impact Study

The proposed project consists of a multi-use residential development (494 units) with a build-out year of approximately 2027. The proposed development will have access to Hill Road via three proposed driveways and one access driveway to Highland Road (M-59).

The proposed development is forecast to generate 215 new trips during the AM peak hour (53 inbound and 162 outbound from the site) and 283 new trips during the PM peak hour (178 inbound and 105 outbound from the site).

An operational analysis was performed for existing, background, and total future (build) conditions for the intersections of:

- Highland Road (M-59) and Hill Road
- Highland Road (M-59) and Le Grand Court
- Westbound Highland Road (M-59) and crossover east of Hill Road
- Eastbound Highland Road (M-59) and crossover west of Hill Road
- Westbound Highland Road (M-59) and crossover west of Hill Road
- Highland Road (M-59) and Haven Road
- Hill Road and Driveway 1

Mr. James Galbraith
November 22, 2021
Page 8

- Hill Road and Driveway 2
- Hill Road and Driveway 3
- Highland Road (M-59) and Driveway 4

The operational analysis indicated that most approaches of the study intersections will operate at acceptable levels of service during both the AM and PM peak hours of the future traffic conditions. Traffic signal warrants were reviewed for the Westbound Highland Road (M-59) and Eastbound crossover (east of Hill Road). The intersection meets Warrant 3 – Peak Hour Vehicular Volume, Condition B for two (2) hours. A signal at this intersection will reduce delay for the northbound left turns experienced during the PM peak hour and reduce queues experienced at this intersection and the intersection of Highland and Hill Road.

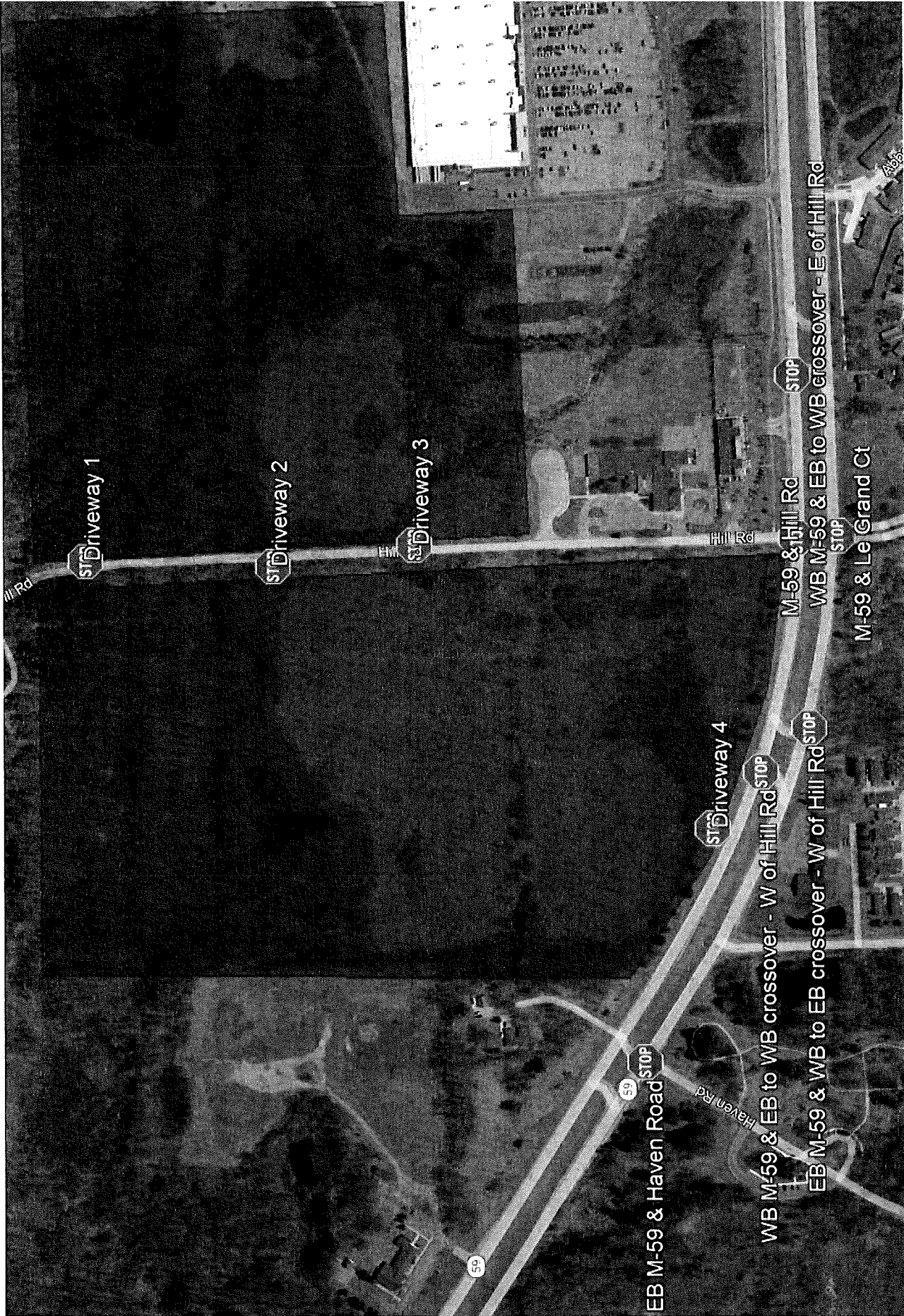
A right turn lane is warranted for the driveway off of WB Highland Road (M-59).

Attachments

R:\Projects\21F0080\Docs\Design\TIS\21F0080 Multi Use Development TIS.docx

SITE PLAN

REPORT FIGURES

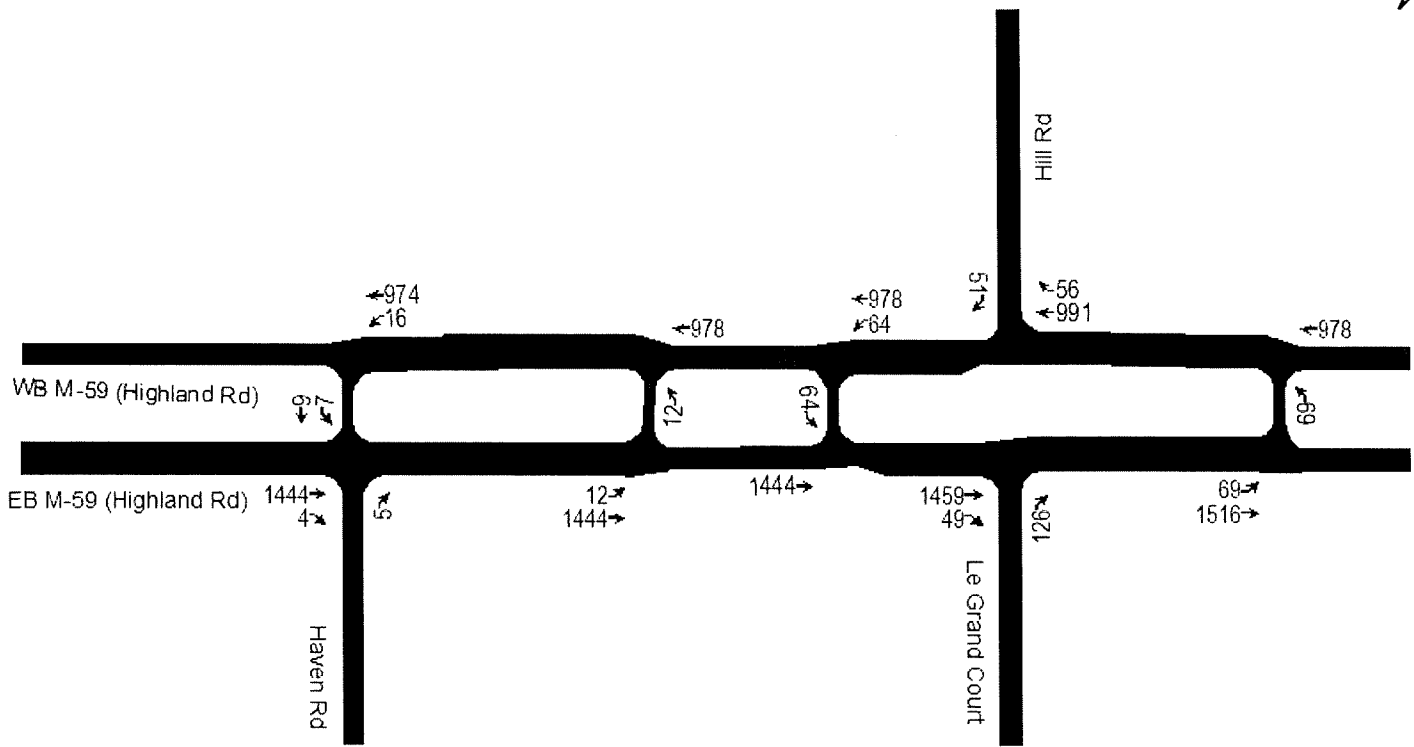
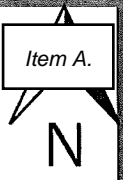


Study Site
Multi-Use Development
Figure

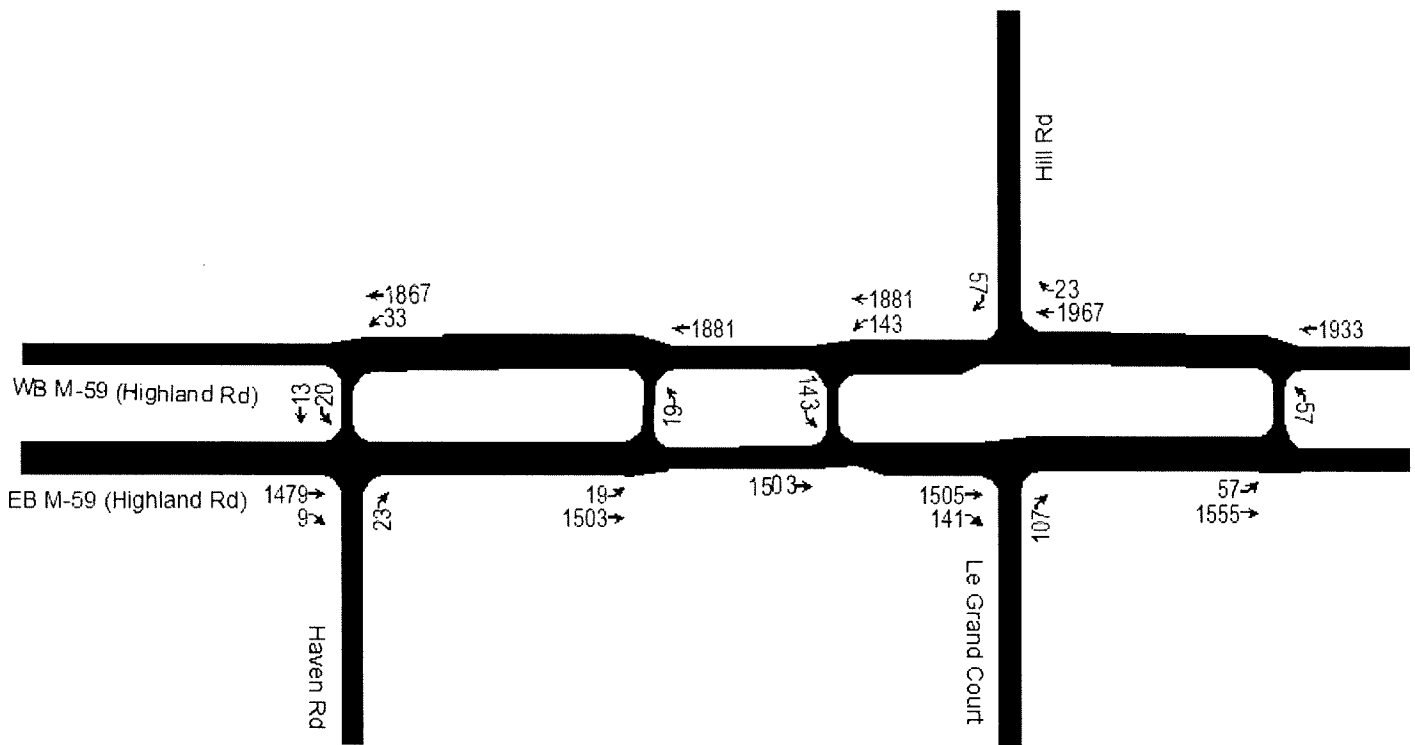
Item A.

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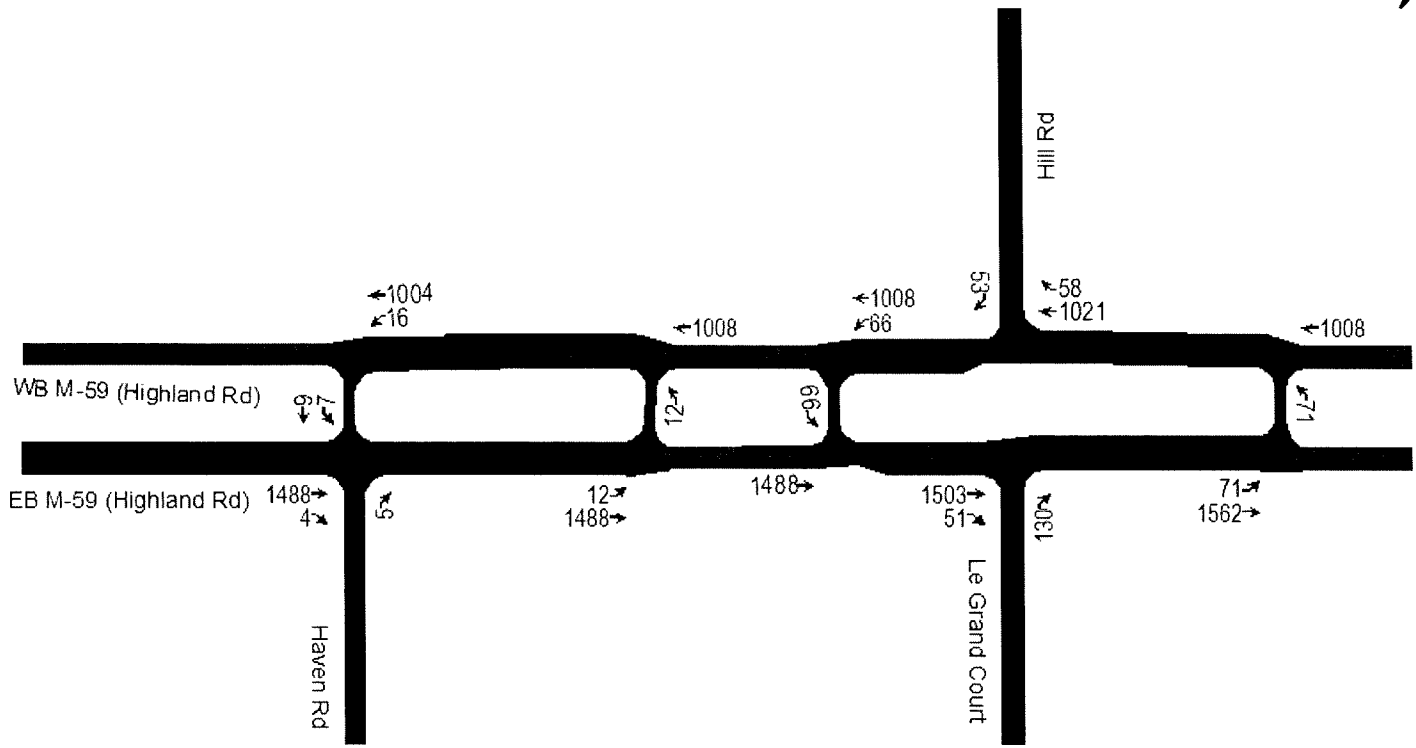
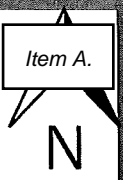
AM Peak Hour



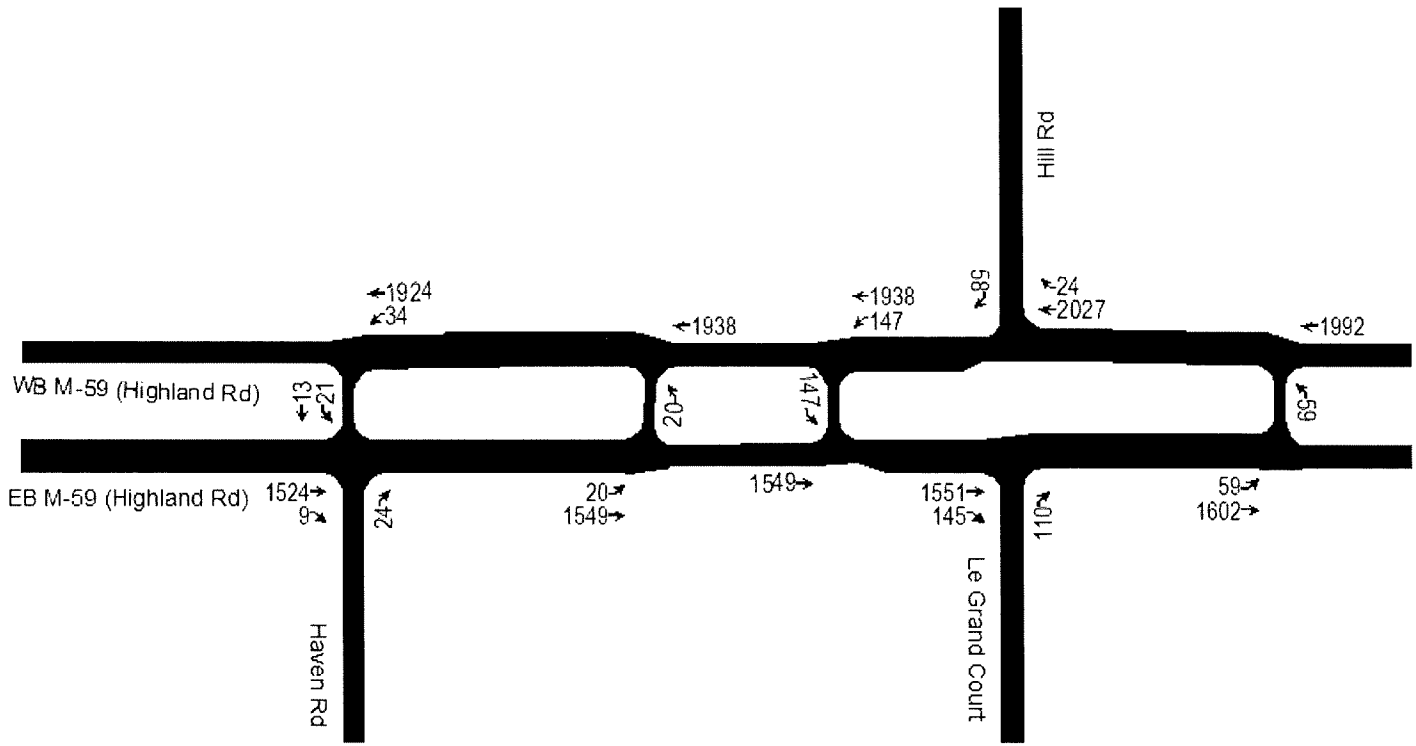
PM Peak Hour



AM Peak Hour



PM Peak Hour



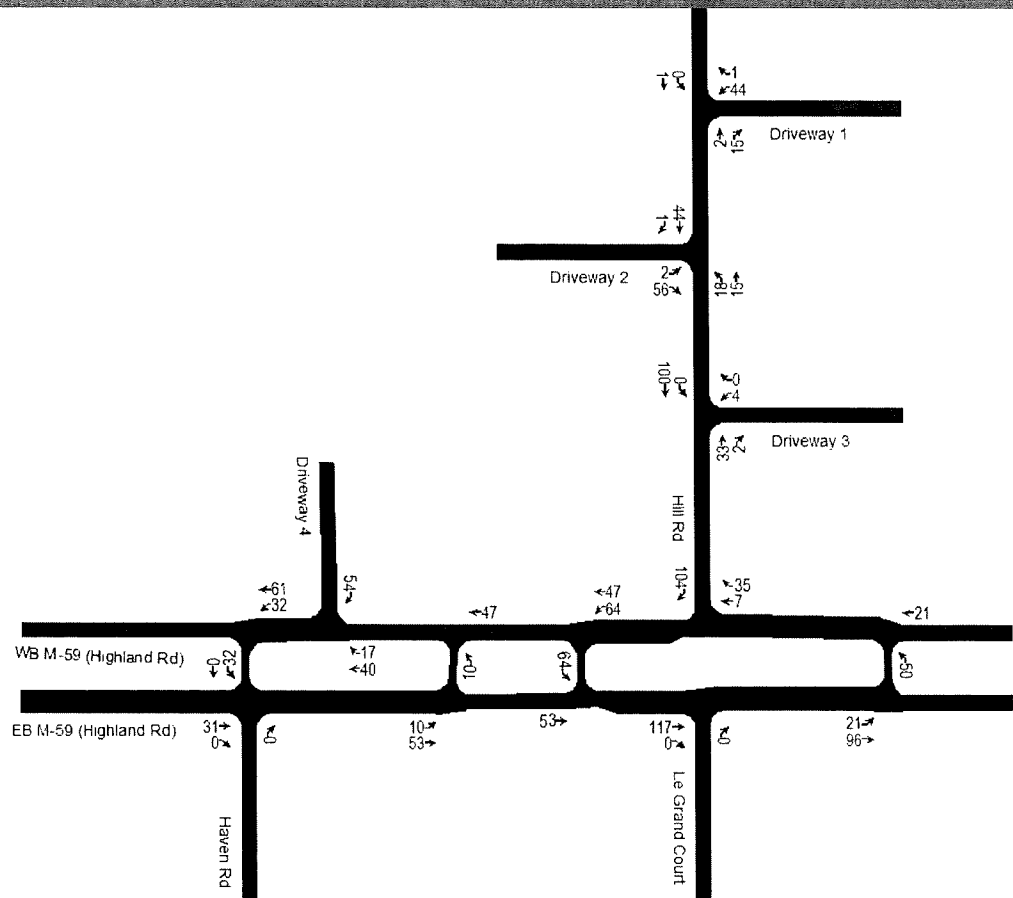
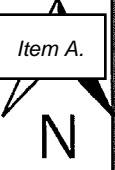
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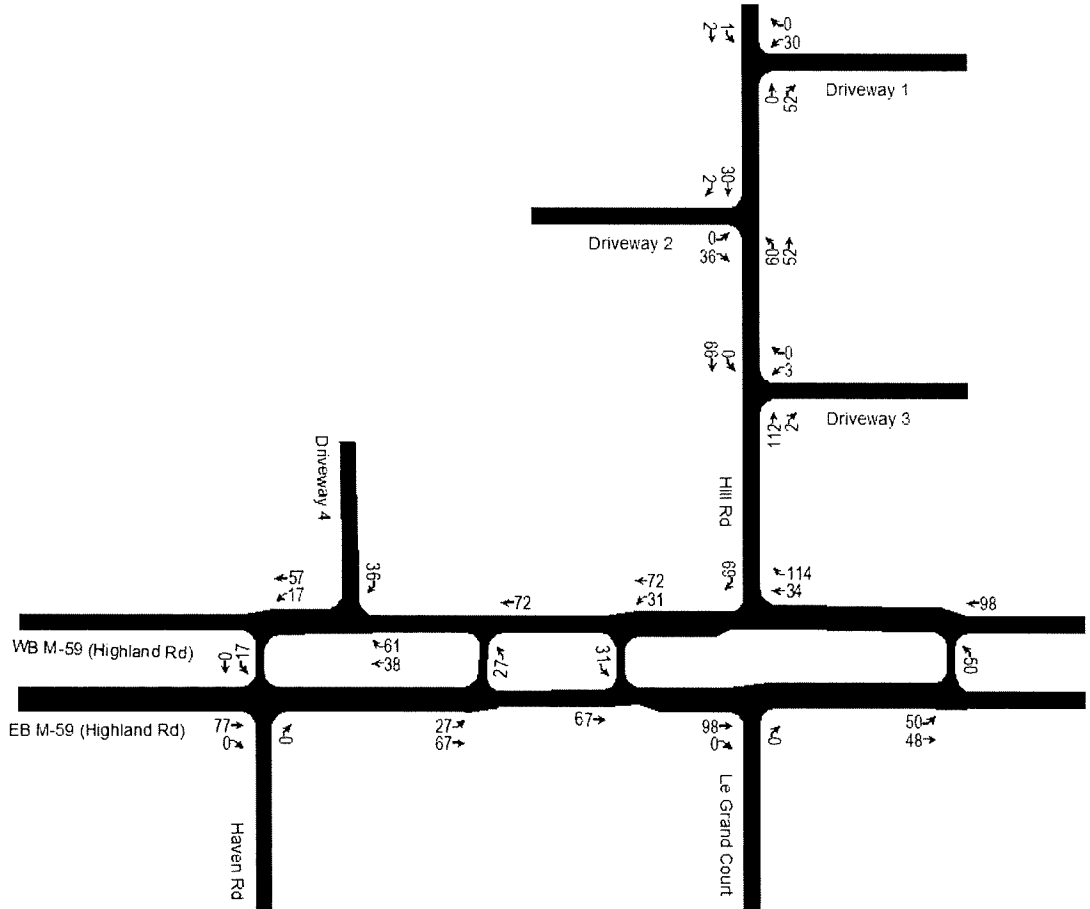
2027 Background Conditions Volumes Multi-Use Development TIS

Figure

AM Peak Hour



PM Peak Hour



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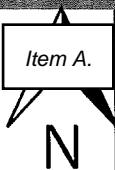
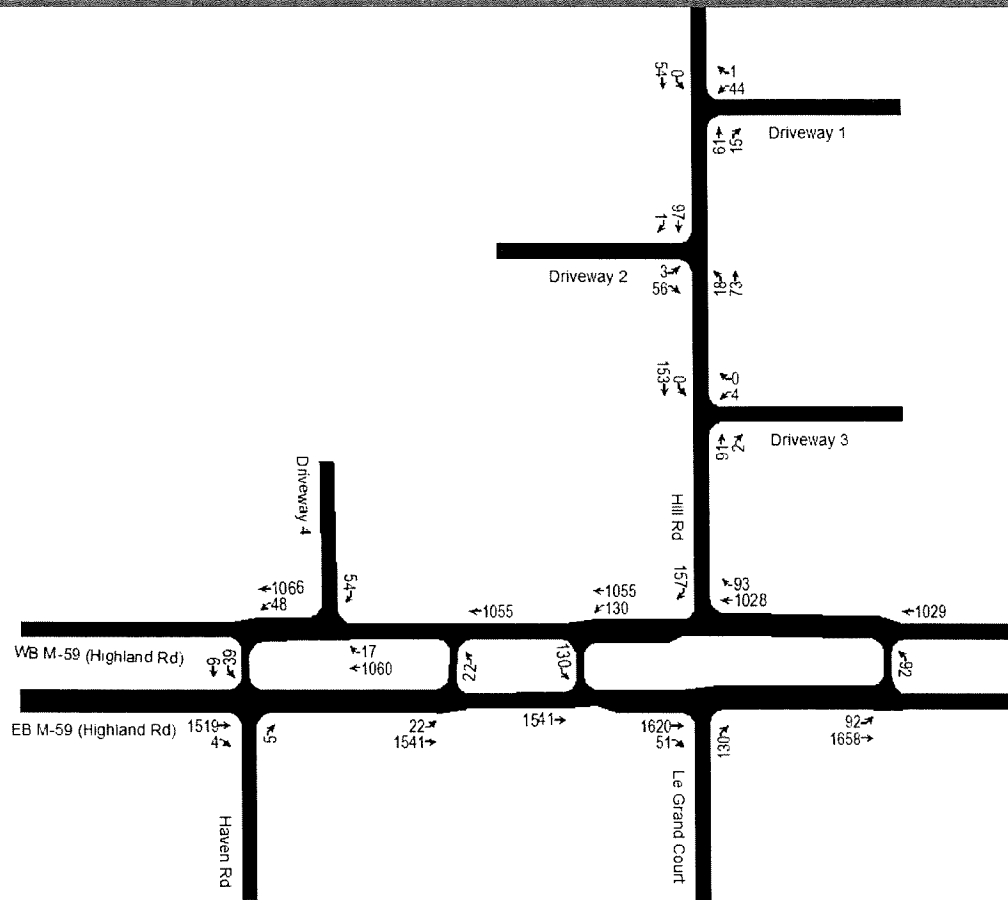
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**Site Generated Volumes
Multi-Use Development TIS**

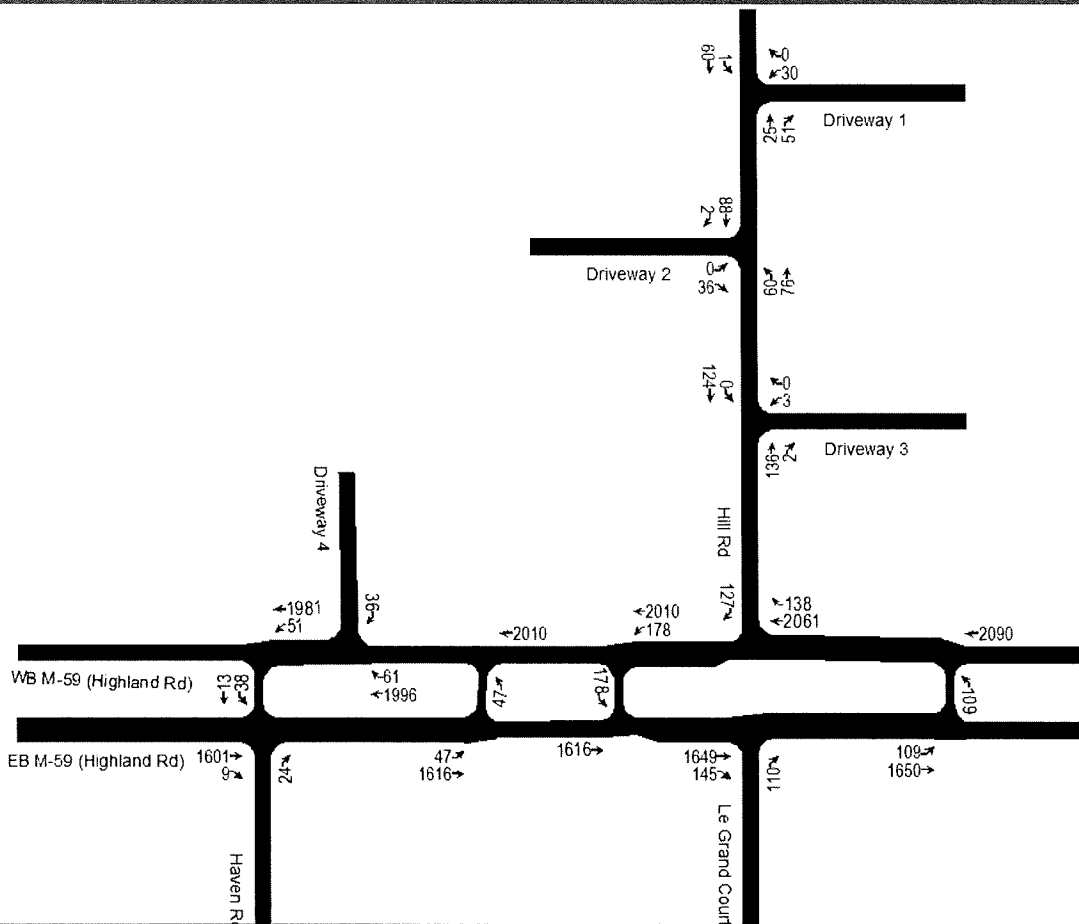
Figure

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AM Peak Hour



PM Peak Hour



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**2027 Future Conditions Volumes
Multi-Use Development TIS**

Fig

Not to scale – for illustrative purpo

TRAFFIC COUNTS

EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877565, Location: 42.648726, -83.539668



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int
	T	U	App	T	U	App	
2021-09-30 7:00AM	344	0	344	172	10	182	526
7:15AM	328	0	328	185	13	198	526
7:30AM	340	0	340	224	22	246	586
7:45AM	397	0	397	254	15	269	666
Hourly Total	1409	0	1409	835	60	895	2304
8:00AM	345	0	345	243	14	257	602
8:15AM	327	0	327	243	13	256	583
8:30AM	312	0	312	232	9	241	553
8:45AM	342	0	342	221	16	237	579
Hourly Total	1326	0	1326	939	52	991	2317
4:00PM	319	0	319	397	25	422	741
4:15PM	382	0	382	425	40	465	847
4:30PM	374	0	374	465	23	488	862
4:45PM	372	0	372	454	28	482	854
Hourly Total	1447	0	1447	1741	116	1857	3304
5:00PM	378	0	378	420	41	461	839
5:15PM	370	0	370	444	40	484	854
5:30PM	376	0	376	447	35	482	858
5:45PM	357	0	357	426	41	467	824
Hourly Total	1481	0	1481	1737	157	1894	3375
Total	5663	0	5663	5252	385	5637	11300
% Approach	100%	0%	-	93.2%	6.8%	-	-
% Total	50.1%	0%	50.1%	46.5%	3.4%	49.9%	-
Lights	5490	0	5490	5078	374	5452	10942
% Lights	96.9%	0%	96.9%	96.7%	97.1%	96.7%	96.8%
Articulated Trucks	65	0	65	56	0	56	121
% Articulated Trucks	1.1%	0%	1.1%	1.1%	0%	1.0%	1.1%
Buses and Single-Unit Trucks	108	0	108	118	11	129	237
% Buses and Single-Unit Trucks	1.9%	0%	1.9%	2.2%	2.9%	2.3%	2.1%

*T: Thru, U: U-Turn

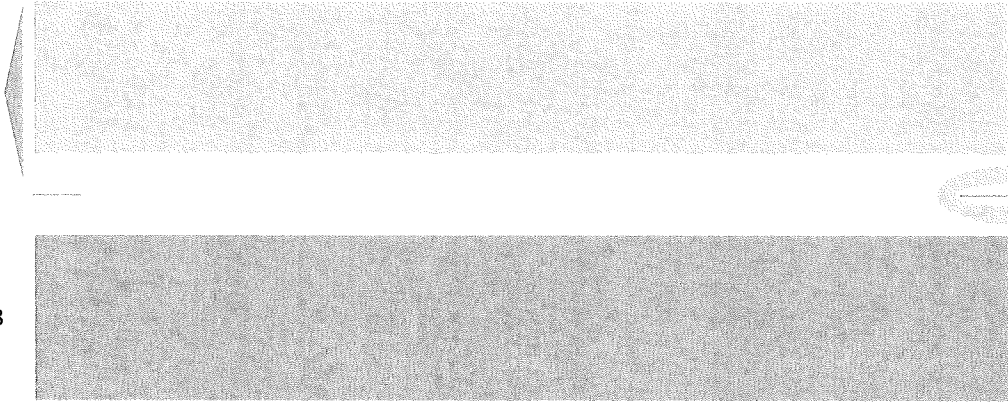
EB M-59 (Highland Road) and WB to EB crossov... - TMC
Thu Sep 30, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877565, Location: 42.648726, -83.539668



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[W] MI 59
Total: 10915
In: 5663 Out: 5252

5663



5252 In: 5637
385 Total: 11685
Out: 6048 [E] MI 59

EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877565, Location: 42.648726, -83.539668



Item A.

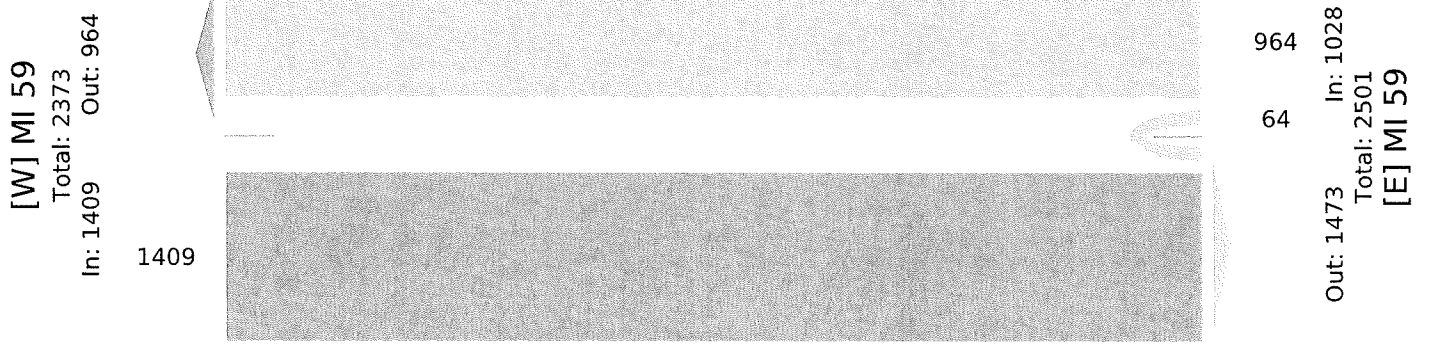
Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int
	T	U	App	T	U	App	
2021-09-30 7:30AM	340	0	340	224	22	246	586
7:45AM	397	0	397	254	15	269	666
8:00AM	345	0	345	243	14	257	602
8:15AM	327	0	327	243	13	256	583
Total	1409	0	1409	964	64	1028	2437
% Approach	100%	0%	-	93.8%	6.2%	-	-
% Total	57.8%	0%	57.8%	39.6%	2.6%	42.2%	-
PHF	0.887	-	0.887	0.949	0.727	0.955	0.915
Lights	1346	0	1346	912	60	972	2318
% Lights	95.5%	0%	95.5%	94.6%	93.8%	94.6%	95.1%
Articulated Trucks	30	0	30	17	0	17	47
% Articulated Trucks	2.1%	0%	2.1%	1.8%	0%	1.7%	1.9%
Buses and Single-Unit Trucks	33	0	33	35	4	39	72
% Buses and Single-Unit Trucks	2.3%	0%	2.3%	3.6%	6.3%	3.8%	3.0%

*T: Thru, U: U-Turn

EB M-59 (Highland Road) and WB to EB crossov... - TMC
Thu Sep 30, 2021
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877565, Location: 42.648726, -83.539668

Item A.



EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877565, Location: 42.648726, -83.539668



Item A.

Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int	
	T	U	App	T	U	App		
Time								
	2021-09-30 4:30PM	374	0	374	465	23	488	862
	4:45PM	372	0	372	454	28	482	854
	5:00PM	378	0	378	420	41	461	839
	5:15PM	370	0	370	444	40	484	854
Total		1494	0	1494	1783	132	1915	3409
% Approach		100%	0%	-	93.1%	6.9%	-	-
% Total		43.8%	0%	43.8%	52.3%	3.9%	56.2%	-
PHF		0.988	-	0.988	0.959	0.805	0.981	0.989
Lights		1468	0	1468	1737	129	1866	3334
% Lights		98.3%	0%	98.3%	97.4%	97.7%	97.4%	97.8%
Articulated Trucks		10	0	10	17	0	17	27
% Articulated Trucks		0.7%	0%	0.7%	1.0%	0%	0.9%	0.8%
Buses and Single-Unit Trucks		16	0	16	29	3	32	48
% Buses and Single-Unit Trucks		1.1%	0%	1.1%	1.6%	2.3%	1.7%	1.4%

*T: Thru, U: U-Turn

EB M-59 (Highland Road) and WB to EB crossov... - TMC
Thu Sep 30, 2021
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877565, Location: 42.648726, -83.539668

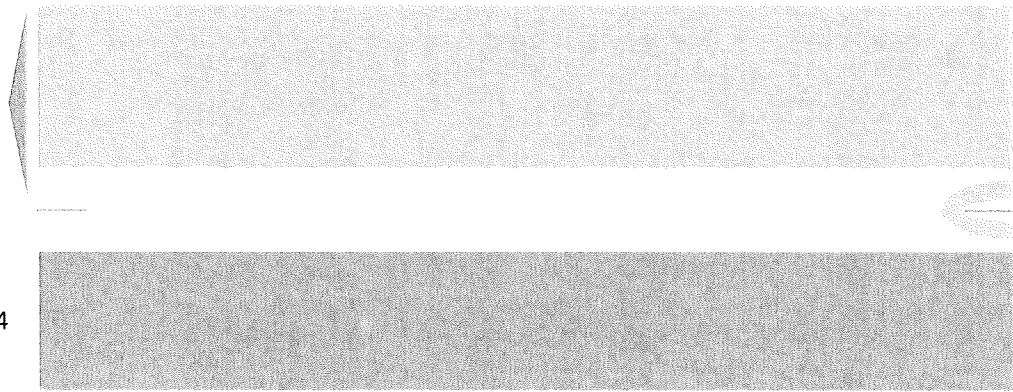


Item A.

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[W] MI 59
Total: 3277
In: 1494 Out: 1783

1494



1783 In: 1915
132 Total: 3541
Out: 1626 [E] MI 59

EB M-59 (Highland Road) and WB to EB crossov... - TMC

Thu Sep 30, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 877563, Location: 42.650179, -83.543706



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

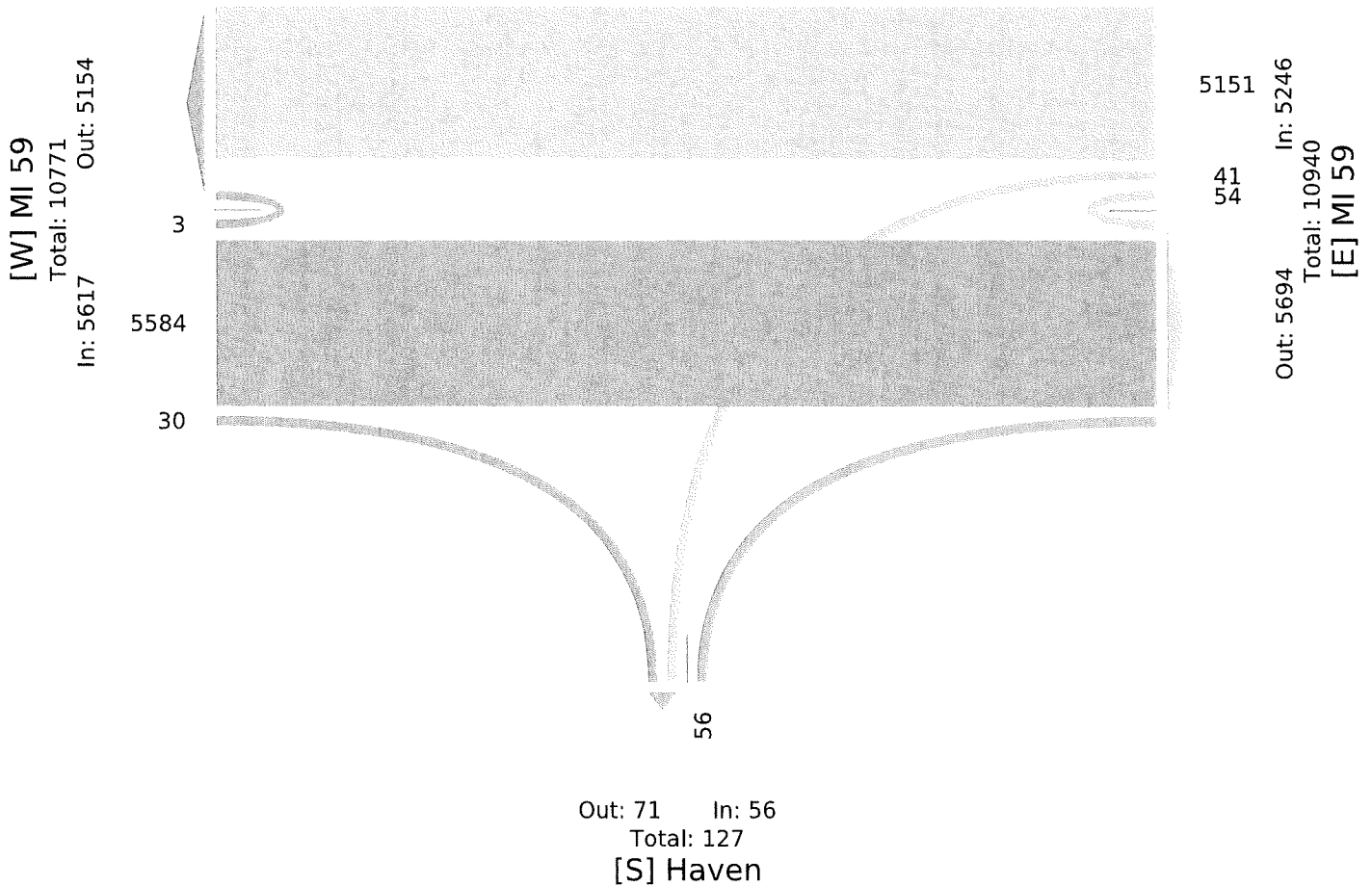
Leg Direction	MI 59 Eastbound				MI 59 Westbound				Haven Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2021-09-30 7:00AM	327	1	0	328	2	170	2	174	0	1	0	1	503
7:15AM	332	1	0	333	1	185	2	188	0	0	0	0	521
7:30AM	335	1	0	336	3	226	0	229	0	1	0	1	566
7:45AM	384	1	1	386	1	256	3	260	0	1	0	1	647
Hourly Total	1378	4	1	1383	7	837	7	851	0	3	0	3	2237
8:00AM	346	2	0	348	3	235	3	241	0	1	0	1	590
8:15AM	321	0	0	321	2	230	1	233	0	2	0	2	556
8:30AM	314	2	0	316	1	225	4	230	0	1	0	1	547
8:45AM	335	2	0	337	1	216	2	219	0	3	0	3	559
Hourly Total	1316	6	0	1322	7	906	10	923	0	7	0	7	2252
4:00PM	317	0	0	317	3	371	7	381	0	6	0	6	704
4:15PM	378	3	0	381	2	428	2	432	0	3	0	3	816
4:30PM	376	3	2	381	4	432	2	438	0	8	0	8	827
4:45PM	364	1	0	365	3	445	3	451	0	1	0	1	817
Hourly Total	1435	7	2	1444	12	1676	14	1702	0	18	0	18	3164
5:00PM	382	2	0	384	2	427	5	434	0	3	0	3	821
5:15PM	350	1	0	351	3	451	5	459	0	13	0	13	823
5:30PM	386	5	0	391	5	438	7	450	0	6	0	6	847
5:45PM	337	5	0	342	5	416	6	427	0	6	0	6	775
Hourly Total	1455	13	0	1468	15	1732	23	1770	0	28	0	28	3266
Total	5584	30	3	5617	41	5151	54	5246	0	56	0	56	10919
% Approach	99.4%	0.5%	0.1%	-	0.8%	98.2%	1.0%	-	0%	100%	0%	-	-
% Total	51.1%	0.3%	0%	51.4%	0.4%	47.2%	0.5%	48.0%	0%	0.5%	0%	0.5%	-
Lights	5412	30	3	5445	40	4979	51	5070	0	55	0	55	10570
% Lights	96.9%	100%	100%	96.9%	97.6%	96.7%	94.4%	96.6%	0%	98.2%	0%	98.2%	96.8%
Articulated Trucks	64	0	0	64	1	53	1	55	0	0	0	0	119
% Articulated Trucks	1.1%	0%	0%	1.1%	2.4%	1.0%	1.9%	1.0%	0%	0%	0%	0%	1.1%
Buses and Single-Unit Trucks	108	0	0	108	0	119	2	121	0	1	0	1	230
% Buses and Single-Unit Trucks	1.9%	0%	0%	1.9%	0%	2.3%	3.7%	2.3%	0%	1.8%	0%	1.8%	2.1%

*L: Left, R: Right, T: Thru, U: U-Turn

EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877563, Location: 42.650179, -83.543706



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US



EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877563, Location: 42.650179, -83.543706



Item A.

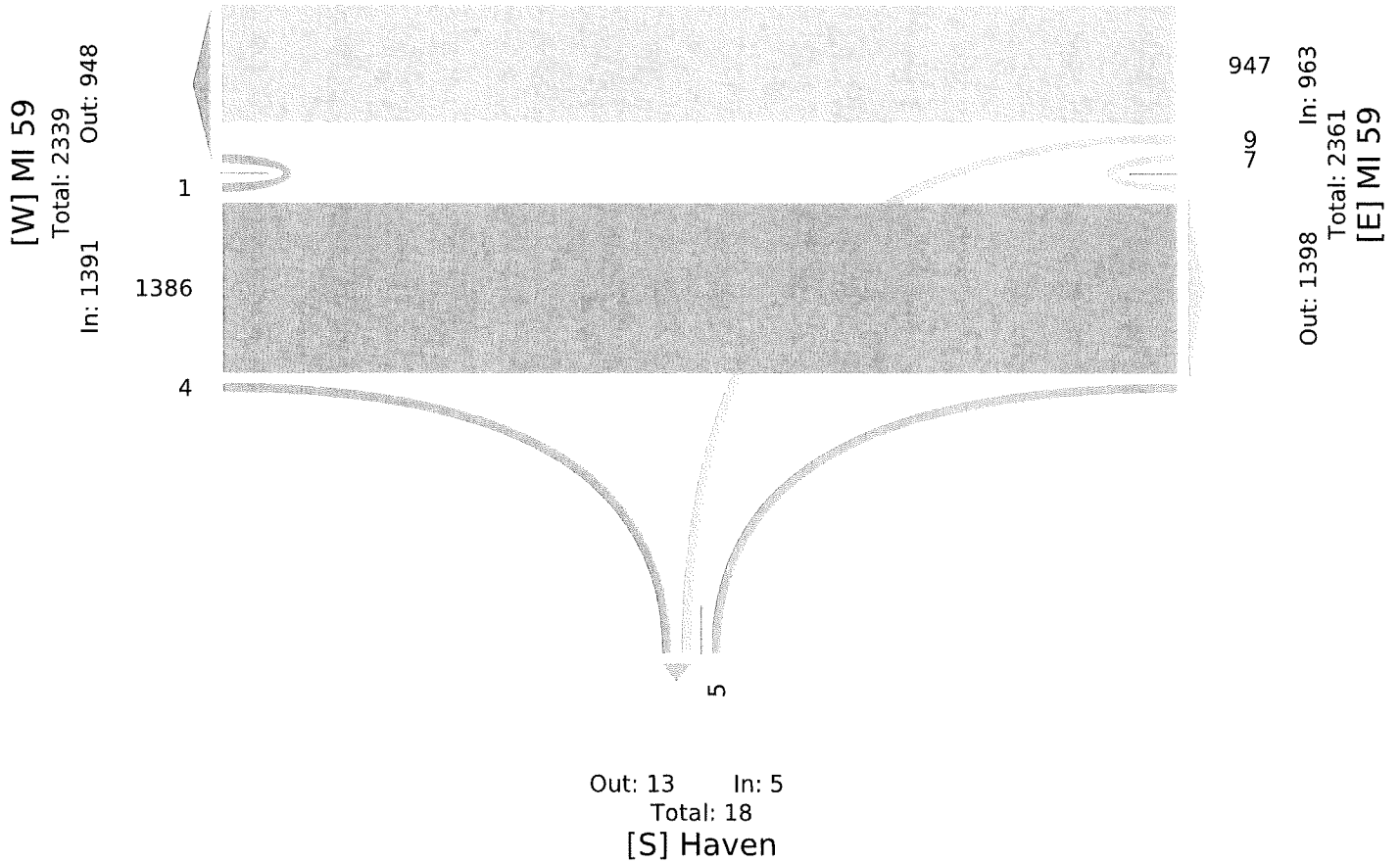
Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound				MI 59 Westbound				Haven Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2021-09-30 7:30AM	335	1	0	336	3	226	0	229	0	1	0	1	566
7:45AM	384	1	1	386	1	256	3	260	0	1	0	1	647
8:00AM	346	2	0	348	3	235	3	241	0	1	0	1	590
8:15AM	321	0	0	321	2	230	1	233	0	2	0	2	556
Total	1386	4	1	1391	9	947	7	963	0	5	0	5	2359
% Approach	99.6%	0.3%	0.1%	-	0.9%	98.3%	0.7%	-	0%	100%	0%	-	-
% Total	58.8%	0.2%	0%	59.0%	0.4%	40.1%	0.3%	40.8%	0%	0.2%	0%	0.2%	-
PHF	0.902	0.500	0.250	0.901	0.750	0.925	0.583	0.926	-	0.625	-	0.625	0.912
Lights	1321	4	1	1326	9	899	6	914	0	5	0	5	2245
% Lights	95.3%	100%	100%	95.3%	100%	94.9%	85.7%	94.9%	0%	100%	0%	100%	95.2%
Articulated Trucks	32	0	0	32	0	15	0	15	0	0	0	0	47
% Articulated Trucks	2.3%	0%	0%	2.3%	0%	1.6%	0%	1.6%	0%	0%	0%	0%	2.0%
Buses and Single-Unit Trucks	33	0	0	33	0	33	1	34	0	0	0	0	67
% Buses and Single-Unit Trucks	2.4%	0%	0%	2.4%	0%	3.5%	14.3%	3.5%	0%	0%	0%	0%	2.8%

*L: Left, R: Right, T: Thru, U: U-Turn

EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877563, Location: 42.650179, -83.543706

Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US



EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877563, Location: 42.650179, -83.543706



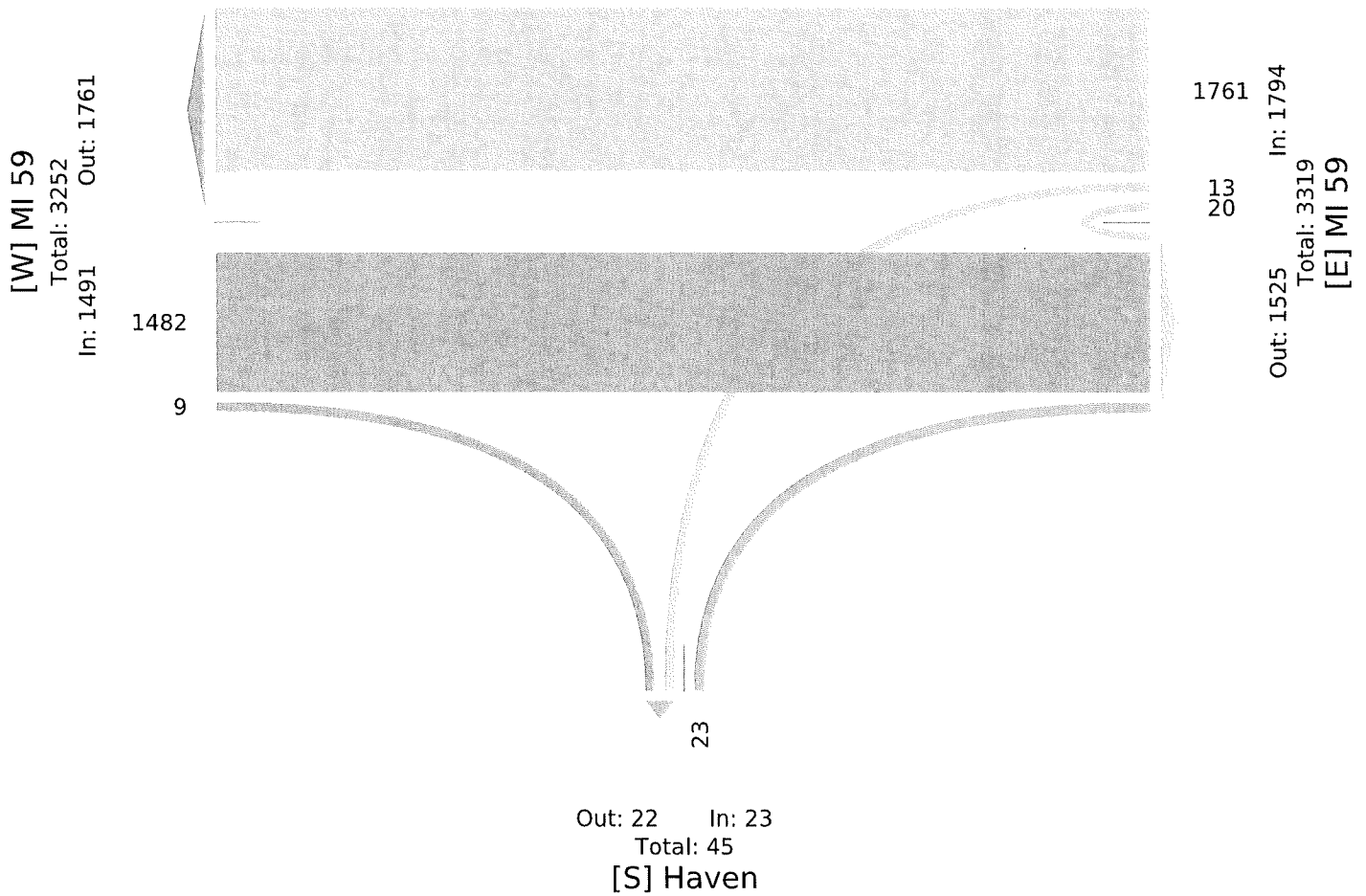
Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound				MI 59 Westbound				Haven Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2021-09-30 4:45PM	364	1	0	365	3	445	3	451	0	1	0	1	817
5:00PM	382	2	0	384	2	427	5	434	0	3	0	3	821
5:15PM	350	1	0	351	3	451	5	459	0	13	0	13	823
5:30PM	386	5	0	391	5	438	7	450	0	6	0	6	847
Total	1482	9	0	1491	13	1761	20	1794	0	23	0	23	3308
% Approach	99.4%	0.6%	0%	-	0.7%	98.2%	1.1%	-	0%	100%	0%	-	-
% Total	44.8%	0.3%	0%	45.1%	0.4%	53.2%	0.6%	54.2%	0%	0.7%	0%	0.7%	-
PHF	0.960	0.450	-	0.953	0.650	0.976	0.714	0.977	-	0.442	-	0.442	0.976
Lights	1451	9	0	1460	13	1725	19	1757	0	23	0	23	3240
% Lights	97.9%	100%	0%	97.9%	100%	98.0%	95.0%	97.9%	0%	100%	0%	100%	97.9%
Articulated Trucks	10	0	0	10	0	14	1	15	0	0	0	0	25
% Articulated Trucks	0.7%	0%	0%	0.7%	0%	0.8%	5.0%	0.8%	0%	0%	0%	0%	0.8%
Buses and Single-Unit Trucks	21	0	0	21	0	22	0	22	0	0	0	0	43
% Buses and Single-Unit Trucks	1.4%	0%	0%	1.4%	0%	1.2%	0%	1.2%	0%	0%	0%	0%	1.3%

*L: Left, R: Right, T: Thru, U: U-Turn

EB M-59 (Highland Road) and WB to EB crossov... - TMC
 Thu Sep 30, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877563, Location: 42.650179, -83.543706

Item A.



M-59 (Highland Road) and Hill Road - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877561, Location: 42.648831, -83.53738

GHA GEWALT HAMILTON ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound				MI 59 Westbound				Hill Southbound				Int
	L	T	U	App	T	R	U	App	L	R	U	App	
2021-09-30 7:00AM	0	0	0	0	177	1	0	178	0	8	0	8	186
7:15AM	0	0	0	0	193	4	0	197	0	4	0	4	201
7:30AM	0	0	0	0	245	12	0	257	0	8	0	8	265
7:45AM	0	0	0	0	250	31	0	281	0	26	0	26	307
Hourly Total	0	0	0	0	865	48	0	913	0	46	0	46	959
8:00AM	0	0	0	0	242	7	0	249	0	13	0	13	262
8:15AM	0	0	0	0	254	6	0	260	0	4	0	4	264
8:30AM	0	0	0	0	232	0	0	232	0	8	0	8	240
8:45AM	0	0	0	0	232	2	0	234	0	4	0	4	238
Hourly Total	0	0	0	0	960	15	0	975	0	29	0	29	1004
4:00PM	0	0	0	0	423	8	0	431	0	7	0	7	438
4:15PM	0	0	0	0	463	5	0	468	0	10	0	10	478
4:30PM	0	0	0	0	490	5	0	495	0	8	0	8	503
4:45PM	0	0	0	0	473	8	0	481	0	9	0	9	490
Hourly Total	0	0	0	0	1849	26	0	1875	0	34	0	34	1909
5:00PM	0	0	0	0	473	11	0	484	0	11	0	11	495
5:15PM	0	0	0	0	480	11	0	491	0	17	0	17	508
5:30PM	0	0	0	0	494	15	0	509	0	9	0	9	518
5:45PM	0	0	0	0	462	23	0	485	0	20	0	20	505
Hourly Total	0	0	0	0	1909	60	0	1969	0	57	0	57	2026
Total	0	0	0	0	5583	149	0	5732	0	166	0	166	5898
% Approach	0%	0%	0%	-	97.4%	2.6%	0%	-	0%	100%	0%	-	-
% Total	0%	0%	0%	0%	94.7%	2.5%	0%	97.2%	0%	2.8%	0%	2.8%	-
Lights	0	0	0	0	5389	141	0	5530	0	162	0	162	5692
% Lights	0%	0%	0%	-	96.5%	94.6%	0%	96.5%	0%	97.6%	0%	97.6%	96.5%
Articulated Trucks	0	0	0	0	47	2	0	49	0	0	0	0	49
% Articulated Trucks	0%	0%	0%	-	0.8%	1.3%	0%	0.9%	0%	0%	0%	0%	0.8%
Buses and Single-Unit Trucks	0	0	0	0	147	6	0	153	0	4	0	4	157
% Buses and Single-Unit Trucks	0%	0%	0%	-	2.6%	4.0%	0%	2.7%	0%	2.4%	0%	2.4%	2.7%

*L: Left, R: Right, T: Thru, U: U-Turn

M-59 (Highland Road) and Hill Road - TMC

Thu Sep 30, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

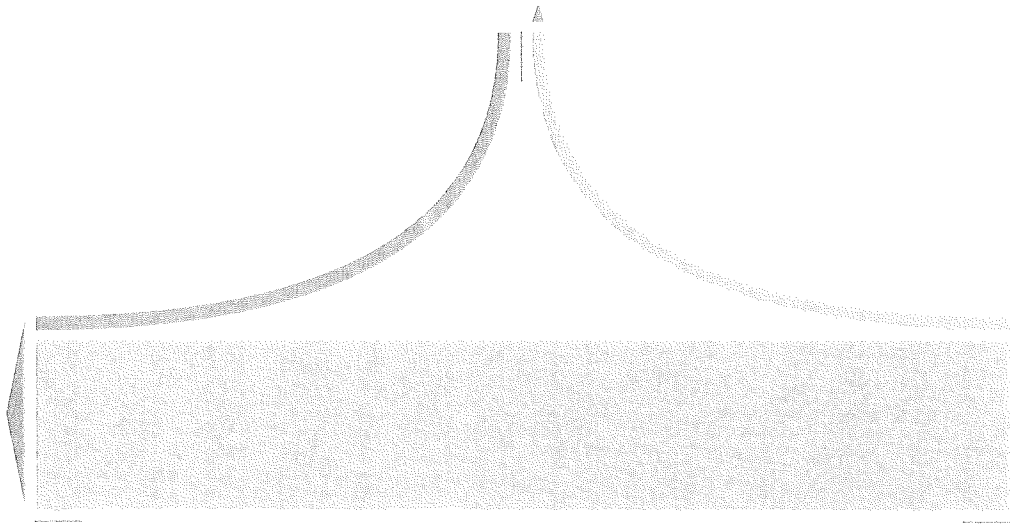
ID: 877561, Location: 42.648831, -83.53738

[N] Hill

Total: 315

In: 166 Out: 149

166



[W] MI 59

Total: 5749

In: 0

Out: 5749

149

5583

Out: 0 In: 5732

Total: 5732

[E] MI 59

M-59 (Highland Road) and Hill Road - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877561, Location: 42.648831, -83.53738

GHA GEWALT HAMILTON ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound				MI 59 Westbound				Hill Southbound				Int
	L	T	U	App	T	R	U	App	L	R	U	App	
2021-09-30 7:30AM	0	0	0	0	245	12	0	257	0	8	0	8	265
7:45AM	0	0	0	0	250	31	0	281	0	26	0	26	307
8:00AM	0	0	0	0	242	7	0	249	0	13	0	13	262
8:15AM	0	0	0	0	254	6	0	260	0	4	0	4	264
Total	0	0	0	0	991	56	0	1047	0	51	0	51	1098
% Approach	0%	0%	0%	-	94.7%	5.3%	0%	-	0%	100%	0%	-	-
% Total	0%	0%	0%	0%	90.3%	5.1%	0%	95.4%	0%	4.6%	0%	4.6%	-
PHF	-	-	-	-	0.975	0.452	-	0.931	-	0.490	-	0.490	0.894
Lights	0	0	0	0	934	52	0	986	0	50	0	50	1036
% Lights	0%	0%	0%	-	94.2%	92.9%	0%	94.2%	0%	98.0%	0%	98.0%	94.4%
Articulated Trucks	0	0	0	0	17	0	0	17	0	0	0	0	17
% Articulated Trucks	0%	0%	0%	-	1.7%	0%	0%	1.6%	0%	0%	0%	0%	1.5%
Buses and Single-Unit Trucks	0	0	0	0	40	4	0	44	0	1	0	1	45
% Buses and Single-Unit Trucks	0%	0%	0%	-	4.0%	7.1%	0%	4.2%	0%	2.0%	0%	2.0%	4.1%

*L: Left, R: Right, T: Thru, U: U-Turn

M-59 (Highland Road) and Hill Road - TMC

Thu Sep 30, 2021

AM Peak (7:30 AM - 8:30 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 877561, Location: 42.648831, -83.53738



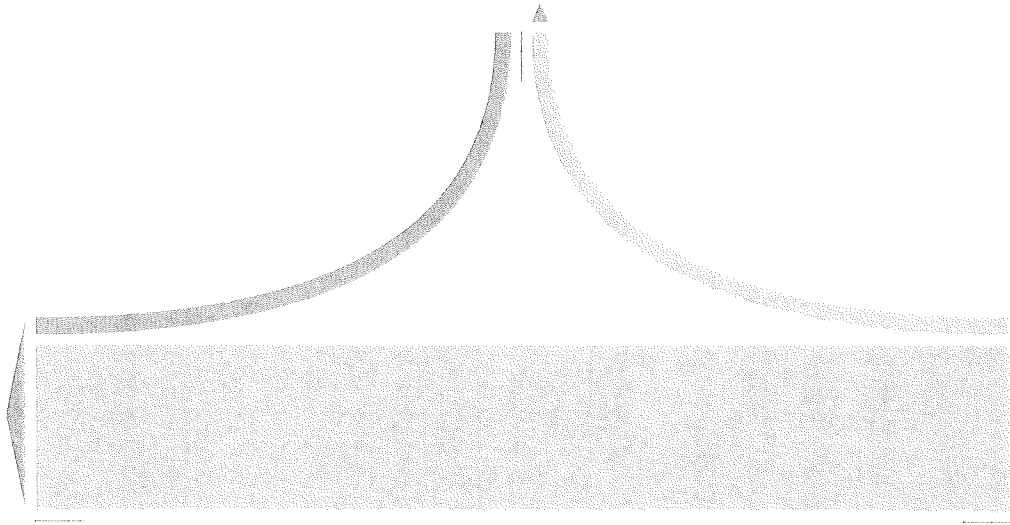
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Hill

Total: 107

In: 51 Out: 56

51



[W] MI 59

Total: 1042

In: 0

Out: 1042

56

991

Out: 0 In: 1047

Total: 1047

[E] MI 59

M-59 (Highland Road) and Hill Road - TMC
 Thu Sep 30, 2021
 PM Peak (5 PM - 6 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877561, Location: 42.648831, -83.53738



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound				MI 59 Westbound				Hill Southbound				Int
	L	T	U	App	T	R	U	App	L	R	U	App	
2021-09-30 5:00PM	0	0	0	0	473	11	0	484	0	11	0	11	495
5:15PM	0	0	0	0	480	11	0	491	0	17	0	17	508
5:30PM	0	0	0	0	494	15	0	509	0	9	0	9	518
5:45PM	0	0	0	0	462	23	0	485	0	20	0	20	505
Total	0	0	0	0	1909	60	0	1969	0	57	0	57	2026
% Approach	0%	0%	0%	-	97.0%	3.0%	0%	-	0%	100%	0%	-	-
% Total	0%	0%	0%	0%	94.2%	3.0%	0%	97.2%	0%	2.8%	0%	2.8%	-
PHF	-	-	-	-	0.966	0.652	-	0.967	-	0.713	-	0.713	0.978
Lights	0	0	0	0	1878	58	0	1936	0	56	0	56	1992
% Lights	0%	0%	0%	-	98.4%	96.7%	0%	98.3%	0%	98.2%	0%	98.2%	98.3%
Articulated Trucks	0	0	0	0	9	1	0	10	0	0	0	0	10
% Articulated Trucks	0%	0%	0%	-	0.5%	1.7%	0%	0.5%	0%	0%	0%	0%	0.5%
Buses and Single-Unit Trucks	0	0	0	0	22	1	0	23	0	1	0	1	24
% Buses and Single-Unit Trucks	0%	0%	0%	-	1.2%	1.7%	0%	1.2%	0%	1.8%	0%	1.8%	1.2%

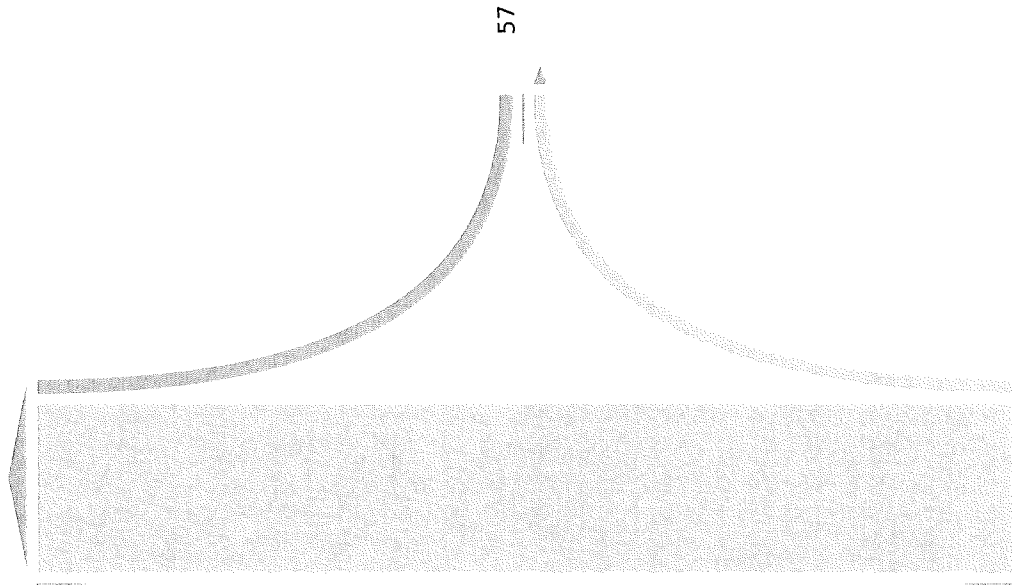
* L: Left, R: Right, T: Thru, U: U-Turn

M-59 (Highland Road) and Hill Road - TMC
Thu Sep 30, 2021
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877561, Location: 42.648831, -83.53738

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Hill
Total: 117
In: 57 Out: 60

[W] MI 59
Total: 1966
In: 0 Out: 1966



60
1909
Out: 0 In: 1969
Total: 1969
[E] MI 59

M-59 (Highland Road) and Le Grand Ct - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877562, Location: 42.64847, -83.537354



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

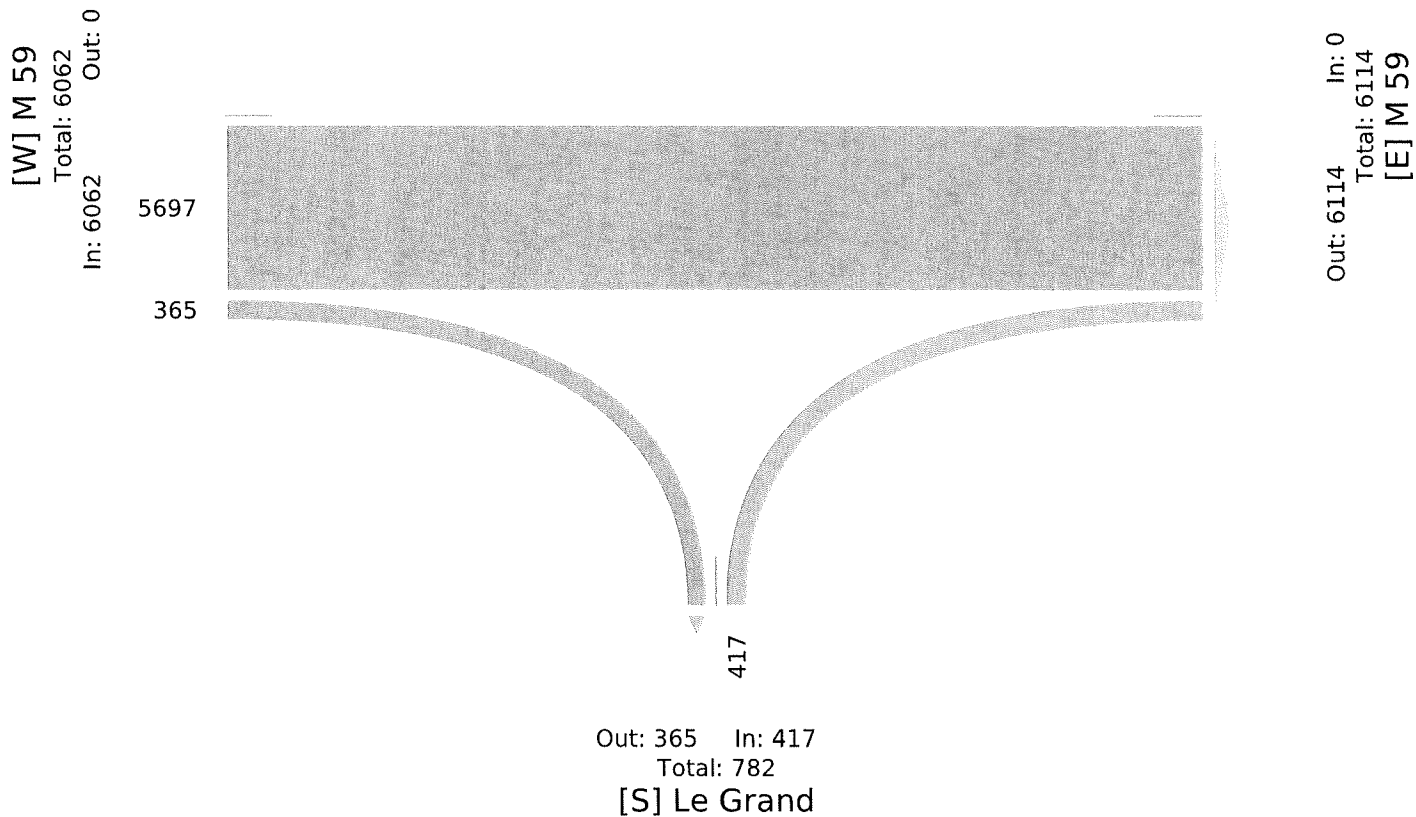
Leg Direction	M 59 Eastbound				M 59 Westbound				Le Grand Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2021-09-30 7:00AM	346	5	0	351	0	0	0	0	0	31	0	31	382
7:15AM	336	11	0	347	0	0	0	0	0	29	0	29	376
7:30AM	342	20	0	362	0	0	0	0	0	40	0	40	402
7:45AM	399	8	0	407	0	0	0	0	0	26	0	26	433
Hourly Total	1423	44	0	1467	0	0	0	0	0	126	0	126	1593
8:00AM	352	10	0	362	0	0	0	0	0	31	0	31	393
8:15AM	332	12	0	344	0	0	0	0	0	19	0	19	363
8:30AM	313	8	0	321	0	0	0	0	0	24	0	24	345
8:45AM	340	14	0	354	0	0	0	0	0	40	0	40	394
Hourly Total	1337	44	0	1381	0	0	0	0	0	114	0	114	1495
4:00PM	319	27	0	346	0	0	0	0	0	14	0	14	360
4:15PM	382	40	0	422	0	0	0	0	0	17	0	17	439
4:30PM	365	34	0	399	0	0	0	0	0	19	0	19	418
4:45PM	366	32	0	398	0	0	0	0	0	23	0	23	421
Hourly Total	1432	133	0	1565	0	0	0	0	0	73	0	73	1638
5:00PM	394	39	0	433	0	0	0	0	0	36	0	36	469
5:15PM	367	36	0	403	0	0	0	0	0	26	0	26	429
5:30PM	384	34	0	418	0	0	0	0	0	22	0	22	440
5:45PM	360	35	0	395	0	0	0	0	0	20	0	20	415
Hourly Total	1505	144	0	1649	0	0	0	0	0	104	0	104	1753
Total	5697	365	0	6062	0	0	0	0	0	417	0	417	6479
% Approach	94.0%	6.0%	0%	-	0%	0%	0%	-	0%	100%	0%	-	-
% Total	87.9%	5.6%	0%	93.6%	0%	0%	0%	0%	0%	6.4%	0%	6.4%	-
Lights	5517	352	0	5869	0	0	0	0	0	403	0	403	6272
% Lights	96.8%	96.4%	0%	96.8%	0%	0%	0%	-	0%	96.6%	0%	96.6%	96.8%
Articulated Trucks	60	0	0	60	0	0	0	0	0	0	0	0	60
% Articulated Trucks	1.1%	0%	0%	1.0%	0%	0%	0%	-	0%	0%	0%	0%	0.9%
Buses and Single-Unit Trucks	120	13	0	133	0	0	0	0	0	14	0	14	147
% Buses and Single-Unit Trucks	2.1%	3.6%	0%	2.2%	0%	0%	0%	-	0%	3.4%	0%	3.4%	2.3%

*L: Left, R: Right, T: Thru, U: U-Turn

M-59 (Highland Road) and Le Grand Ct - TMC
Thu Sep 30, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877562, Location: 42.64847, -83.537354



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-59 (Highland Road) and Le Grand Ct - TMC
 Thu Sep 30, 2021
 AM Peak (7:15 AM - 8:15 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877562, Location: 42.64847, -83.537354



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

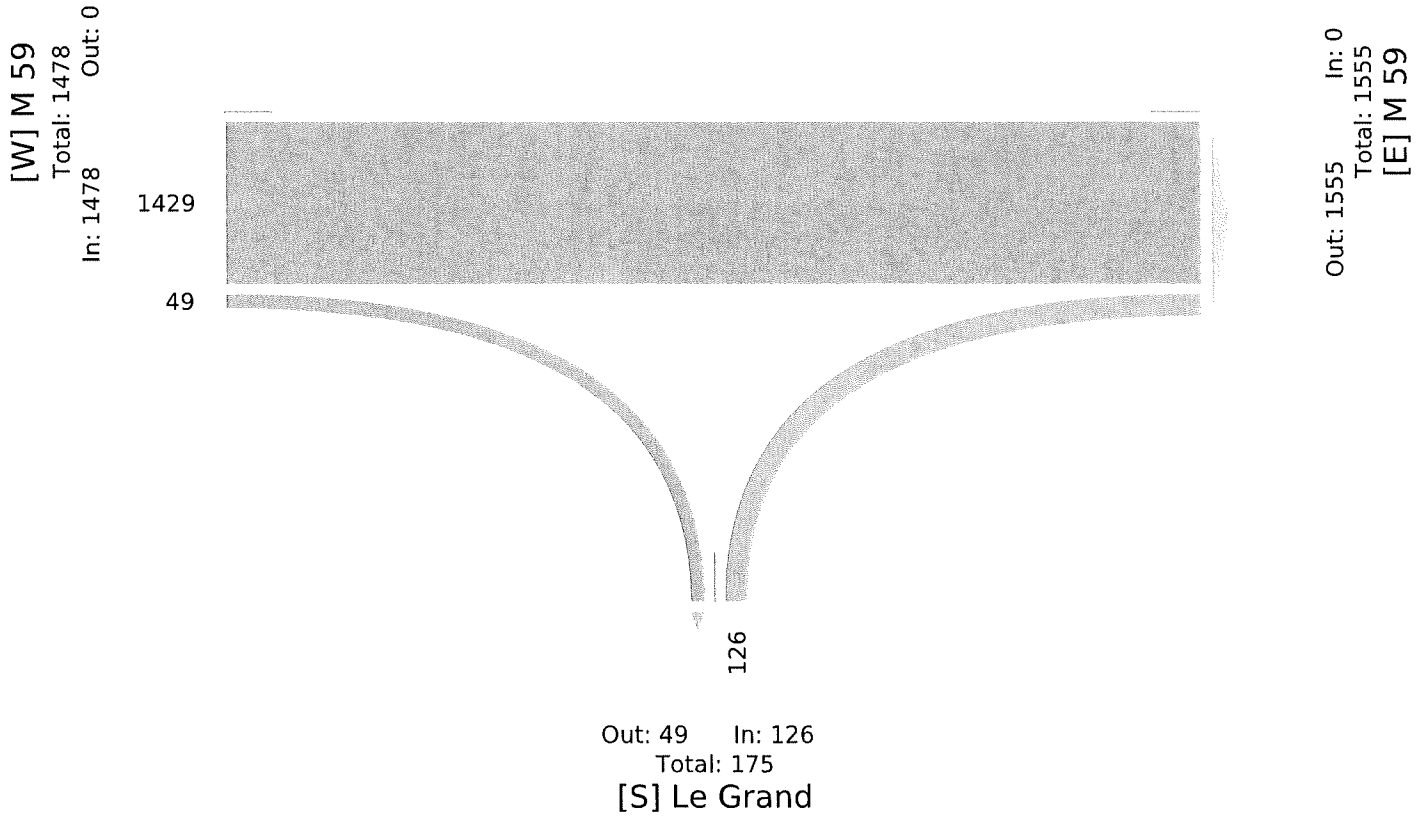
Leg Direction	M 59 Eastbound				M 59 Westbound				Le Grand Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2021-09-30 7:15AM	336	11	0	347	0	0	0	0	0	29	0	29	376
7:30AM	342	20	0	362	0	0	0	0	0	40	0	40	402
7:45AM	399	8	0	407	0	0	0	0	0	26	0	26	433
8:00AM	352	10	0	362	0	0	0	0	0	31	0	31	393
Total	1429	49	0	1478	0	0	0	0	0	126	0	126	1604
% Approach	96.7%	3.3%	0%	-	0%	0%	0%	-	0%	100%	0%	-	-
% Total	89.1%	3.1%	0%	92.1%	0%	0%	0%	0%	0%	7.9%	0%	7.9%	-
PHF	0.895	0.613	-	0.908	-	-	-	-	-	0.788	-	0.788	0.926
Lights	1369	46	0	1415	0	0	0	0	0	122	0	122	1537
% Lights	95.8%	93.9%	0%	95.7%	0%	0%	0%	-	0%	96.8%	0%	96.8%	95.8%
Articulated Trucks	26	0	0	26	0	0	0	0	0	0	0	0	26
% Articulated Trucks	1.8%	0%	0%	1.8%	0%	0%	0%	-	0%	0%	0%	0%	1.6%
Buses and Single-Unit Trucks	34	3	0	37	0	0	0	0	0	4	0	4	41
% Buses and Single-Unit Trucks	2.4%	6.1%	0%	2.5%	0%	0%	0%	-	0%	3.2%	0%	3.2%	2.6%

* L: Left, R: Right, T: Thru, U: U-Turn

M-59 (Highland Road) and Le Grand Ct - TMC
 Thu Sep 30, 2021
 AM Peak (7:15 AM - 8:15 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877562, Location: 42.64847, -83.537354

GHA GEWALT HAMILTON
 ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Item A.



M-59 (Highland Road) and Le Grand Ct - TMC
 Thu Sep 30, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877562, Location: 42.64847, -83.537354



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

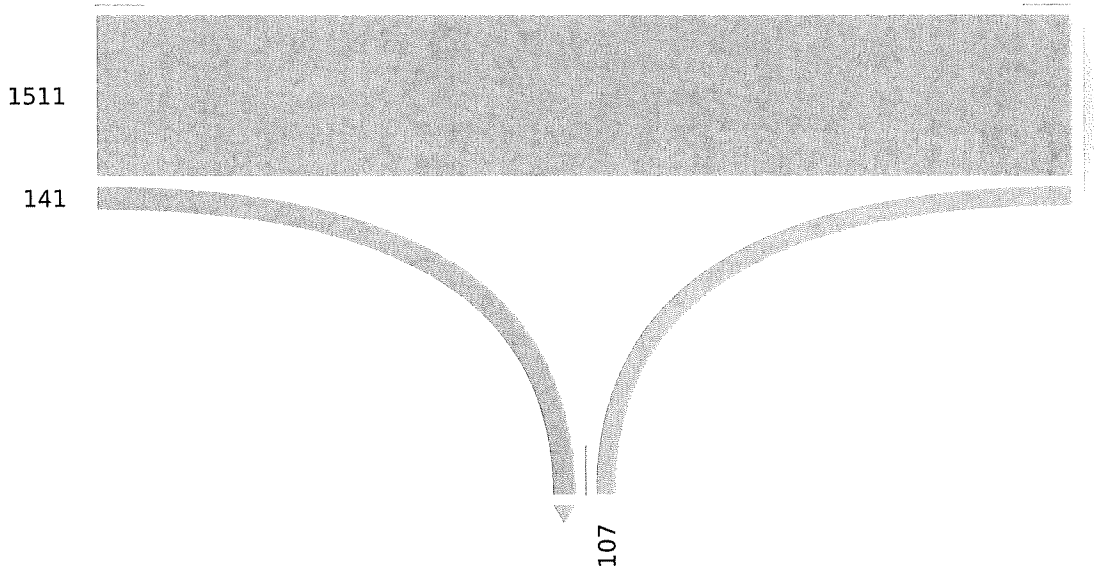
Leg Direction	M 59 Eastbound				M 59 Westbound				Le Grand Northbound				Int
	T	R	U	App	L	T	U	App	L	R	U	App	
2021-09-30 4:45PM	366	32	0	398	0	0	0	0	0	23	0	23	421
5:00PM	394	39	0	433	0	0	0	0	0	36	0	36	469
5:15PM	367	36	0	403	0	0	0	0	0	26	0	26	429
5:30PM	384	34	0	418	0	0	0	0	0	22	0	22	440
Total	1511	141	0	1652	0	0	0	0	0	107	0	107	1759
% Approach	91.5%	8.5%	0%	-	0%	0%	0%	-	0%	100%	0%	-	-
% Total	85.9%	8.0%	0%	93.9%	0%	0%	0%	0%	0%	6.1%	0%	6.1%	-
PHF	0.959	0.904	-	0.954	-	-	-	-	-	0.743	-	0.743	0.938
Lights	1476	138	0	1614	0	0	0	0	0	103	0	103	1717
% Lights	97.7%	97.9%	0%	97.7%	0%	0%	0%	-	0%	96.3%	0%	96.3%	97.6%
Articulated Trucks	9	0	0	9	0	0	0	0	0	0	0	0	9
% Articulated Trucks	0.6%	0%	0%	0.5%	0%	0%	0%	-	0%	0%	0%	0%	0.5%
Buses and Single-Unit Trucks	26	3	0	29	0	0	0	0	0	4	0	4	33
% Buses and Single-Unit Trucks	1.7%	2.1%	0%	1.8%	0%	0%	0%	-	0%	3.7%	0%	3.7%	1.9%

*L: Left, R: Right, T: Thru, U: U-Turn

M-59 (Highland Road) and Le Grand Ct - TMC
Thu Sep 30, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877562, Location: 42.64847, -83.537354

Item A.

[W] M 59
Total: 1652
In: 1652 Out: 0



Out: 1618 In: 0
Total: 1618
[E] M 59

Out: 141 In: 107
Total: 248
[S] Le Grand

WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877566, Location: 42.648859, -83.535424

GHA GEWALT HAMILTON ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

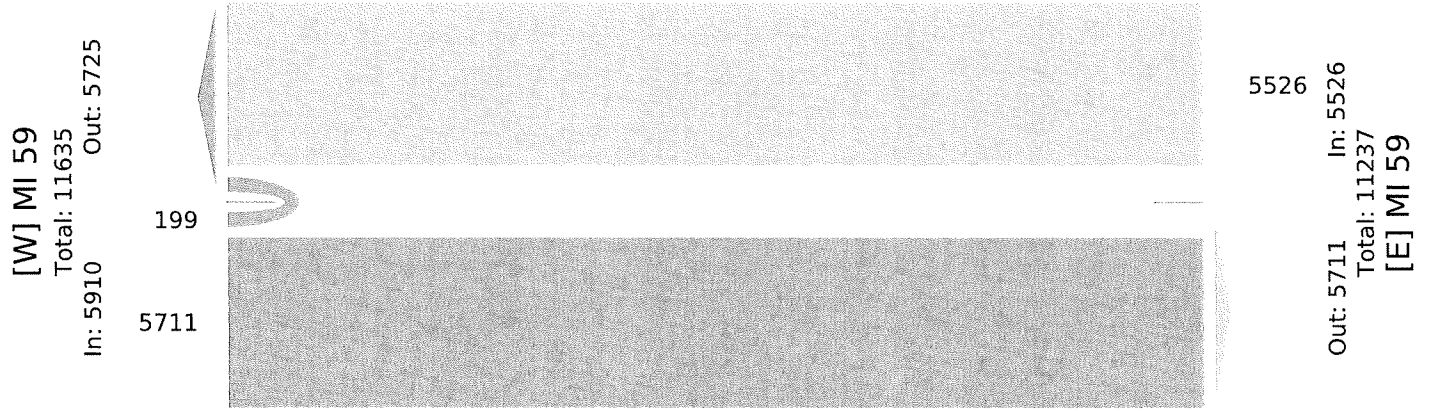
Leg Direction	M1 59 Eastbound			M1 59 Westbound			Int
	T	U	App	T	U	App	
2021-09-30 7:00AM	357	12	369	164	0	164	533
7:15AM	354	8	362	188	0	188	550
7:30AM	354	19	373	236	0	236	609
7:45AM	375	30	405	256	0	256	661
Hourly Total	1440	69	1509	844	0	844	2353
8:00AM	365	10	375	238	0	238	613
8:15AM	323	10	333	248	0	248	581
8:30AM	306	4	310	225	0	225	535
8:45AM	362	8	370	229	0	229	599
Hourly Total	1356	32	1388	940	0	940	2328
4:00PM	297	9	306	423	0	423	729
4:15PM	372	8	380	463	0	463	843
4:30PM	345	9	354	497	0	497	851
4:45PM	348	14	362	466	0	466	828
Hourly Total	1362	40	1402	1849	0	1849	3251
5:00PM	416	9	425	478	0	478	903
5:15PM	396	20	416	490	0	490	906
5:30PM	377	14	391	499	0	499	890
5:45PM	364	15	379	426	0	426	805
Hourly Total	1553	58	1611	1893	0	1893	3504
Total	5711	199	5910	5526	0	5526	11436
% Approach	96.6%	3.4%	-	100%	0%	-	-
% Total	49.9%	1.7%	51.7%	48.3%	0%	48.3%	-
Lights	5547	188	5735	5345	0	5345	11080
% Lights	97.1%	94.5%	97.0%	96.7%	0%	96.7%	96.9%
Articulated Trucks	60	1	61	61	0	61	122
% Articulated Trucks	1.1%	0.5%	1.0%	1.1%	0%	1.1%	1.1%
Buses and Single-Unit Trucks	104	10	114	120	0	120	234
% Buses and Single-Unit Trucks	1.8%	5.0%	1.9%	2.2%	0%	2.2%	2.0%

*T: Thru, U: U-Turn

WB M-59 (Highland Road) and EB to WB crossov... - TMC
Thu Sep 30, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877566, Location: 42.648859, -83.535424



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877566, Location: 42.648859, -83.535424



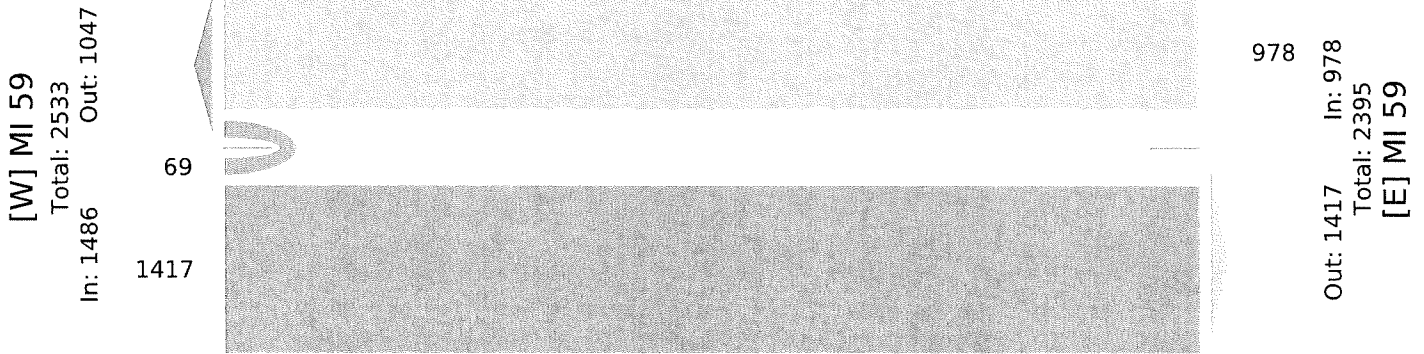
Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	M1 59 Eastbound			M1 59 Westbound			Int
	T	U	App	T	U	App	
2021-09-30 7:30AM	354	19	373	236	0	236	609
7:45AM	375	30	405	256	0	256	661
8:00AM	365	10	375	238	0	238	613
8:15AM	323	10	333	248	0	248	581
Total	1417	69	1486	978	0	978	2464
% Approach	95.4%	4.6%	-	100%	0%	-	-
% Total	57.5%	2.8%	60.3%	39.7%	0%	39.7%	-
PHF	0.945	0.575	0.917	0.955	-	0.955	0.932
Lights	1354	65	1419	923	0	923	2342
% Lights	95.6%	94.2%	95.5%	94.4%	0%	94.4%	95.0%
Articulated Trucks	27	0	27	20	0	20	47
% Articulated Trucks	1.9%	0%	1.8%	2.0%	0%	2.0%	1.9%
Buses and Single-Unit Trucks	36	4	40	35	0	35	75
% Buses and Single-Unit Trucks	2.5%	5.8%	2.7%	3.6%	0%	3.6%	3.0%

*T: Thru, U: U-Turn

WB M-59 (Highland Road) and EB to WB crossov... - TMC
Thu Sep 30, 2021
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877566, Location: 42.648859, -83.535424

Item A.



WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877566, Location: 42.648859, -83.535424



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int
	T	U	App	T	U	App	
2021-09-30 4:45PM	348	14	362	466	0	466	828
5:00PM	416	9	425	478	0	478	903
5:15PM	396	20	416	490	0	490	906
5:30PM	377	14	391	499	0	499	890
Total	1537	57	1594	1933	0	1933	3527
% Approach	96.4%	3.6%	-	100%	0%	-	-
% Total	43.6%	1.6%	45.2%	54.8%	0%	54.8%	-
PHF	0.924	0.713	0.938	0.968	-	0.968	0.973
Lights	1506	54	1560	1897	0	1897	3457
% Lights	98.0%	94.7%	97.9%	98.1%	0%	98.1%	98.0%
Articulated Trucks	11	1	12	16	0	16	28
% Articulated Trucks	0.7%	1.8%	0.8%	0.8%	0%	0.8%	0.8%
Buses and Single-Unit Trucks	20	2	22	20	0	20	42
% Buses and Single-Unit Trucks	1.3%	3.5%	1.4%	1.0%	0%	1.0%	1.2%

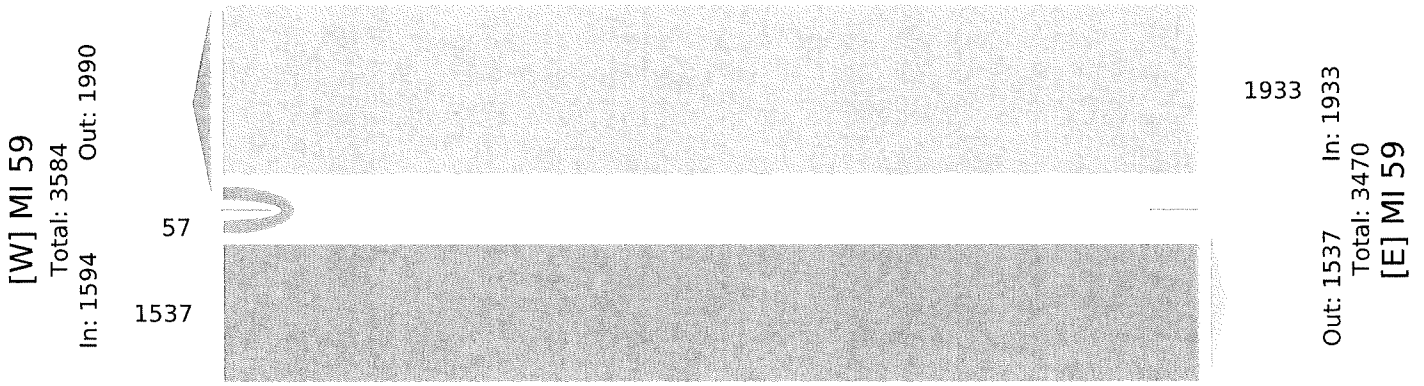
*T: Thru, U: U-Turn

WB M-59 (Highland Road) and EB to WB crossov... - TMC
Thu Sep 30, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877566, Location: 42.648859, -83.535424



Item A.

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877564, Location: 42.64915, -83.540201



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

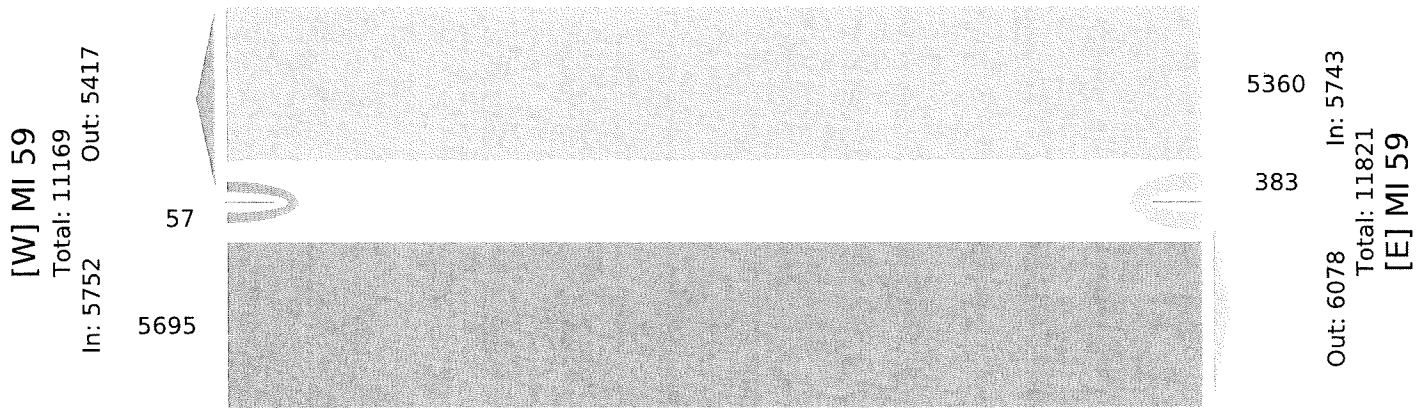
Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int
	T	U	App	T	U	App	
2021-09-30 7:00AM	339	1	340	175	10	185	525
7:15AM	339	2	341	185	13	198	539
7:30AM	353	2	355	230	22	252	607
7:45AM	407	5	412	257	15	272	684
Hourly Total	1438	10	1448	847	60	907	2355
8:00AM	344	3	347	243	13	256	603
8:15AM	340	2	342	246	13	259	601
8:30AM	309	4	313	233	9	242	555
8:45AM	341	3	344	220	16	236	580
Hourly Total	1334	12	1346	942	51	993	2339
4:00PM	322	2	324	401	25	426	750
4:15PM	378	2	380	437	40	477	857
4:30PM	370	8	378	469	23	492	870
4:45PM	368	3	371	458	27	485	856
Hourly Total	1438	15	1453	1765	115	1880	3333
5:00PM	387	4	391	438	42	480	871
5:15PM	368	9	377	459	40	499	876
5:30PM	380	3	383	463	34	497	880
5:45PM	350	4	354	446	41	487	841
Hourly Total	1485	20	1505	1806	157	1963	3468
Total	5695	57	5752	5360	383	5743	11495
% Approach	99.0%	1.0%	-	93.3%	6.7%	-	-
% Total	49.5%	0.5%	50.0%	46.6%	3.3%	50.0%	-
Lights	5541	53	5594	5183	373	5556	11150
% Lights	97.3%	93.0%	97.3%	96.7%	97.4%	96.7%	97.0%
Articulated Trucks	64	0	64	46	0	46	110
% Articulated Trucks	1.1%	0%	1.1%	0.9%	0%	0.8%	1.0%
Buses and Single-Unit Trucks	90	4	94	131	10	141	235
% Buses and Single-Unit Trucks	1.6%	7.0%	1.6%	2.4%	2.6%	2.5%	2.0%

*T: Thru, U: U-Turn

WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877564, Location: 42.64915, -83.540201

GHA GEWALT HAMILTON
 ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Item A.



WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877564, Location: 42.64915, -83.540201



GEWALT HAMILTON ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

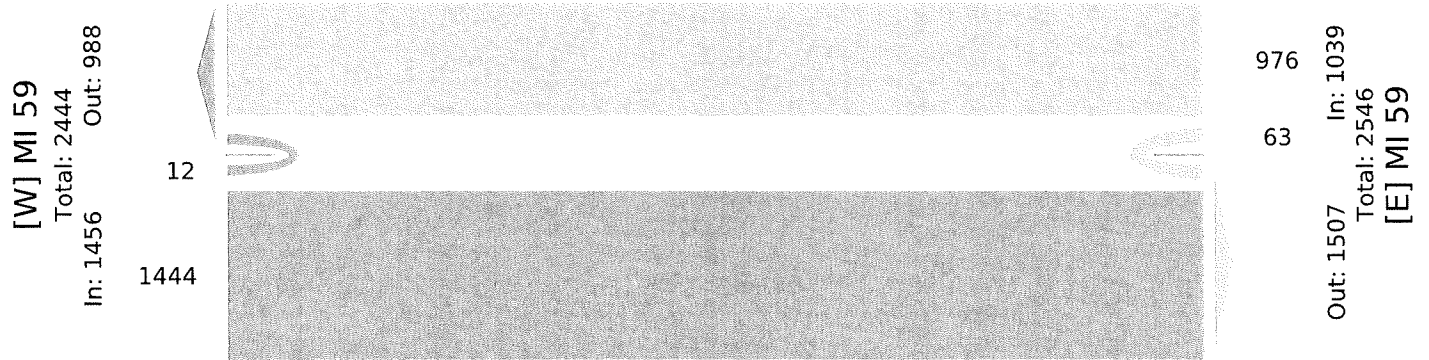
Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int	
	T	U	App	T	U	App		
Time								
	2021-09-30 7:30AM	353	2	355	230	22	252	607
	7:45AM	407	5	412	257	15	272	684
	8:00AM	344	3	347	243	13	256	603
	8:15AM	340	2	342	246	13	259	601
	Total	1444	12	1456	976	63	1039	2495
	% Approach	99.2%	0.8%	-	93.9%	6.1%	-	-
	% Total	57.9%	0.5%	58.4%	39.1%	2.5%	41.6%	-
	PHF	0.887	0.600	0.883	0.949	0.716	0.955	0.912
	Lights	1392	11	1403	927	59	986	2389
	% Lights	96.4%	91.7%	96.4%	95.0%	93.7%	94.9%	95.8%
	Articulated Trucks	27	0	27	11	0	11	38
	% Articulated Trucks	1.9%	0%	1.9%	1.1%	0%	1.1%	1.5%
	Buses and Single-Unit Trucks	25	1	26	38	4	42	68
	% Buses and Single-Unit Trucks	1.7%	8.3%	1.8%	3.9%	6.3%	4.0%	2.7%

*T: Thru, U: U-Turn

WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877564, Location: 42.64915, -83.540201

GHA GEWALT HAMILTON
 ASSOCIATES, INC.
 Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Item A.



WB M-59 (Highland Road) and EB to WB crossov... - TMC
 Thu Sep 30, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 877564, Location: 42.64915, -83.540201



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	MI 59 Eastbound			MI 59 Westbound			Int	
	T	U	App	T	U	App		
Time								
	2021-09-30 4:45PM	368	3	371	458	27	485	856
	5:00PM	387	4	391	438	42	480	871
	5:15PM	368	9	377	459	40	499	876
	5:30PM	380	3	383	463	34	497	880
	Total	1503	19	1522	1818	143	1961	3483
	% Approach	98.8%	1.2%	-	92.7%	7.3%	-	-
	% Total	43.2%	0.5%	43.7%	52.2%	4.1%	56.3%	-
	PHF	0.971	0.528	0.973	0.982	0.851	0.982	0.989
	Lights	1472	17	1489	1781	141	1922	3411
	% Lights	97.9%	89.5%	97.8%	98.0%	98.6%	98.0%	97.9%
	Articulated Trucks	12	0	12	14	0	14	26
	% Articulated Trucks	0.8%	0%	0.8%	0.8%	0%	0.7%	0.7%
	Buses and Single-Unit Trucks	19	2	21	23	2	25	46
	% Buses and Single-Unit Trucks	1.3%	10.5%	1.4%	1.3%	1.4%	1.3%	1.3%

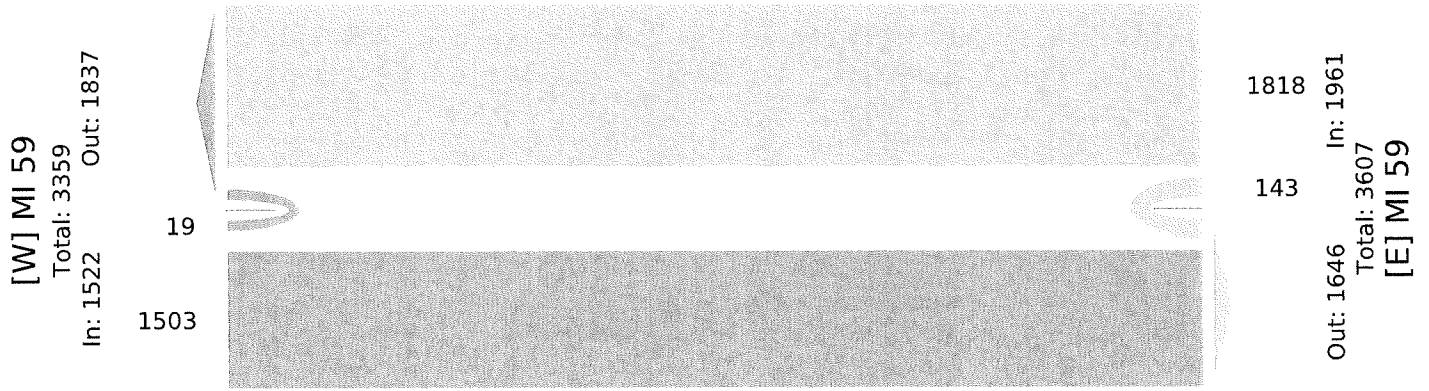
*T: Thru, U: U-Turn

WB M-59 (Highland Road) and EB to WB crossov... - TMC
Thu Sep 30, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 877564, Location: 42.64915, -83.540201



Item A.

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



LOS OUTPUT REPORTS

HCM 6th TWSC
1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Existing Condition 2021
AM Peak Hour

Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	978	69	0
Future Vol, veh/h	0	0	0	978	69	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	95	92	92
Heavy Vehicles, %	2	2	2	6	5	5
Mvmt Flow	0	0	0	1029	75	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	515
Stage 1	-	0
Stage 2	-	515
Critical Hdwy	-	6.9
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	5.9
Follow-up Hdwy	-	3.55
Pot Cap-1 Maneuver	0	482
Stage 1	0	-
Stage 2	0	556
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	482
Mov Cap-2 Maneuver	-	482
Stage 1	-	-
Stage 2	-	556

Approach	WB	NB
HCM Control Delay, s	0	13.8
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	482	-
HCM Lane V/C Ratio	0.156	-
HCM Control Delay (s)	13.8	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0.5	-

HCM 6th TWSC
2: Le Grand Court & M-59 (Highland Rd)

Existing Condition 2021
AM Peak Hour

Intersection						
Int Delay, s/veh	2.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑				↑
Traffic Vol, veh/h	1459	49	0	0	0	126
Future Vol, veh/h	1459	49	0	0	0	126
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	79	79
Heavy Vehicles, %	4	4	2	2	3	3
Mvmt Flow	1603	54	0	0	0	159

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	NB
HCM Control Delay, s	0	26.3
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	325	-	-
HCM Lane V/C Ratio	0.491	-	-
HCM Control Delay (s)	26.3	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	2.6	-	-

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Existing Condition 2021
AM Peak Hour

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	991	56	0	51
Future Vol, veh/h	0	0	991	56	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	93	93	60	60
Heavy Vehicles, %	2	2	8	8	2	2
Mvmt Flow	0	0	1066	60	0	85

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	0
Stage 1	-	0
Stage 2	-	0
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	SB
HCM Control Delay, s	0	13.9
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	491
HCM Lane V/C Ratio	-	-	0.173
HCM Control Delay (s)	-	-	13.9
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.6

HCM 6th TWSC
4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Existing Condition 2021
AM Peak Hour

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑				↘	
Traffic Vol, veh/h	0	1444	0	0	64	0
Future Vol, veh/h	0	1444	0	0	64	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	89	92	92	95	92
Heavy Vehicles, %	2	5	2	2	5	2
Mvmt Flow	0	1622	0	0	67	0

Major/Minor	Major1	Minor2
Conflicting Flow All	-	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	0	-
Stage 1	0	-
Stage 2	0	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	SB
HCM Control Delay, s	0	19.7
HCM LOS		C

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	311
HCM Lane V/C Ratio	-	0.217
HCM Control Delay (s)	-	19.7
HCM Lane LOS	-	C
HCM 95th %tile Q(veh)	-	0.8

HCM 6th TWSC
5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Existing Condition 2021
AM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	978	12	0
Future Vol, veh/h	0	0	0	978	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	88	88
Heavy Vehicles, %	2	2	5	5	4	4
Mvmt Flow	0	0	0	1029	14	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	- 515 -
Stage 1	-	- 0 -
Stage 2	-	- 515 -
Critical Hdwy	-	- 6.88 -
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 5.88 -
Follow-up Hdwy	-	- 3.54 -
Pot Cap-1 Maneuver	0	- 484 0
Stage 1	0	- - 0
Stage 2	0	- 559 0
Platoon blocked, %		-
Mov Cap-1 Maneuver	-	- 484 -
Mov Cap-2 Maneuver	-	- 484 -
Stage 1	-	- - -
Stage 2	-	- 559 -

Approach	WB	NB
HCM Control Delay, s	0	12.7
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	484	-
HCM Lane V/C Ratio	0.028	-
HCM Control Delay (s)	12.7	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0.1	-

HCM 6th TWSC
6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Existing Condition 2021
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	0	1444	4	0	0	0	0	0	5	7	9	0
Future Vol, veh/h	0	1444	4	0	0	0	0	0	5	7	9	0
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	-	-	280	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	92	92	92	63	63	63	92	92	92
Heavy Vehicles, %	5	5	5	2	2	2	0	0	0	2	2	2
Mvmt Flow	0	1604	4	0	0	0	0	0	8	8	10	0

Major/Minor

	Major1			Minor1			Minor2				
Conflicting Flow All	-	0	0	-	-	-	802	802	1608	-	
Stage 1	-	-	-	-	-	-	-	0	0	-	
Stage 2	-	-	-	-	-	-	-	802	1608	-	
Critical Hdwy	-	-	-	-	-	-	6.9	7.54	6.54	-	
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-	
Follow-up Hdwy	-	-	-	-	-	-	3.3	3.52	4.02	-	
Pot Cap-1 Maneuver	0	-	-	-	-	0	0	331	275	104	0
Stage 1	0	-	-	-	-	0	0	-	-	-	0
Stage 2	0	-	-	-	-	0	0	-	344	162	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	331	268	104	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	268	104	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	336	162	-

Approach

	EB	NB	SB
HCM Control Delay, s	0	16.1	33.9
HCM LOS		C	D

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	331	-	-	142
HCM Lane V/C Ratio	0.024	-	-	0.122
HCM Control Delay (s)	16.1	-	-	33.9
HCM Lane LOS	C	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	0.4

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	82
Average Queue (ft)	34
95th Queue (ft)	63
Link Distance (ft)	41
Upstream Blk Time (%)	4
Queuing Penalty (veh)	3
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	NB
Directions Served	R
Maximum Queue (ft)	183
Average Queue (ft)	59
95th Queue (ft)	134
Link Distance (ft)	269
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	60
Average Queue (ft)	23
95th Queue (ft)	48
Link Distance (ft)	449
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Existing Condition 2021

AM Peak Hour

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	SB
Directions Served	L
Maximum Queue (ft)	76
Average Queue (ft)	35
95th Queue (ft)	62
Link Distance (ft)	30
Upstream Blk Time (%)	19
Queuing Penalty (veh)	12
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	39
Average Queue (ft)	9
95th Queue (ft)	32
Link Distance (ft)	48
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	28	40
Average Queue (ft)	3	13
95th Queue (ft)	18	39
Link Distance (ft)	507	68
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report

Existing Condition 2021

AM Peak Hour

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

Movement	EB
Directions Served	L
Maximum Queue (ft)	4
Average Queue (ft)	0
95th Queue (ft)	3
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	5
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

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)

Intersection: 600: EB Crossover & M-59 (Highland Rd)

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)

Zone Summary

Zone wide Queuing Penalty: 15

HCM 6th TWSC
1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Existing Condition 2021
PM Peak Hour

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↑	
Traffic Vol, veh/h	0	0	0	1933	57	0
Future Vol, veh/h	0	0	0	1933	57	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	65	65	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2974	61	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	- 1487
Stage 1	-	- 0
Stage 2	-	- 1487
Critical Hdwy	-	- 6.84
Critical Hdwy Stg 1	-	- -
Critical Hdwy Stg 2	-	- 5.84
Follow-up Hdwy	-	- 3.52
Pot Cap-1 Maneuver	0	- 115 0
Stage 1	0	- - 0
Stage 2	0	- 174 0
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 115 -
Mov Cap-2 Maneuver	-	- 115 -
Stage 1	-	- - -
Stage 2	-	- 174 -

Approach	WB	NB
HCM Control Delay, s	0	66.8
HCM LOS		F

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	115	-
HCM Lane V/C Ratio	0.527	-
HCM Control Delay (s)	66.8	-
HCM Lane LOS	F	-
HCM 95th %tile Q(veh)	2.5	-

HCM 6th TWSC
2: Le Grand Court & M-59 (Highland Rd)

Existing Condition 2021
PM Peak Hour

Intersection						
Int Delay, s/veh	1.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑				↑
Traffic Vol, veh/h	1505	141	0	0	0	107
Future Vol, veh/h	1505	141	0	0	0	107
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	79	74
Heavy Vehicles, %	2	2	2	2	3	4
Mvmt Flow	1584	148	0	0	0	145

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	NB
HCM Control Delay, s	0	24.4
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	328	-	-
HCM Lane V/C Ratio	0.441	-	-
HCM Control Delay (s)	24.4	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	2.2	-	-

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Existing Condition 2021
PM Peak Hour

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	1967	23	0	57
Future Vol, veh/h	0	0	1967	23	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	95	95	71	71
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	0	0	2071	24	0	80

Major/Minor

	Major2	Minor2
Conflicting Flow All	-	0 - 1036
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	-	0 228
Stage 1	-	0 -
Stage 2	-	0 -
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 228
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach

	WB	SB
HCM Control Delay, s	0	29.1
HCM LOS		D

Minor Lane/Major Mvmt

	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	228
HCM Lane V/C Ratio	-	-	0.352
HCM Control Delay (s)	-	-	29.1
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.5

HCM 6th TWSC
 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Existing Condition 2021
 PM Peak Hour

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↘	
Traffic Vol, veh/h	0	1503	0	0	143	0
Future Vol, veh/h	0	1503	0	0	143	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	95	92	92	95	92
Heavy Vehicles, %	2	2	2	2	3	2
Mvmt Flow	0	1582	0	0	151	0

Major/Minor	Major1	Minor2
Conflicting Flow All	- 0	791 -
Stage 1	- -	0 -
Stage 2	- -	791 -
Critical Hdwy	- -	6.86 -
Critical Hdwy Stg 1	- -	- -
Critical Hdwy Stg 2	- -	5.86 -
Follow-up Hdwy	- -	3.53 -
Pot Cap-1 Maneuver	0 -	325 0
Stage 1	0 -	- 0
Stage 2	0 -	405 0
Platoon blocked, %	-	
Mov Cap-1 Maneuver	- -	325 -
Mov Cap-2 Maneuver	- -	325 -
Stage 1	- -	- -
Stage 2	- -	405 -

Approach	EB	SB
HCM Control Delay, s	0	25.3
HCM LOS		D

Minor Lane/Major Mvmt	EBT SBLn1
Capacity (veh/h)	- 325
HCM Lane V/C Ratio	- 0.463
HCM Control Delay (s)	- 25.3
HCM Lane LOS	- D
HCM 95th %tile Q(veh)	- 2.3

HCM 6th TWSC
5: EB to WB Crossover West of Hill & M-59 (Highland Rd)

Existing Condition 2021
PM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	1881	19	0
Future Vol, veh/h	0	0	0	1881	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	1980	20	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	990
Stage 1	-	0
Stage 2	-	990
Critical Hdwy	-	6.84
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	5.84
Follow-up Hdwy	-	3.52
Pot Cap-1 Maneuver	0	243
Stage 1	0	-
Stage 2	0	320
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	243
Mov Cap-2 Maneuver	-	243
Stage 1	-	-
Stage 2	-	320

Approach	WB	NE
HCM Control Delay, s	0	21.1
HCM LOS		C

Minor Lane/Major Mvmt	NELn1	WBT
Capacity (veh/h)	243	-
HCM Lane V/C Ratio	0.082	-
HCM Control Delay (s)	21.1	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.3	-

HCM 6th TWSC
6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Existing Condition 2021
PM 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	0	1479	9	0	0	0	0	0	23	20	13	0
Future Vol, veh/h	0	1479	9	0	0	0	0	0	23	20	13	0
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	-	-	280	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	10849	10592	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	95	95	92	92	92	63	63	60	95	95	92
Heavy Vehicles, %	2	2	2	2	2	2	0	0	0	2	2	2
Mvmt Flow	0	1557	9	0	0	0	0	0	38	21	14	0

Major/Minor	Major1			Minor1			Minor2			
Conflicting Flow All	-	0	0	-	-	-	779	779	1566	-
Stage 1	-	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	-	779	1566	-
Critical Hdwy	-	-	-	-	-	-	6.9	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-	-	-	-	3.3	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-	0	0	0	343	286	110	0
Stage 1	0	-	-	0	0	0	-	-	-	0
Stage 2	0	-	-	0	0	0	-	355	170	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-	343	254	110	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	254	110	-
Stage 1	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	315	170	-

Approach	EB	NB	SB
HCM Control Delay, s	0	16.8	31.9
HCM LOS		C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	343	-	-	168
HCM Lane V/C Ratio	0.112	-	-	0.207
HCM Control Delay (s)	16.8	-	-	31.9
HCM Lane LOS	C	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	0.7

Queuing and Blocking Report

Existing Condition 2021

PM Peak Hour

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	WB	NB
Directions Served	T	L
Maximum Queue (ft)	240	102
Average Queue (ft)	8	50
95th Queue (ft)	172	97
Link Distance (ft)	2280	46
Upstream Blk Time (%)		26
Queuing Penalty (veh)		15
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	EB	EB	EB	NB
Directions Served	T	T	R	R
Maximum Queue (ft)	37	49	29	129
Average Queue (ft)	2	2	1	46
95th Queue (ft)	30	38	21	98
Link Distance (ft)	605	605		269
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	109
Average Queue (ft)	35
95th Queue (ft)	76
Link Distance (ft)	931
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Existing Condition 2021

PM Peak Hour

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	SB
Directions Served	L
Maximum Queue (ft)	105
Average Queue (ft)	64
95th Queue (ft)	105
Link Distance (ft)	41
Upstream Blk Time (%)	27
Queuing Penalty (veh)	39
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	NE
Directions Served	L
Maximum Queue (ft)	32
Average Queue (ft)	16
95th Queue (ft)	40
Link Distance (ft)	31
Upstream Blk Time (%)	11
Queuing Penalty (veh)	2
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	49	57
Average Queue (ft)	17	22
95th Queue (ft)	42	51
Link Distance (ft)	507	77
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report

Existing Condition 2021

PM Peak Hour

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

Movement	EB	EB	EB
Directions Served	L	T	T
Maximum Queue (ft)	150	237	248
Average Queue (ft)	21	21	22
95th Queue (ft)	111	157	168
Link Distance (ft)		454	454
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		1	2
Storage Bay Dist (ft)	250		
Storage Blk Time (%)	1	2	
Queuing Penalty (veh)	7	1	

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	72
Average Queue (ft)	8
95th Queue (ft)	43
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

Movement	EB
Directions Served	L
Maximum Queue (ft)	22
Average Queue (ft)	3
95th Queue (ft)	16
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 600: EB Crossover & M-59 (Highland Rd)

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)	

Zone Summary

Zone wide Queuing Penalty: 68

HCM 6th TWSC
1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Background Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	1008	71	0
Future Vol, veh/h	0	0	0	1008	71	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	95	92	92
Heavy Vehicles, %	2	2	2	6	5	5
Mvmt Flow	0	0	0	1061	77	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	531
Stage 1	-	0
Stage 2	-	531
Critical Hdwy	-	6.9
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	5.9
Follow-up Hdwy	-	3.55
Pot Cap-1 Maneuver	0	471
Stage 1	0	-
Stage 2	0	546
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	471
Mov Cap-2 Maneuver	-	471
Stage 1	-	-
Stage 2	-	546

Approach	WB	NB
HCM Control Delay, s	0	14.1
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	471	-
HCM Lane V/C Ratio	0.164	-
HCM Control Delay (s)	14.1	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0.6	-

HCM 6th TWSC
2: Le Grand Court & M-59 (Highland Rd)

Background Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	2.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑				↑
Traffic Vol, veh/h	1503	51	0	0	0	130
Future Vol, veh/h	1503	51	0	0	0	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	79	79
Heavy Vehicles, %	4	4	2	2	3	3
Mvmt Flow	1652	56	0	0	0	165

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	NB
HCM Control Delay, s	0	28.6
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	313	-	-
HCM Lane V/C Ratio	0.526	-	-
HCM Control Delay (s)	28.6	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	2.9	-	-

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Background Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	1021	58	0	53
Future Vol, veh/h	0	0	1021	58	0	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	93	93	60	60
Heavy Vehicles, %	2	2	8	8	2	2
Mvmt Flow	0	0	1098	62	0	88

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	3.32
Pot Cap-1 Maneuver	-	0
Stage 1	-	0
Stage 2	-	0
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	480
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	SB
HCM Control Delay, s	0	14.2
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	480
HCM Lane V/C Ratio	-	-	0.184
HCM Control Delay (s)	-	-	14.2
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.7

HCM 6th TWSC
4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Background Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑				↘	
Traffic Vol, veh/h	0	1488	0	0	66	0
Future Vol, veh/h	0	1488	0	0	66	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	89	92	92	95	92
Heavy Vehicles, %	2	5	2	2	5	2
Mvmt Flow	0	1672	0	0	69	0

Major/Minor	Major1	Minor2
Conflicting Flow All	-	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	0	-
Stage 1	0	-
Stage 2	0	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	SB
HCM Control Delay, s	0	20.6
HCM LOS		C

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	300
HCM Lane V/C Ratio	-	0.232
HCM Control Delay (s)	-	20.6
HCM Lane LOS	-	C
HCM 95th %tile Q(veh)	-	0.9

HCM 6th TWSC
5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Background Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	1008	12	0
Future Vol, veh/h	0	0	0	1008	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	88	88
Heavy Vehicles, %	2	2	5	5	4	4
Mvmt Flow	0	0	0	1061	14	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	531
Stage 1	-	0
Stage 2	-	531
Critical Hdwy	-	6.88
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	5.88
Follow-up Hdwy	-	3.54
Pot Cap-1 Maneuver	0	473
Stage 1	0	-
Stage 2	0	548
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	473
Mov Cap-2 Maneuver	-	473
Stage 1	-	-
Stage 2	-	548

Approach	WB	NB
HCM Control Delay, s	0	12.8
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	473	-
HCM Lane V/C Ratio	0.029	-
HCM Control Delay (s)	12.8	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0.1	-

HCM 6th TWSC
6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Background Condition 2027
AM Peak Hour

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	0	1488	4	0	0	0	0	0	5	7	9	0
Future Vol, veh/h	0	1488	4	0	0	0	0	0	5	7	9	0
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	-	-	280	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	92	92	92	63	63	63	92	92	92
Heavy Vehicles, %	5	5	5	2	2	2	0	0	0	2	2	2
Mvmt Flow	0	1653	4	0	0	0	0	0	8	8	10	0

Major/Minor	Major1			Minor1		Minor2		
Conflicting Flow All	-	0	0	-	-	827	827	1657
Stage 1	-	-	-	-	-	-	0	0
Stage 2	-	-	-	-	-	-	827	1657
Critical Hdwy	-	-	-	-	-	6.9	7.54	6.54
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54
Follow-up Hdwy	-	-	-	-	-	3.3	3.52	4.02
Pot Cap-1 Maneuver	0	-	-	0	0	319	264	97
Stage 1	0	-	-	0	0	-	-	0
Stage 2	0	-	-	0	0	-	332	154
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	319	257	97
Mov Cap-2 Maneuver	-	-	-	-	-	-	257	97
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	324	154

Approach	EB	NB	SB
HCM Control Delay, s	0	16.6	36.1
HCM LOS		C	E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	319	-	-	133
HCM Lane V/C Ratio	0.025	-	-	0.131
HCM Control Delay (s)	16.6	-	-	36.1
HCM Lane LOS	C	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	0.4

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	74
Average Queue (ft)	34
95th Queue (ft)	61
Link Distance (ft)	41
Upstream Blk Time (%)	4
Queuing Penalty (veh)	3
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	NB
Directions Served	R
Maximum Queue (ft)	139
Average Queue (ft)	50
95th Queue (ft)	103
Link Distance (ft)	269
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	52
Average Queue (ft)	20
95th Queue (ft)	43
Link Distance (ft)	449
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Background Condition 2027

AM Peak Hour

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	EB	SB
Directions Served	T	L
Maximum Queue (ft)	12	81
Average Queue (ft)	0	36
95th Queue (ft)	9	68
Link Distance (ft)	132	30
Upstream Blk Time (%)		20
Queuing Penalty (veh)		13
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	36
Average Queue (ft)	9
95th Queue (ft)	32
Link Distance (ft)	48
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	28	47
Average Queue (ft)	4	13
95th Queue (ft)	20	40
Link Distance (ft)	507	68
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

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)

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	24
Average Queue (ft)	1
95th Queue (ft)	15
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

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)

Queuing and Blocking Report

Background Condition 2027
AM Peak Hour

Intersection: 600: EB Crossover & M-59 (Highland Rd)

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)

Zone Summary

Zone wide Queuing Penalty: 16

HCM 6th TWSC
1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

ROWE Professtional Services Company
PM Peak Hour

Intersection						
Int Delay, s/veh	1.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↑	
Traffic Vol, veh/h	0	0	0	1992	59	0
Future Vol, veh/h	0	0	0	1992	59	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	65	65	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	3065	63	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	- 1533
Stage 1	-	- 0
Stage 2	-	- 1533
Critical Hdwy	-	- 6.84
Critical Hdwy Stg 1	-	- -
Critical Hdwy Stg 2	-	- 5.84
Follow-up Hdwy	-	- 3.52
Pot Cap-1 Maneuver	0	- 107
Stage 1	0	- -
Stage 2	0	- 164
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 107
Mov Cap-2 Maneuver	-	- 107
Stage 1	-	- -
Stage 2	-	- 164

Approach	WB	NB
HCM Control Delay, s	0	78
HCM LOS		F

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	107	-
HCM Lane V/C Ratio	0.587	-
HCM Control Delay (s)	78	-
HCM Lane LOS	F	-
HCM 95th %tile Q(veh)	2.8	-

HCM 6th TWSC
2: Le Grand Court & M-59 (Highland Rd)

ROWE Professional Services Company
PM Peak Hour

Intersection

Int Delay, s/veh 2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑				↑
Traffic Vol, veh/h	1551	145	0	0	0	110
Future Vol, veh/h	1551	145	0	0	0	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	79	74
Heavy Vehicles, %	2	2	2	2	3	4
Mvmt Flow	1633	153	0	0	0	149

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	NB
HCM Control Delay, s	0	26.2
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	315	-	-
HCM Lane V/C Ratio	0.472	-	-
HCM Control Delay (s)	26.2	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	2.4	-	-

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

ROWE Professional Services Company
PM Peak Hour

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	2027	24	0	58
Future Vol, veh/h	0	0	2027	24	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	95	95	71	71
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	0	0	2134	25	0	82

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0 - 1067
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	-	0 218
Stage 1	-	0 -
Stage 2	-	0 -
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 218
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	SB
HCM Control Delay, s	0	31.1
HCM LOS		D

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	218
HCM Lane V/C Ratio	-	-	0.375
HCM Control Delay (s)	-	-	31.1
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.6

HCM 6th TWSC

ROWE Profesional Services Company

4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

PM Peak Hour

Intersection

Int Delay, s/veh 2.4

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations		↑↑			↘	
Traffic Vol, veh/h	0	1549	0	0	147	0
Future Vol, veh/h	0	1549	0	0	147	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	95	92	92	95	92
Heavy Vehicles, %	2	2	2	2	3	2
Mvmt Flow	0	1631	0	0	155	0

Major/Minor Major1 Minor2

Conflicting Flow All	-	0	816	-
Stage 1	-	-	0	-
Stage 2	-	-	816	-
Critical Hdwy	-	-	6.86	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.86	-
Follow-up Hdwy	-	-	3.53	-
Pot Cap-1 Maneuver	0	-	313	0
Stage 1	0	-	-	0
Stage 2	0	-	393	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	313	-
Mov Cap-2 Maneuver	-	-	313	-
Stage 1	-	-	-	-
Stage 2	-	-	393	-

Approach EB SB

HCM Control Delay, s	0	27.2
HCM LOS		D

Minor Lane/Major Mvmt EBT SBLn1

Capacity (veh/h)	-	313
HCM Lane V/C Ratio	-	0.494
HCM Control Delay (s)	-	27.2
HCM Lane LOS	-	D
HCM 95th %tile Q(veh)	-	2.6

HCM 6th TWSC
5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

ROWE Professtional Services Company
PM Peak Hour

Intersection

Int Delay, s/veh 0.2

Movement EBT EBR WBL WBT NEL NER

Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	1938	20	0
Future Vol, veh/h	0	0	0	1938	20	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2040	21	0

Major/Minor Major2 Minor1

Conflicting Flow All	-	-	1020	-
Stage 1	-	-	0	-
Stage 2	-	-	1020	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	233	0
Stage 1	0	-	-	0
Stage 2	0	-	309	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	233	-
Mov Cap-2 Maneuver	-	-	233	-
Stage 1	-	-	-	-
Stage 2	-	-	309	-

Approach WB NE

HCM Control Delay, s	0	22
HCM LOS		C

Minor Lane/Major Mvmt NELn1 WBT

Capacity (veh/h)	233	-
HCM Lane V/C Ratio	0.09	-
HCM Control Delay (s)	22	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	0.3	-

HCM 6th TWSC
6: Haven Rd/EB Crossover & M-59 (Highland Rd)

ROWE Professional Services Company
PM 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	0	1524	9	0	0	0	0	0	24	21	13	0
Future Vol, veh/h	0	1524	9	0	0	0	0	0	24	21	13	0
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	-	-	280	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	10849	10592	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	95	95	92	92	92	63	63	60	95	95	92
Heavy Vehicles, %	2	2	2	2	2	2	0	0	0	2	2	2
Mvmt Flow	0	1604	9	0	0	0	0	0	40	22	14	0

Major/Minor	Major1			Minor1			Minor2					
Conflicting Flow All	-	0	0	-	-	-	802	802	1613	-		
Stage 1	-	-	-	-	-	-	-	0	0	-		
Stage 2	-	-	-	-	-	-	-	802	1613	-		
Critical Hdwy	-	-	-	-	-	-	6.9	7.54	6.54	-		
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-		
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-		
Follow-up Hdwy	-	-	-	-	-	-	3.3	3.52	4.02	-		
Pot Cap-1 Maneuver	0	-	-	-	-	-	0	0	331	275	103	0
Stage 1	0	-	-	-	-	-	0	0	-	-	-	0
Stage 2	0	-	-	-	-	-	0	0	-	344	161	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	331	242	103	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	242	103	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	302	161	-

Approach	EB	NB	SB
HCM Control Delay, s	0	17.4	33.9
HCM LOS		C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	331	-	-	160
HCM Lane V/C Ratio	0.121	-	-	0.224
HCM Control Delay (s)	17.4	-	-	33.9
HCM Lane LOS	C	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	0.8

Queuing and Blocking Report

Background Condition 2027

PM Peak Hour

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	WB	NB
Directions Served	T	L
Maximum Queue (ft)	239	101
Average Queue (ft)	8	57
95th Queue (ft)	171	104
Link Distance (ft)	2280	46
Upstream Blk Time (%)		35
Queuing Penalty (veh)		22
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	22	46	157
Average Queue (ft)	2	3	59
95th Queue (ft)	18	28	138
Link Distance (ft)	605	605	269
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	120
Average Queue (ft)	42
95th Queue (ft)	99
Link Distance (ft)	931
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	SB
Directions Served	L
Maximum Queue (ft)	112
Average Queue (ft)	74
95th Queue (ft)	115
Link Distance (ft)	41
Upstream Blk Time (%)	38
Queuing Penalty (veh)	57
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	WB	NE
Directions Served	T	L
Maximum Queue (ft)	8	32
Average Queue (ft)	0	16
95th Queue (ft)	6	40
Link Distance (ft)	121	31
Upstream Blk Time (%)		12
Queuing Penalty (veh)		2
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	58	61
Average Queue (ft)	18	25
95th Queue (ft)	44	55
Link Distance (ft)	507	77
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report

Background Condition 2027
PM Peak Hour**Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill**

Movement	EB	EB	EB
Directions Served	L	T	T
Maximum Queue (ft)	252	350	354
Average Queue (ft)	39	44	45
95th Queue (ft)	171	249	255
Link Distance (ft)		454	454
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		2	2
Storage Bay Dist (ft)	250		
Storage Blk Time (%)	3	5	
Queuing Penalty (veh)	23	3	

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	95
Average Queue (ft)	18
95th Queue (ft)	68
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

Movement	EB
Directions Served	L
Maximum Queue (ft)	36
Average Queue (ft)	3
95th Queue (ft)	19
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Background Condition 2027
PM Peak Hour

Intersection: 600: EB Crossover & M-59 (Highland Rd)

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)

Zone Summary

Zone wide Queuing Penalty: 111

HCM 6th TWSC
1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↑	
Traffic Vol, veh/h	0	0	0	1029	92	0
Future Vol, veh/h	0	0	0	1029	92	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	95	92	92
Heavy Vehicles, %	2	2	2	6	5	5
Mvmt Flow	0	0	0	1083	100	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	- 542
Stage 1	-	- 0
Stage 2	-	- 542
Critical Hdwy	-	- 6.9
Critical Hdwy Stg 1	-	- -
Critical Hdwy Stg 2	-	- 5.9
Follow-up Hdwy	-	- 3.55
Pot Cap-1 Maneuver	0	- 463 0
Stage 1	0	- - 0
Stage 2	0	- 539 0
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 463
Mov Cap-2 Maneuver	-	- 463
Stage 1	-	- -
Stage 2	-	- 539

Approach	WB	NB
HCM Control Delay, s	0	14.9
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	463	-
HCM Lane V/C Ratio	0.216	-
HCM Control Delay (s)	14.9	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0.8	-

HCM 6th TWSC
2: Le Grand Court & M-59 (Highland Rd)

Future Condition 2027
AM Peak Hour

Intersection

Int Delay, s/veh 2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑				↑
Traffic Vol, veh/h	1620	51	0	0	0	130
Future Vol, veh/h	1620	51	0	0	0	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	79	79
Heavy Vehicles, %	4	4	2	2	3	3
Mvmt Flow	1780	56	0	0	0	165

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	NB
HCM Control Delay, s	0	33.8
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	284	-	-
HCM Lane V/C Ratio	0.579	-	-
HCM Control Delay (s)	33.8	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	3.4	-	-

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	1028	93	0	157
Future Vol, veh/h	0	0	1028	93	0	157
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	93	93	60	60
Heavy Vehicles, %	2	2	8	8	2	2
Mvmt Flow	0	0	1105	100	0	262

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	0
Stage 1	-	0
Stage 2	-	0
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	SB
HCM Control Delay, s	0	21.3
HCM LOS		C

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	477
HCM Lane V/C Ratio	-	-	0.549
HCM Control Delay (s)	-	-	21.3
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	3.3

HCM 6th TWSC
4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↑	
Traffic Vol, veh/h	0	1541	0	0	130	0
Future Vol, veh/h	0	1541	0	0	130	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	89	92	92	95	92
Heavy Vehicles, %	2	5	2	2	5	2
Mvmt Flow	0	1731	0	0	137	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	866	-
Stage 1	-	-	0	-
Stage 2	-	-	866	-
Critical Hdwy	-	-	6.9	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.9	-
Follow-up Hdwy	-	-	3.55	-
Pot Cap-1 Maneuver	0	-	287	0
Stage 1	0	-	-	0
Stage 2	0	-	365	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	287	-
Mov Cap-2 Maneuver	-	-	287	-
Stage 1	-	-	-	-
Stage 2	-	-	365	-

Approach	EB	SB
HCM Control Delay, s	0	28.5
HCM LOS		D

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	287
HCM Lane V/C Ratio	-	0.477
HCM Control Delay (s)	-	28.5
HCM Lane LOS	-	D
HCM 95th %tile Q(veh)	-	2.4

HCM 6th TWSC
5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	1055	22	0
Future Vol, veh/h	0	0	0	1055	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	88	88
Heavy Vehicles, %	2	2	5	5	4	4
Mvmt Flow	0	0	0	1111	25	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	556
Stage 1	-	0
Stage 2	-	556
Critical Hdwy	-	6.88
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	5.88
Follow-up Hdwy	-	3.54
Pot Cap-1 Maneuver	0	456
Stage 1	0	-
Stage 2	0	532
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	456
Mov Cap-2 Maneuver	-	456
Stage 1	-	-
Stage 2	-	532

Approach	WB	NB
HCM Control Delay, s	0	13.4
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	456	-
HCM Lane V/C Ratio	0.055	-
HCM Control Delay (s)	13.4	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0.2	-

HCM 6th TWSC
6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Future Condition 2027
AM Peak Hour

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑							↑	↑	
Traffic Vol, veh/h	0	1519	4	0	0	0	0	0	5	39	9	0
Future Vol, veh/h	0	1519	4	0	0	0	0	0	5	39	9	0
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	-	-	280	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	92	92	92	63	63	63	92	92	92
Heavy Vehicles, %	5	5	5	2	2	2	0	0	0	2	2	2
Mvmt Flow	0	1688	4	0	0	0	0	0	8	42	10	0

Major/Minor	Major1			Minor1			Minor2			
Conflicting Flow All	-	0	0	-	-	-	844	844	1692	-
Stage 1	-	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	-	844	1692	-
Critical Hdwy	-	-	-	-	-	-	6.9	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-	-	-	-	3.3	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-	0	0	0	311	256	92	0
Stage 1	0	-	-	0	0	0	-	-	-	0
Stage 2	0	-	-	0	0	0	-	324	147	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-	311	249	92	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	249	92	-
Stage 1	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	316	147	-

Approach	EB	NB	SB
HCM Control Delay, s	0	16.9	31.2
HCM LOS		C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	311	-	-	189
HCM Lane V/C Ratio	0.026	-	-	0.276
HCM Control Delay (s)	16.9	-	-	31.2
HCM Lane LOS	C	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	1.1

HCM 6th TWSC
7: Hill Rd & Driveway 1

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	2.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Traffic Vol, veh/h	44	1	61	15	0	54
Future Vol, veh/h	44	1	61	15	0	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	1	66	16	0	59

Major/Minor	Minor1	Major1	Major2	Major3	Major4	Major5
Conflicting Flow All	133	74	0	0	82	0
Stage 1	74	-	-	-	-	-
Stage 2	59	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	861	988	-	-	1515	-
Stage 1	949	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	861	988	-	-	1515	-
Mov Cap-2 Maneuver	861	-	-	-	-	-
Stage 1	949	-	-	-	-	-
Stage 2	964	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	863	1515
HCM Lane V/C Ratio	-	-	0.057	-
HCM Control Delay (s)	-	-	9.4	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0

HCM 6th TWSC
8: Hill Rd & Driveway 2

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	3	56	18	73	97	1
Future Vol, veh/h	3	56	18	73	97	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	61	20	79	105	1

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	225	106	106	0	-
Stage 1	106	-	-	-	-
Stage 2	119	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	763	948	1485	-	-
Stage 1	918	-	-	-	-
Stage 2	906	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	752	948	1485	-	-
Mov Cap-2 Maneuver	752	-	-	-	-
Stage 1	905	-	-	-	-
Stage 2	906	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.1	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1485	-	936	-	-
HCM Lane V/C Ratio	0.013	-	0.069	-	-
HCM Control Delay (s)	7.5	0	9.1	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

HCM 6th TWSC
9: Hill Rd & Driveway 3

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	4	0	91	2	0	153
Future Vol, veh/h	4	0	91	2	0	153
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	0	99	2	0	166

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	266	100	0	0	101	0
Stage 1	100	-	-	-	-	-
Stage 2	166	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	723	956	-	-	1491	-
Stage 1	924	-	-	-	-	-
Stage 2	863	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	723	956	-	-	1491	-
Mov Cap-2 Maneuver	723	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	723	1491
HCM Lane V/C Ratio	-	-	0.006	-
HCM Control Delay (s)	-	-	10	0
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 6th TWSC
10: M-59 (Highland Rd) & Driveway 4

Future Condition 2027
AM Peak Hour

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑			↗
Traffic Vol, veh/h	0	0	1060	17	0	54
Future Vol, veh/h	0	0	1060	17	0	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Stop
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	1152	18	0	59

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	3.32
Pot Cap-1 Maneuver	-	0
Stage 1	-	0
Stage 2	-	0
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	460
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	SB
HCM Control Delay, s	0	14
HCM LOS		B

Minor Lane/Major Mvmt	WBT	SBLn1
Capacity (veh/h)	-	460
HCM Lane V/C Ratio	-	0.128
HCM Control Delay (s)	-	14
HCM Lane LOS	-	B
HCM 95th %tile Q(veh)	-	0.4

Queuing and Blocking Report

Future Condition 2027

AM Peak Hour

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	90
Average Queue (ft)	41
95th Queue (ft)	71
Link Distance (ft)	41
Upstream Blk Time (%)	8
Queuing Penalty (veh)	8
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	NB
Directions Served	R
Maximum Queue (ft)	215
Average Queue (ft)	73
95th Queue (ft)	170
Link Distance (ft)	269
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	136
Average Queue (ft)	44
95th Queue (ft)	96
Link Distance (ft)	924
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Future Condition 2027

AM Peak Hour

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	EB	SB
Directions Served	T	L
Maximum Queue (ft)	10	88
Average Queue (ft)	0	52
95th Queue (ft)	7	85
Link Distance (ft)	132	30
Upstream Blk Time (%)		40
Queuing Penalty (veh)		52
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	17
95th Queue (ft)	45
Link Distance (ft)	48
Upstream Blk Time (%)	1
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	32	66
Average Queue (ft)	4	29
95th Queue (ft)	21	58
Link Distance (ft)	507	68
Upstream Blk Time (%)		1
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report

Future Condition 2027

AM Peak Hour

Intersection: 7: Hill Rd & Driveway 1

Movement	WB
Directions Served	LR
Maximum Queue (ft)	51
Average Queue (ft)	26
95th Queue (ft)	49
Link Distance (ft)	575
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Hill Rd & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	63	24
Average Queue (ft)	29	2
95th Queue (ft)	50	12
Link Distance (ft)	330	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Hill Rd & Driveway 3

Movement	WB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	5
95th Queue (ft)	22
Link Distance (ft)	280
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Future Condition 2027
AM Peak Hour

Intersection: 10: M-59 (Highland Rd) & Driveway 4

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	12	5	11
Average Queue (ft)	1	0	1
95th Queue (ft)	7	5	11
Link Distance (ft)	30	30	289
Upstream Blk Time (%)	0	0	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

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)

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	4
95th Queue (ft)	25
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover West of Hill

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)

Intersection: 600: EB Crossover & M-59 (Highland Rd)

Movement

WB

Directions Served

L

Maximum Queue (ft)

10

Average Queue (ft)

0

95th Queue (ft)

8

Link Distance (ft)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (ft)

300

Storage Blk Time (%)

Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 60

HCM 6th TWSC
1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Future Condition 2027
PM Peak Hour

Intersection

Int Delay, s/veh 8.3

Movement EBT EBR WBL WBT NBL NBR

Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	2090	109	0
Future Vol, veh/h	0	0	0	2090	109	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	65	94	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	3215	116	0

Major/Minor Major2 Minor1

Conflicting Flow All	-	-	1608	-
Stage 1	-	-	0	-
Stage 2	-	-	1608	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	~ 96	0
Stage 1	0	-	-	0
Stage 2	0	-	149	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	~ 96	-
Mov Cap-2 Maneuver	-	-	~ 96	-
Stage 1	-	-	-	-
Stage 2	-	-	149	-

Approach WB NB

HCM Control Delay, s	0	239.5
HCM LOS		F

Minor Lane/Major Mvmt NBLn1 WBT

Capacity (veh/h)	96	-
HCM Lane V/C Ratio	1.208	-
HCM Control Delay (s)	239.5	-
HCM Lane LOS	F	-
HCM 95th %tile Q(veh)	8	-

Notes

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

HCM 6th TWSC
2: Le Grand Court & M-59 (Highland Rd)

Future Condition 2027
PM Peak Hour

Intersection

Int Delay, s/veh 2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑				↑
Traffic Vol, veh/h	1649	145	0	0	0	110
Future Vol, veh/h	1649	145	0	0	0	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	79	74
Heavy Vehicles, %	2	2	2	2	3	4
Mvmt Flow	1736	153	0	0	0	149

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	-
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	-
Pot Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	EB	NB
HCM Control Delay, s	0	29.4
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	292	-	-
HCM Lane V/C Ratio	0.509	-	-
HCM Control Delay (s)	29.4	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	2.7	-	-

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	5.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	2061	138	0	127
Future Vol, veh/h	0	0	2061	138	0	127
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	95	95	60	71
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	0	0	2169	145	0	179

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0 - 1085
Stage 1	-	- -
Stage 2	-	- -
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	- -
Critical Hdwy Stg 2	-	- -
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	-	0 212
Stage 1	-	0 -
Stage 2	-	0 -
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 212
Mov Cap-2 Maneuver	-	- -
Stage 1	-	- -
Stage 2	-	- -

Approach	WB	SB
HCM Control Delay, s	0	74.5
HCM LOS		F

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	212
HCM Lane V/C Ratio	-	-	0.844
HCM Control Delay (s)	-	-	74.5
HCM Lane LOS	-	-	F
HCM 95th %tile Q(veh)	-	-	6.4

HCM 6th TWSC
4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↖	
Traffic Vol, veh/h	0	1616	0	0	178	0
Future Vol, veh/h	0	1616	0	0	178	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	95	92	92	95	92
Heavy Vehicles, %	2	2	2	2	3	2
Mvmt Flow	0	1701	0	0	187	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	851	-
Stage 1	-	-	0	-
Stage 2	-	-	851	-
Critical Hdwy	-	-	6.86	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.86	-
Follow-up Hdwy	-	-	3.53	-
Pot Cap-1 Maneuver	0	-	297	0
Stage 1	0	-	-	0
Stage 2	0	-	376	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	297	-
Mov Cap-2 Maneuver	-	-	297	-
Stage 1	-	-	-	-
Stage 2	-	-	376	-

Approach	EB	SB
HCM Control Delay, s	0	35.7
HCM LOS		E

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	297
HCM Lane V/C Ratio	-	0.631
HCM Control Delay (s)	-	35.7
HCM Lane LOS	-	E
HCM 95th %tile Q(veh)	-	4

HCM 6th TWSC
5: EB to WB Crossover WEST of Hill & M-59 (Highland Rd)

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				↑↑	↘	
Traffic Vol, veh/h	0	0	0	2010	47	0
Future Vol, veh/h	0	0	0	2010	47	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	95	88
Heavy Vehicles, %	2	2	5	2	2	4
Mvmt Flow	0	0	0	2116	49	0

Major/Minor	Major2	Minor1
Conflicting Flow All	-	1058
Stage 1	-	0
Stage 2	-	1058
Critical Hdwy	-	6.84
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	5.84
Follow-up Hdwy	-	3.52
Pot Cap-1 Maneuver	0	220
Stage 1	0	-
Stage 2	0	295
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	220
Mov Cap-2 Maneuver	-	220
Stage 1	-	-
Stage 2	-	295

Approach	WB	NE
HCM Control Delay, s	0	26
HCM LOS		D

Minor Lane/Major Mvmt	NELn1	WBT
Capacity (veh/h)	220	-
HCM Lane V/C Ratio	0.225	-
HCM Control Delay (s)	26	-
HCM Lane LOS	D	-
HCM 95th %tile Q(veh)	0.8	-

HCM 6th TWSC
6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Future Condition 2027
PM Peak Hour

Intersection

Int Delay, s/veh 1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑		↑	
Traffic Vol, veh/h	0	1601	9	0	0	0	0	0	24	38	13	0
Future Vol, veh/h	0	1601	9	0	0	0	0	0	24	38	13	0
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	-	-	280	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	10849	10592	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	95	95	92	92	92	63	63	60	95	95	92
Heavy Vehicles, %	5	2	2	2	2	2	0	0	0	2	2	2
Mvmt Flow	0	1685	9	0	0	0	0	0	40	40	14	0

Major/Minor

	Major1			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	843	843	1694	-
Stage 1	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	843	1694	-
Critical Hdwy	-	-	-	-	-	6.9	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-	-	-	3.3	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-	0	0	311	257	92	0
Stage 1	0	-	-	0	0	-	-	-	0
Stage 2	0	-	-	0	0	-	325	147	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	311	224	92	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	92	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	283	147	-

Approach

	EB	NB	SB
HCM Control Delay, s	0	18.3	37.3
HCM LOS		C	E

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	SBLn1
Capacity (veh/h)	311	-	-	164
HCM Lane V/C Ratio	0.129	-	-	0.327
HCM Control Delay (s)	18.3	-	-	37.3
HCM Lane LOS	C	-	-	E
HCM 95th %tile Q(veh)	0.4	-	-	1.3

HCM 6th TWSC
7: Hill Rd & Driveway 1

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑			↑
Traffic Vol, veh/h	30	0	25	51	1	60
Future Vol, veh/h	30	0	25	51	1	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	0	27	55	1	65

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	122	55	0	0	82
Stage 1	55	-	-	-	-
Stage 2	67	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	873	1012	-	-	1515
Stage 1	968	-	-	-	-
Stage 2	956	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	872	1012	-	-	1515
Mov Cap-2 Maneuver	872	-	-	-	-
Stage 1	968	-	-	-	-
Stage 2	955	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	872	1515
HCM Lane V/C Ratio	-	-	0.037	0.001
HCM Control Delay (s)	-	-	9.3	7.4
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 6th TWSC
8: Hill Rd & Driveway 2

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	
Traffic Vol, veh/h	0	36	60	76	88	2
Future Vol, veh/h	0	36	60	76	88	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	39	65	83	96	2

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	310	97	98	0	-
Stage 1	97	-	-	-	-
Stage 2	213	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	682	959	1495	-	-
Stage 1	927	-	-	-	-
Stage 2	823	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	651	959	1495	-	-
Mov Cap-2 Maneuver	651	-	-	-	-
Stage 1	884	-	-	-	-
Stage 2	823	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	3.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1495	-	959	-	-
HCM Lane V/C Ratio	0.044	-	0.041	-	-
HCM Control Delay (s)	7.5	0	8.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

HCM 6th TWSC
9: Hill Rd & Driveway 3

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	3	0	136	2	0	124
Future Vol, veh/h	3	0	136	2	0	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	0	148	2	0	135

Major/Minor	Minor1	Major1	Major2	Major3	Major4
Conflicting Flow All	284	149	0	0	150
Stage 1	149	-	-	-	-
Stage 2	135	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	706	898	-	-	1431
Stage 1	879	-	-	-	-
Stage 2	891	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	706	898	-	-	1431
Mov Cap-2 Maneuver	706	-	-	-	-
Stage 1	879	-	-	-	-
Stage 2	891	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	706	1431
HCM Lane V/C Ratio	-	-	0.005	-
HCM Control Delay (s)	-	-	10.1	0
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 6th TWSC
10: M-59 (Highland Rd) & Driveway 4

Future Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↓			↑
Traffic Vol, veh/h	0	0	1996	61	0	36
Future Vol, veh/h	0	0	1996	61	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Stop
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	2170	66	0	39

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0 - 1085
Stage 1	-	- -
Stage 2	-	- -
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	- -
Critical Hdwy Stg 2	-	- -
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	-	0 0 212
Stage 1	-	0 0 -
Stage 2	-	0 0 -
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- - 212
Mov Cap-2 Maneuver	-	- - -
Stage 1	-	- - -
Stage 2	-	- - -

Approach	WB	SB
HCM Control Delay, s	0	25.8
HCM LOS		D

Minor Lane/Major Mvmt	WBT SBLn1
Capacity (veh/h)	- 212
HCM Lane V/C Ratio	- 0.185
HCM Control Delay (s)	- 25.8
HCM Lane LOS	- D
HCM 95th %tile Q(veh)	- 0.7

Queuing and Blocking Report

Future Condition 2027
PM Peak Hour

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	WB	WB	NB
Directions Served	T	T	L
Maximum Queue (ft)	471	707	114
Average Queue (ft)	43	50	80
95th Queue (ft)	341	387	119
Link Distance (ft)	2280	2280	46
Upstream Blk Time (%)			61
Queuing Penalty (veh)			67
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	EB	EB	EB	NB
Directions Served	T	T	R	R
Maximum Queue (ft)	554	534	120	295
Average Queue (ft)	121	120	17	140
95th Queue (ft)	515	504	94	318
Link Distance (ft)	605	605		269
Upstream Blk Time (%)	5	6		26
Queuing Penalty (veh)	49	50		0
Storage Bay Dist (ft)			100	
Storage Blk Time (%)		12		
Queuing Penalty (veh)		17		

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	WB	WB	WB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	100	98	80	471
Average Queue (ft)	29	33	15	231
95th Queue (ft)	215	222	140	612
Link Distance (ft)	452	452		924
Upstream Blk Time (%)	1	1		3
Queuing Penalty (veh)	11	11		4
Storage Bay Dist (ft)			300	
Storage Blk Time (%)		3		
Queuing Penalty (veh)		4		

Queuing and Blocking Report

Future Condition 2027

PM Peak Hour

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	144	148	123
Average Queue (ft)	26	27	84
95th Queue (ft)	126	130	117
Link Distance (ft)	157	157	41
Upstream Blk Time (%)	6	6	60
Queuing Penalty (veh)	46	46	106
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	WB	WB	NE
Directions Served	T	T	L
Maximum Queue (ft)	11	9	39
Average Queue (ft)	0	0	26
95th Queue (ft)	8	6	41
Link Distance (ft)	127	127	28
Upstream Blk Time (%)			44
Queuing Penalty (veh)			21
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	EB	EB	EB	NB	SB
Directions Served	T	T	R	R	LT
Maximum Queue (ft)	320	315	61	70	72
Average Queue (ft)	44	42	2	22	37
95th Queue (ft)	421	414	44	58	71
Link Distance (ft)	3326	3326		507	77
Upstream Blk Time (%)					4
Queuing Penalty (veh)					2
Storage Bay Dist (ft)			280		
Storage Blk Time (%)		2			
Queuing Penalty (veh)		0			

Queuing and Blocking Report

Future Condition 2027

PM Peak Hour

Intersection: 7: Hill Rd & Driveway 1

Movement	WB
Directions Served	LR
Maximum Queue (ft)	47
Average Queue (ft)	20
95th Queue (ft)	47
Link Distance (ft)	575
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Hill Rd & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	43	29
Average Queue (ft)	23	5
95th Queue (ft)	47	21
Link Distance (ft)	330	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Hill Rd & Driveway 3

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	30	49
Average Queue (ft)	2	6
95th Queue (ft)	15	57
Link Distance (ft)	280	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report

Future Condition 2027

PM Peak Hour

Intersection: 10: M-59 (Highland Rd) & Driveway 4

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	14	21	11
Average Queue (ft)	0	1	0
95th Queue (ft)	10	10	8
Link Distance (ft)	70	70	289
Upstream Blk Time (%)	0	0	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

Movement	EB	EB	EB
Directions Served	L	T	T
Maximum Queue (ft)	274	470	509
Average Queue (ft)	99	148	152
95th Queue (ft)	292	486	506
Link Distance (ft)		454	454
Upstream Blk Time (%)		10	8
Queuing Penalty (veh)		89	72
Storage Bay Dist (ft)	250		
Storage Blk Time (%)	19	17	
Queuing Penalty (veh)	160	19	

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB	WB	WB
Directions Served	L	T	T
Maximum Queue (ft)	235	288	294
Average Queue (ft)	74	65	63
95th Queue (ft)	237	332	336
Link Distance (ft)		568	568
Upstream Blk Time (%)		1	1
Queuing Penalty (veh)		14	14
Storage Bay Dist (ft)	250		
Storage Blk Time (%)	7	3	
Queuing Penalty (veh)	68	5	

Queuing and Blocking Report

Future Condition 2027

PM Peak Hour

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

Movement	EB	EB	EB
Directions Served	L	T	T
Maximum Queue (ft)	302	656	664
Average Queue (ft)	38	94	96
95th Queue (ft)	162	498	505
Link Distance (ft)		940	940
Upstream Blk Time (%)		2	2
Queuing Penalty (veh)		13	15
Storage Bay Dist (ft)	250		
Storage Blk Time (%)		7	
Queuing Penalty (veh)		3	

Intersection: 600: EB Crossover & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	31
Average Queue (ft)	3
95th Queue (ft)	20
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 907

HCM 6th Signalized Intersection Summary
 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Future Condition 2027
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑			↑				
Traffic Volume (veh/h)	0	0	0	0	1029	0	92	0	0	0	0	0
Future Volume (veh/h)	0	0	0	0	1029	0	92	0	0	0	0	0
Initial Q (Qb), veh				0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00			
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach				No			No					
Adj Sat Flow, veh/h/ln				0	1906	0	1922	1969	0			
Adj Flow Rate, veh/h				0	1083	0	100	0	0			
Peak Hour Factor				0.95	0.95	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %				0	6	0	5	2	0			
Cap, veh/h				0	2762	0	305	0	0			
Arrive On Green				0.00	0.76	0.00	0.16	0.00	0.00			
Sat Flow, veh/h				0	3813	0	1875	0	0			
Grp Volume(v), veh/h				0	1083	0	100	0	0			
Grp Sat Flow(s),veh/h/ln				0	1811	0	1875	0	0			
Q Serve(g_s), s				0.0	12.2	0.0	5.7	0.0	0.0			
Cycle Q Clear(g_c), s				0.0	12.2	0.0	5.7	0.0	0.0			
Prop In Lane				0.00		0.00	1.00		0.00			
Lane Grp Cap(c), veh/h				0	2762	0	305	0	0			
V/C Ratio(X)				0.00	0.39	0.00	0.33	0.00	0.00			
Avail Cap(c_a), veh/h				0	2762	0	305	0	0			
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)				0.00	0.96	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh				0.0	4.8	0.0	44.5	0.0	0.0			
Incr Delay (d2), s/veh				0.0	0.4	0.0	2.9	0.0	0.0			
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln				0.0	3.2	0.0	2.9	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				0.0	5.2	0.0	47.3	0.0	0.0			
LnGrp LOS				A	A	A	D	A	A			
Approach Vol, veh/h					1083			100				
Approach Delay, s/veh					5.2			47.3				
Approach LOS					A			D				
Timer - Assigned Phs						6		8				
Phs Duration (G+Y+Rc), s						96.0		24.0				
Change Period (Y+Rc), s						4.5		4.5				
Max Green Setting (Gmax), s						91.5		19.5				
Max Q Clear Time (g_c+I1), s						14.2		7.7				
Green Ext Time (p_c), s						8.5		0.3				
Intersection Summary												
HCM 6th Ctrl Delay					8.8							
HCM 6th LOS					A							

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Future Condition 2027
AM Peak Hour

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	1028	93	0	157
Future Vol, veh/h	0	0	1028	93	0	157
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	300	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	93	93	60	60
Heavy Vehicles, %	2	2	8	8	2	2
Mvmt Flow	0	0	1105	100	0	262

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0 - 553
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	-	0 477
Stage 1	-	0 -
Stage 2	-	0 -
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 477
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	SB
HCM Control Delay, s	0	21.3
HCM LOS		C

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	477
HCM Lane V/C Ratio	-	-	0.549
HCM Control Delay (s)	-	-	21.3
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	3.3

Queuing and Blocking Report

Future Condition 2027

AM Peak Hour

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	WB	WB	NB
Directions Served	T	T	LT
Maximum Queue (ft)	129	135	76
Average Queue (ft)	70	74	36
95th Queue (ft)	119	125	62
Link Distance (ft)	2237	2237	41
Upstream Blk Time (%)			5
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	NB
Directions Served	R
Maximum Queue (ft)	181
Average Queue (ft)	68
95th Queue (ft)	151
Link Distance (ft)	269
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	111
Average Queue (ft)	44
95th Queue (ft)	86
Link Distance (ft)	924
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	SB
Directions Served	L
Maximum Queue (ft)	96
Average Queue (ft)	53
95th Queue (ft)	88
Link Distance (ft)	30
Upstream Blk Time (%)	38
Queuing Penalty (veh)	50
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	NB
Directions Served	L
Maximum Queue (ft)	49
Average Queue (ft)	17
95th Queue (ft)	46
Link Distance (ft)	48
Upstream Blk Time (%)	1
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	27	72
Average Queue (ft)	3	28
95th Queue (ft)	18	60
Link Distance (ft)	507	68
Upstream Blk Time (%)		1
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Hill Rd & Driveway 1

Movement	WB
Directions Served	LR
Maximum Queue (ft)	53
Average Queue (ft)	26
95th Queue (ft)	49
Link Distance (ft)	575
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Hill Rd & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	44	15
Average Queue (ft)	28	1
95th Queue (ft)	46	10
Link Distance (ft)	330	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Hill Rd & Driveway 3

Movement	WB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	4
95th Queue (ft)	20
Link Distance (ft)	280
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: M-59 (Highland Rd) & Driveway 4

Movement	WB	WB
Directions Served	T	TR
Maximum Queue (ft)	15	4
Average Queue (ft)	1	0
95th Queue (ft)	7	4
Link Distance (ft)	30	30
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

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)

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	56
Average Queue (ft)	6
95th Queue (ft)	32
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

Movement	EB
Directions Served	L
Maximum Queue (ft)	19
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 600: EB Crossover & M-59 (Highland Rd)

Movement	WB
Directions Served	L
Maximum Queue (ft)	10
Average Queue (ft)	0
95th Queue (ft)	5
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	













Zone Summary

Zone wide Queuing Penalty: 55

HCM 6th Signalized Intersection Summary
 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Future Improved Condition 2027

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑			↔				
Traffic Volume (veh/h)	0	0	0	0	2090	0	109	0	0	0	0	0
Future Volume (veh/h)	0	0	0	0	2090	0	109	0	0	0	0	0
Initial Q (Qb), veh				0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00			
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach				No		No						
Adj Sat Flow, veh/h/ln				0	1969	0	1969	1969	0			
Adj Flow Rate, veh/h				0	3215	0	116	0	0			
Peak Hour Factor				0.95	0.65	0.92	0.94	0.92	0.92			
Percent Heavy Veh, %				0	2	0	2	2	0			
Cap, veh/h				0	3205	0	102	0	0			
Arrive On Green				0.00	0.28	0.00	0.05	0.00	0.00			
Sat Flow, veh/h				0	3938	0	1875	0	0			
Grp Volume(v), veh/h				0	3215	0	116	0	0			
Grp Sat Flow(s),veh/h/ln				0	1870	0	1875	0	0			
Q Serve(g_s), s				0.0	102.8	0.0	6.5	0.0	0.0			
Cycle Q Clear(g_c), s				0.0	102.8	0.0	6.5	0.0	0.0			
Prop In Lane				0.00		0.00	1.00		0.00			
Lane Grp Cap(c), veh/h				0	3205	0	102	0	0			
V/C Ratio(X)				0.00	1.00	0.00	1.14	0.00	0.00			
Avail Cap(c_a), veh/h				0	3205	0	102	0	0			
HCM Platoon Ratio				1.00	0.33	1.00	1.00	1.00	1.00			
Upstream Filter(I)				0.00	0.36	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh				0.0	43.0	0.0	56.8	0.0	0.0			
Incr Delay (d2), s/veh				0.0	10.3	0.0	132.6	0.0	0.0			
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(95%),veh/ln				0.0	62.3	0.0	11.5	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				0.0	53.4	0.0	189.4	0.0	0.0			
LnGrp LOS				A	F	A	F	A	A			
Approach Vol, veh/h					3215			116				
Approach Delay, s/veh					53.4			189.4				
Approach LOS					D			F				
Timer - Assigned Phs							6		8			
Phs Duration (G+Y+Rc), s							109.0		11.0			
Change Period (Y+Rc), s							6.2		4.5			
Max Green Setting (Gmax), s							102.8		6.5			
Max Q Clear Time (g_c+I1), s							104.8		8.5			
Green Ext Time (p_c), s							0.0		0.0			
Intersection Summary												
HCM 6th Ctrl Delay					58.1							
HCM 6th LOS					E							

HCM 6th TWSC
3: M-59 (Highland Rd) & Hill Rd

Future Improved Condition 2027
PM Peak Hour

Intersection						
Int Delay, s/veh	5.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↑		↑
Traffic Vol, veh/h	0	0	2061	138	0	127
Future Vol, veh/h	0	0	2061	138	0	127
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	500	-	0
Veh in Median Storage, #	-	1	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	95	95	60	71
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	0	0	2169	145	0	179

Major/Minor	Major2	Minor2
Conflicting Flow All	-	0 - 1085
Stage 1	-	- -
Stage 2	-	- -
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	- -
Critical Hdwy Stg 2	-	- -
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	-	0 212
Stage 1	-	0 -
Stage 2	-	0 -
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	- 212
Mov Cap-2 Maneuver	-	- -
Stage 1	-	- -
Stage 2	-	- -

Approach	WB	SB
HCM Control Delay, s	0	74.5
HCM LOS		F

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	212
HCM Lane V/C Ratio	-	-	0.844
HCM Control Delay (s)	-	-	74.5
HCM Lane LOS	-	-	F
HCM 95th %tile Q(veh)	-	-	6.4

Queuing and Blocking Report

Future Improved Condition 2027

PM Peak Hour

Intersection: 1: EB to WB Crossover - East of Hill & M-59 (Highland Rd)

Movement	WB	WB	NB
Directions Served	T	T	LT
Maximum Queue (ft)	932	995	113
Average Queue (ft)	98	107	68
95th Queue (ft)	464	497	110
Link Distance (ft)	2273	2273	46
Upstream Blk Time (%)			34
Queuing Penalty (veh)			39
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Le Grand Court & M-59 (Highland Rd)

Movement	NB
Directions Served	R
Maximum Queue (ft)	158
Average Queue (ft)	49
95th Queue (ft)	111
Link Distance (ft)	269
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: M-59 (Highland Rd) & Hill Rd

Movement	WB	SB
Directions Served	T	R
Maximum Queue (ft)	52	274
Average Queue (ft)	2	108
95th Queue (ft)	38	227
Link Distance (ft)	457	924
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: M-59 (Highland Rd) & WB to EB Crossover West of Hill Rd

Movement	SB
Directions Served	L
Maximum Queue (ft)	117
Average Queue (ft)	81
95th Queue (ft)	115
Link Distance (ft)	41
Upstream Blk Time (%)	47
Queuing Penalty (veh)	84
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB to WB Crossover WEst of Hill & M-59 (Highland Rd)

Movement	WB	NE
Directions Served	T	L
Maximum Queue (ft)	8	50
Average Queue (ft)	0	35
95th Queue (ft)	6	59
Link Distance (ft)	113	38
Upstream Blk Time (%)		22
Queuing Penalty (veh)		10
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Haven Rd/EB Crossover & M-59 (Highland Rd)

Movement	NB	SB
Directions Served	R	LT
Maximum Queue (ft)	50	78
Average Queue (ft)	18	33
95th Queue (ft)	43	66
Link Distance (ft)	507	77
Upstream Blk Time (%)		1
Queuing Penalty (veh)		1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Hill Rd & Driveway 1

Movement	WB
Directions Served	LR
Maximum Queue (ft)	42
Average Queue (ft)	17
95th Queue (ft)	42
Link Distance (ft)	575
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Hill Rd & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	48	30
Average Queue (ft)	21	4
95th Queue (ft)	46	21
Link Distance (ft)	330	422
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Hill Rd & Driveway 3

Movement	WB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	4
95th Queue (ft)	20
Link Distance (ft)	280
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Future Improved Condition 2027

PM Peak Hour

Intersection: 10: M-59 (Highland Rd) & Driveway 4

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	8	16	11
Average Queue (ft)	0	1	0
95th Queue (ft)	4	12	8
Link Distance (ft)	63	63	286
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 100: M-59 (Highland Rd) & EB to WB Crossover - East of Hill

Movement	EB	EB	EB
Directions Served	L	T	T
Maximum Queue (ft)	136	147	111
Average Queue (ft)	23	12	9
95th Queue (ft)	107	91	76
Link Distance (ft)		454	454
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	250		
Storage Blk Time (%)	0	0	
Queuing Penalty (veh)	4	0	

Intersection: 400: WB to EB Crossover West of Hill Rd & M-59 (Highland Rd)

Movement	WB	WB
Directions Served	L	T
Maximum Queue (ft)	126	125
Average Queue (ft)	29	4
95th Queue (ft)	91	89
Link Distance (ft)		568
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 500: M-59 (Highland Rd) & EB to WB Crossover WEst of Hill

Movement	EB
Directions Served	L
Maximum Queue (ft)	61
Average Queue (ft)	11
95th Queue (ft)	44
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 600: EB Crossover & M-59 (Highland Rd)

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)

Zone Summary

Zone wide Queuing Penalty: 137

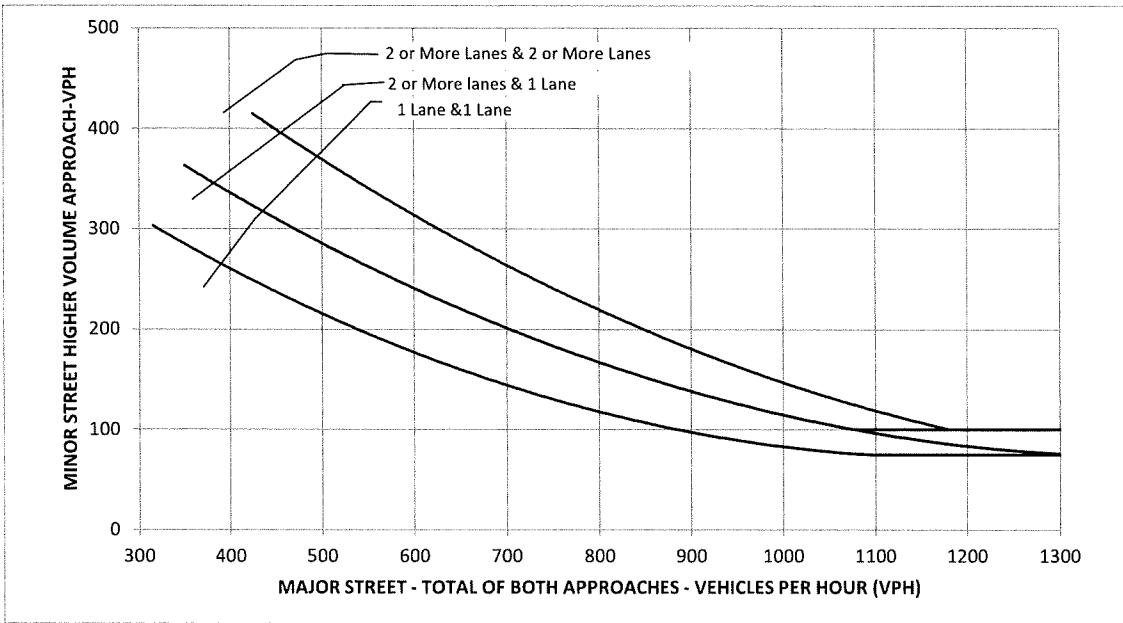
SIGNAL WARRANTS

Summary of Warrants			
Spot Number:	0		
Major Street:	M-59	Minor Street:	WB to EB Crossover
Intersection:	M-59 at WB to EB Crossover		
City/Twp:	White Lake		
Date Performed:	11/1/2021	Performed By:	HRS
Date Volumes Collected:	9/30/2021		
Warrant	Condition	Is Warrant Met	
Data Validation Error		NO	
WARRANT 1: Eight-Hour Vehicular Volume		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
WARRANT 2: Four-Hour Vehicular Volume	(70%)	NO	
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	YES	
	Condition A	NO	
	Condition B	YES	
WARRANT 4: Pedestrian Volume	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold) HAWK	NO	
	(Threshold) RRFB	NO	
WARRANT 5: School Crossing		NO	
WARRANT 6: Coordinated Signal System		NO	
WARRANT 7: Crash Experience		NO	
	Condition A	NO	
	Condition B	NO	
WARRANT 8: Roadway Network		NO	
WARRANT 9: Intersection Near a Grade Crossing		#N/A	
Issue to Be Addressed by Signalization:			
0			

**Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	0
Intersection:	M-59 @ WB to EB Crossover
Date	11/17/2021 by HRS

3	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
55	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an isolated community?
0	: What is the of the population isolated community?



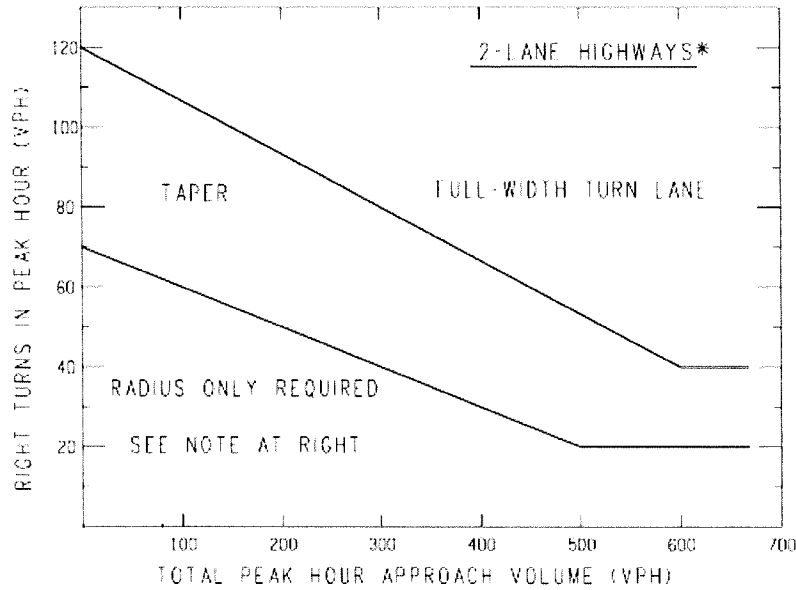
How Many Hours Are Met

2

Is Warrant (70%) Met?

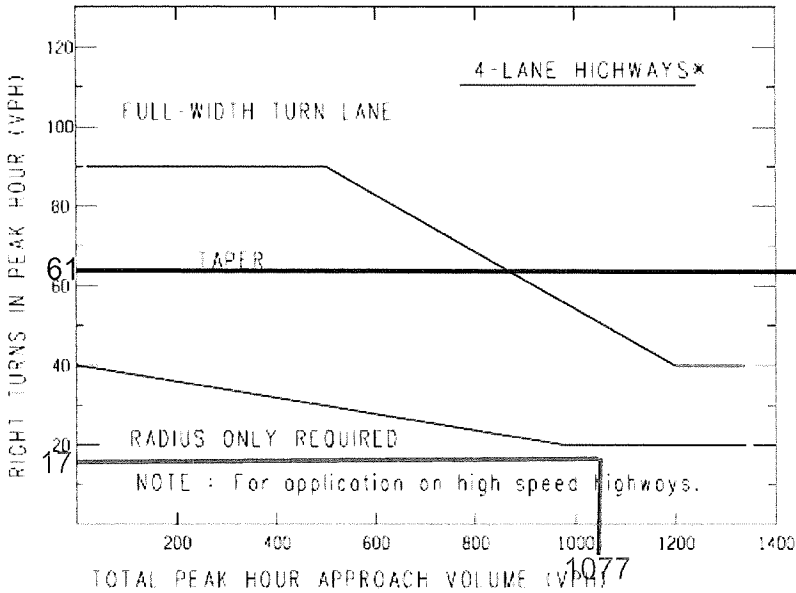
YES

TURN LANE WARRANTS



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.

Full width right turn lane warranted in PM peak hour

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.

February 9, 2022

Mr. Don Cucco
M. Shapiro Real Estate Group
31550 Northwestern Hwy, Suite 200
Farmington Hills, MI 48334

Re: Wetland Delineation Report – Hill Road & M-59 Site

Dear Mr. Cucco:

As you requested, Barr Engineering Co. (Barr) conducted a wetland delineation of the above-referenced property in March and April of 2021. The purpose of this report is to summarize the results of that work, and to provide a professional opinion as to potential jurisdiction by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

1.0 Area of Investigation Description

The Area of Investigation (AOI) includes parcel numbers 12-20-101-003 and 12-20-126-006, located on Hill Road, in White Lake Township, Oakland County, Michigan. Surrounding land uses include commercial and residential development, a school, vacant land, and a recreational ski hill. The land cover within the AOI consists of mowed agricultural fields, a stream corridor and riparian wetlands along Hill Road, and gently to steeply sloping forested topography with wetland depressions.

1.1 Desktop Review

Barr conducted a desktop review of the site to evaluate aerial imagery, topography, soil types, and mapped wetlands within the AOI prior to the wetland delineation. As part of the desktop review, Barr staff reviewed resources such as the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS; Figure 1), the National Wetlands Inventory (NWI; Figure 2), and aerial photography.

1.2 Methodology

The wetland delineation was conducted in a manner consistent with the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0, USACE 2012)*. The wetland delineation procedures outlined in these manuals require the evaluation of on-site vegetation, soils, and hydrologic characteristics. Site observations are described in the sections below.

The wetland boundaries were flagged in the field with alpha-numerically labeled pink pin flags and/or pink flagging tape. Flagging was located using a GPS unit capable of sub-meter accuracy.

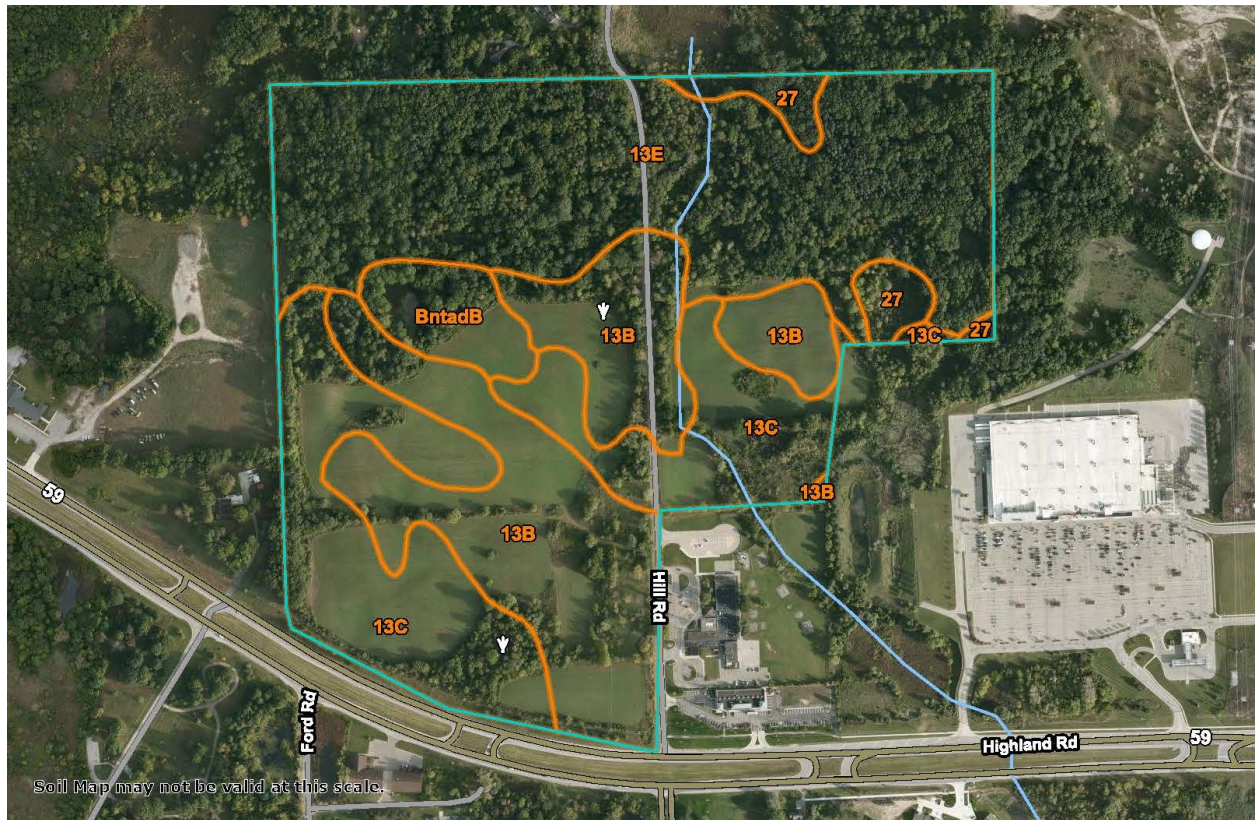


Figure 1. Web Soil Survey

1.3 Results

The AOI includes palustrine scrub shrub (PSS), emergent (PEM), forested (PFO) wetland habitats. The AOI also includes a stream along the east side of Hill Road.

Vegetation, Soils, and Hydrology

Wetland A

This PEM/PFO wetland is located within the southern portion of the west side of the AOI as identified by flags A1-A7. Wetland A is approximately 0.05 acres in size. The vegetation identified in this wetland included species such as reed canary grass, box elder, and green ash. Secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 6 to 12 percent slopes, a well-drained soil. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics. (This inconsistency is not unusual in the WSS when a very small wetland/soil unit is not depicted, simply due to the small size issue. On this site in particular, only Wetlands R, T and U, appear in the WSS as having hydric soils.)

Adjacent upland included species such as smooth brome, garlic mustard, Morrow's honeysuckle, box elder, apple, black cherry, and black walnut; with no observed evidence of wetland hydrology or wetland soils.

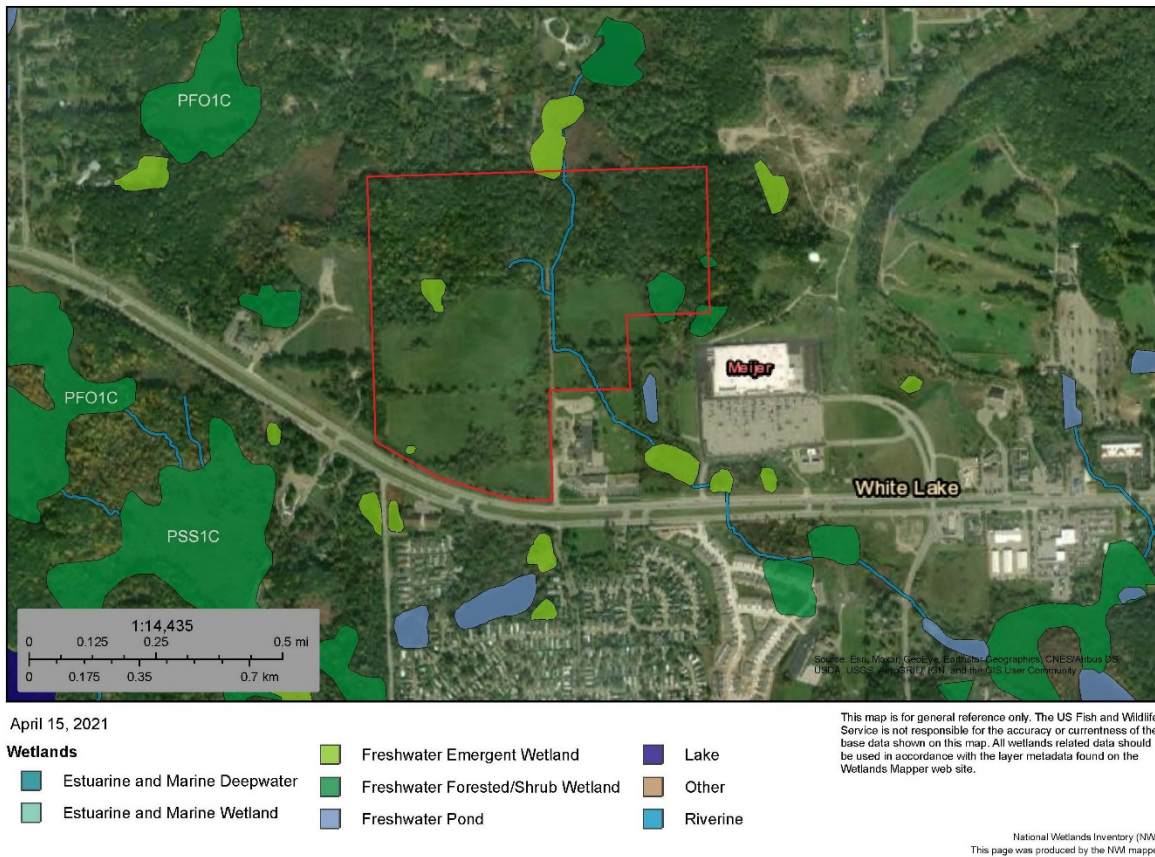


Figure 2. National Wetland Inventory Map

Wetland B

This PEM/PFO wetland is located within the southern portion of the west side of the AOI as identified by flags B1-B20. Wetland B is approximately 0.14 acres in size. The vegetation identified included species such as reed canary grass, box elder, and green ash. Secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 6 to 12 percent slopes, a well-drained soil. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Similar to the area described for Wetland A, the upland adjacent to Wetland B included species such as smooth brome, garlic mustard, Morrow’s honeysuckle, box elder, apple, black cherry, and black walnut; with no observed evidence of wetland hydrology or wetland soils.

Wetland C

This PEM/PFO wetland is located within the northwestern portion of the west side of the AOI as identified by flags C1-C10. Wetland C is approximately 0.11 acres in size. The vegetation identified included species such as American elm and silver maple. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 12 to 40 percent slopes, which are well-drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Please note in this report from this point forward, the upland areas within the woodlot on the west side of the AOI (bordering wetlands C, D, F, G, H, I, J, K, L, M, N, O, P, and Q) included species such as Pennsylvania sedge, black cherry, basswood, pignut hickory and white oak; with no observed evidence of wetland hydrology or wetland soils.

Wetland D

This PSS/PFO wetland is located within the northwestern portion of the west side of the AOI as identified by flags D1-D88. Wetland D is approximately 2.29 acres in size. The vegetation identified included species such as buttonbush, American elm, cottonwood, and silver maple. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Blount loam, 0 to 4 percent slopes, a somewhat poorly drained soil. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Adjacent upland (including Area E, an upland island within Wetland D) included species such as Pennsylvania sedge, black cherry, basswood, pignut hickory and white oak; with no observed evidence of wetland hydrology or soils.

Wetland F

This PSS/PFO wetland is located within the northwestern portion of the west side of the AOI as identified by flags F1-F6. Wetland F is approximately 0.01 acre in size. The vegetation identified included species such as silky dogwood and green ash. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 0 to 6 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland G

This PEM/PFO wetland is located in the northwestern portion of the west side of the AOI as identified by flags G1-G9. Wetland G is approximately 0.10 acres in size. The vegetation identified included species such as American elm and silver maple. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 12 to 40 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland H

This PEM/PSS/PFO wetland is located in the northwestern portion of the west side of the AOI as identified by flags H1-H10. The on-site portion of Wetland H is approximately 0.10 acres in size. Wetland H continues off-site to the northwest. The vegetation identified included species such as lake sedge, green ash, and cottonwood. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 0 to 6 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland I

This PSS/PFO wetland is located in the east-central portion of the west side of the AOI as identified by flags I1-I8. Wetland I is approximately 0.17 acres in size. The vegetation identified included species such as side-flower aster, common buckthorn, and box-elder. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 0 to

6 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland J

This PEM/PSS/PFO wetland is located in the northeastern portion of the west side of the AOI as identified by flags J1-J30. Wetland J is approximately 0.53 acres in size. The vegetation identified included species such as lake sedge, green ash, and cottonwood. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 0 to 6 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland K

This PSS/PFO wetland is located within the northeastern portion of the west side of the AOI as identified by flags K1-K8. Wetland K is approximately 0.04 acres in size. The vegetation identified included species such as silky dogwood and green ash. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 0 to 6 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland L

This PEM/PFO wetland is located within the northcentral portion of the west side of the AOI as identified by flags L1-L6. Wetland L is approximately 0.08 acres in size. The vegetation identified included species such as American elm and silver maple. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 12 to 40 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland M

This PFO wetland is located within the northcentral portion of the west side of the AOI as identified by flags M1-M6. Wetland M is approximately 0.06 acres in size. The vegetation identified included species such as American elm, cottonwood, and silver maple. Secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Blount loam, 0 to 4 percent slopes, a somewhat poorly drained soil. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland N

This PSS wetland is located in the northwestern portion of the west side of the AOI as identified by flags N1-N7. The on-site portion of Wetland N is approximately 0.08 acres in size. Wetland N continues off-site to the west. The vegetation identified included species such as lake sedge, silky dogwood, and buttonbush. Primary and secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 12 to 40 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland O

This PFO wetland is located within the northeastern portion of the west side of the AOI as identified by flags O1-O6. Wetland O is approximately 0.6 acres in size. The vegetation identified included species such as American elm, cottonwood, and silver maple. Secondary indicators of wetland hydrology were identified

within the wetland. The soils are described in the WSS as Blount loam, 0 to 4 percent slopes, a somewhat poorly drained soil. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland P

This PSS wetland is located within the northwestern portion of the west side of the AOI as identified by flags P1-P5. Wetland P is approximately 0.01 acre in size. The vegetation identified included species such as green ash. Secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 12 to 40 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland Q

This PSS wetland is located within the northwestern portion of the west side of the AOI as identified by flags Q1-Q9. Wetland Q is approximately 0.01 acre in size. The vegetation identified included species such as green ash. Secondary indicators of wetland hydrology were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 12 to 40 percent slopes, which are well drained soils. The soils evaluated within the wetland are not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Wetland R

This PSS wetland is located within the northwestern portion of the east side of the AOI. It includes the stream along Hill Road and continues south off-site as identified by flags R1-R242. The on-site portion of Wetland R is approximately 2.26 acres in size. The vegetation identified included species such as nannyberry, silky dogwood, lake sedge, marsh marigold, swamp aster, and reed canary grass. Primary and secondary hydrology indicators were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 0 to 6 percent slopes, which are well-drained soils. The soils evaluated within the wetland were not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Adjacent upland included species such as black walnut, basswood, honeysuckle, smooth brome grass, and dandelions; with no observed evidence of wetland hydrology or wetland soils.

Wetland S

This PFO wetland is located within the southeastern portion of the east side of the AOI as identified by flags S1-S17. Wetland S is approximately 0.11 acres in size. The vegetation identified within the wetland included species such as silver maple, green ash, common buckthorn, nannyberry, side-flower aster, and privet. Primary and secondary hydrology indicators were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, 6 to 12 percent slopes, which are well-drained soils. The soils evaluated within the wetland were not consistent with this description, as they appear to be poorly drained, displaying hydric characteristics.

Adjacent upland included species such as eastern red cedar, common buckthorn, honeysuckle, smooth brome grass, wild onion, and wild grape; with no observed evidence of wetland hydrology or wetland soils.

Wetland T

This PSS wetland is located within the eastern portion of the east side of the AOI as identified by flags T1-T68. The on-site portion of Wetland T is approximately 2.04 acres in size. Wetland T continues off-site to the south. The vegetation identified within the wetland included species such as American elm, buttonbush,

nannyberry, skunk cabbage, and lake sedge. Primary and secondary hydrology indicators were identified within the wetland. The soils are described in the WSS as Houghton and Adrian mucks, which are very poorly drained soils. The soils evaluated within the wetland were consistent with this description, as they appear to be very poorly drained, displaying hydric characteristics.

Adjacent upland included species such as black cherry, Scotch pine, honeysuckle, and common buckthorn; with no observed evidence of wetland hydrology or wetland soils.

Wetland U

This PSS wetland is located within the eastern portion of the east side of the AOI as identified by flags U1–U10. The on-site portion of Wetland U is approximately 0.16 acres in size. Wetland U continues off-site to the south. The vegetation identified within the wetland included species such as peachleaf willow, American elm, silky dogwood, common buckthorn, skunk cabbage, lake sedge, and swamp aster. Primary and secondary hydrology indicators were identified within the wetland. The soils are described in the WSS as Houghton and Adrian mucks, which are very poorly drained soils. The soils evaluated within the wetland were consistent with this description, as they appear to be very poorly drained, displaying hydric characteristics.

Adjacent upland areas included species such as black oak, white oak, black cherry, privet, and multiflora rose; with no observed evidence of wetland hydrology or wetland soils.

Wetland V

This PEM wetland is located within the eastern portion of the east side of the AOI as identified by flags V1–V10. Wetland V is approximately 0.08 acres in size. The vegetation identified within the wetland included species such as peachleaf willow, silky dogwood, tussock sedge, skunk cabbage, and sensitive fern. Primary and secondary hydrology indicators were identified within the wetland. The soils are described in the WSS as Oshtemo-Boyer loamy sands, a well poorly drained soil. The soils evaluated within the wetland were not consistent with this description, as they appear to be very poorly drained, displaying hydric characteristics.

Adjacent upland includes species such white poplar, black walnut, privet, nannyberry, common buckthorn, smooth brome grass, and dandelion; with no observed evidence of wetland hydrology or wetland soils.

The Wetland Delineation (Figure 3) depicts the approximate locations of the wetland areas identified on the site. Completed Wetland Determination Data Forms are enclosed for more detailed information on each of the wetlands (and adjacent upland areas) of the site.

1.4 Conclusions

Based on observations of topography, vegetation, soil, and indicators of hydrology, Barr has determined that numerous wetlands are present within the AOI. These wetland areas were identified as PEM, PSS, and PFO habitat types. According to Part 303, Wetlands Protection, of the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451 (Part 303), as amended, wetlands regulated by the State of Michigan include wetlands that are:

1. Located within 500 feet of, or having a direct surface water connection to, an inland lake, pond, river, or stream; or
2. Greater than five acres in size; or
3. Located within 1,000 feet of, or having a direct surface water connection to, the Great Lakes or Lake St. Clair; or

4. A water of the United States as that term is used in section 502(7) of the Federal Water Pollution Control Act, 33 USC 1362; or
5. Known to have a documented presence of an endangered or threatened species under Part 365 of State of Michigan 1994 PA 451, as amended or the Federal Endangered Species Act of 1973, Public Law 93-205; or
6. Rare or imperiled.

Wetlands I, J, K, O, R, and S appear to be regulated under Part 303 because they are within 500 feet of the stream located east of Hill Road. Wetlands H and N may be regulated under Part 303 because they extend offsite and may be connected to a larger wetland complex, located west of the AOI that appears to be greater than 5 acres in size. Wetlands T and U may also be regulated under Part 303 because they are part of a larger wetland complex, located off-site, which is likely within 500 feet of the stream and likely five acres or more in size. Therefore, a Part 303 permit would likely be required from EGLE to place fill, remove soil, drain surface water from, or make use of these specific wetlands.

Wetlands A, B, C, D, F, G, L, M, P, Q, and V do not appear to be regulated under Part 303 as they do not appear to meet any of the above-mentioned criteria. Therefore, if our determination is accepted by EGLE, a permit would not be required to place fill, remove soil, drain surface water from, or make use of these specific wetlands.

It is our understanding that White Lake Township has rescinded its Wetland Protection Ordinance. Therefore, we do not anticipate that any additional wetlands would be regulated beyond those wetlands that are regulated under Part 303.

Please be advised that EGLE has regulatory authority regarding the wetland boundary location(s) and jurisdictional status of wetlands on this site. Barr's wetland determination was performed in general accordance with accepted procedures for conducting wetland determinations. Barr provides no warranty, guarantee, or other agreement in respect to the period of time for which this wetland determination will remain valid. Barr's conclusions reflect our professional opinion based on the site conditions within the AOI observed during the site visits. Discrepancies may arise between current and future wetland determinations and delineations due to changes in vegetation and/or hydrology as the result of land use practices or other environmental factors, whether on-site or on adjacent or nearby properties. In addition, wetland delineations performed outside the growing season, from late-October until late-April, may differ from those performed at the same site during the growing season due to the presence of snow cover or frozen ground conditions. We recommend our wetland boundary determination and jurisdictional opinion be reviewed by EGLE prior to undertaking any activity near or within any identified wetlands.

Thank you for the opportunity to provide this wetland delineation. If you have any questions, please contact me at your convenience at 734-624-5702 or JSallee@barr.com.

Sincerely,



James Sallee
Senior Regulatory Specialist, Professional Wetland Scientist #2472
BARR ENGINEERING CO.

References

U.S. Army Corps of Engineers (USACE). 1987. *Corps of Engineers Wetlands Delineation Manual*. Washington, DC.

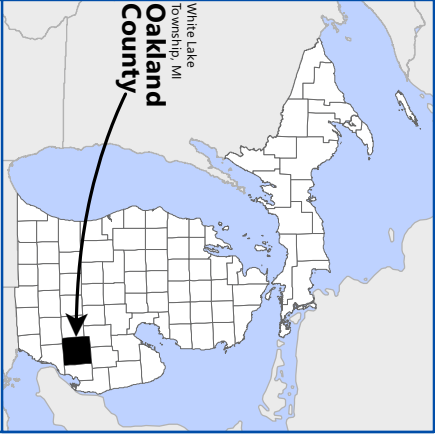
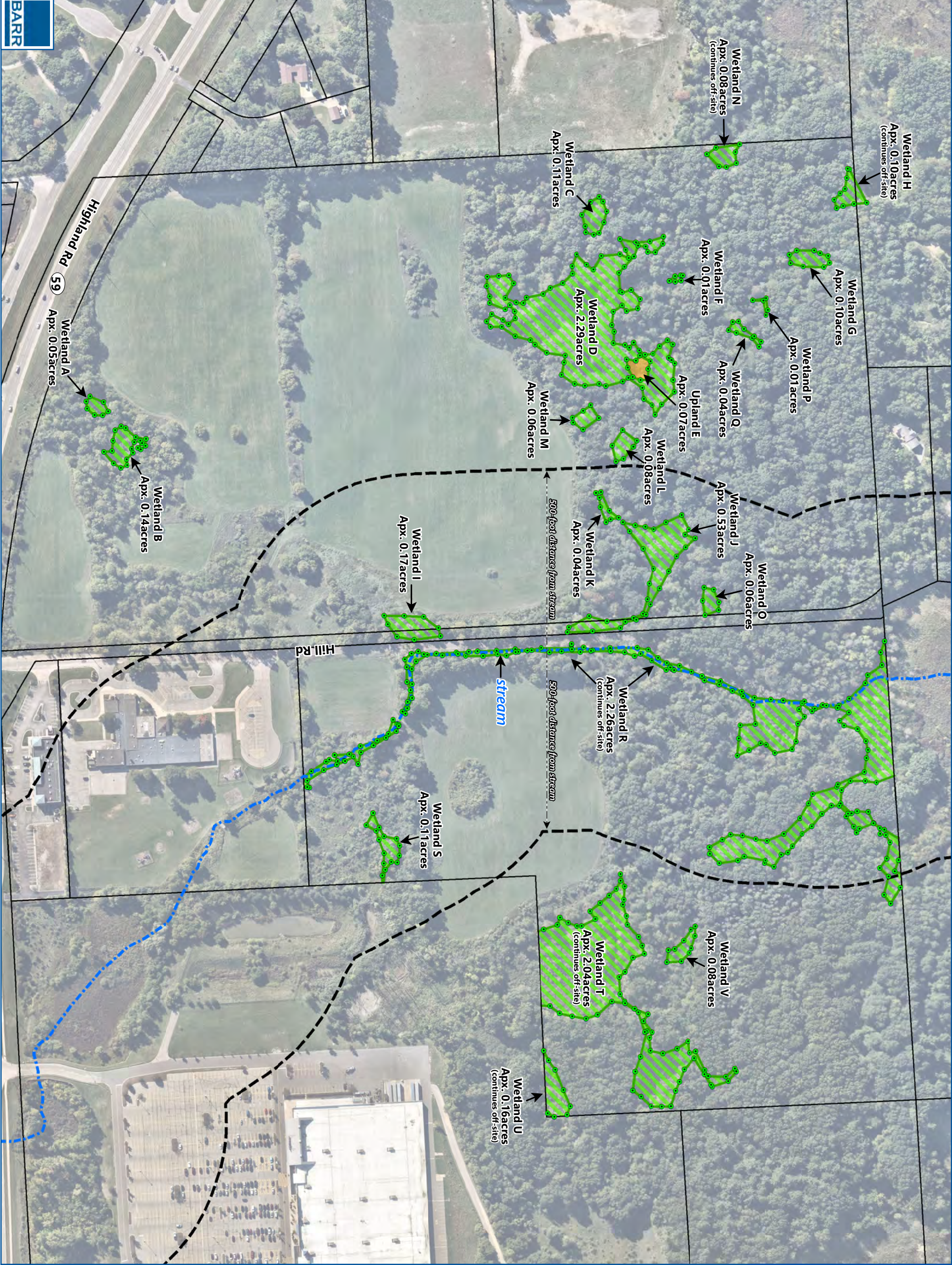
USACE. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*. Washington, DC.

Figure 1 – WSS

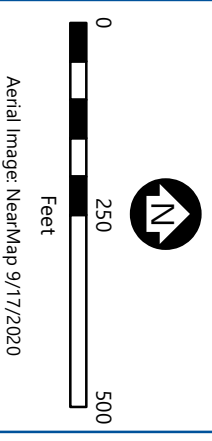
Figure 2 – NWI

Figure 3 – Wetland Delineation

Attachments: Attachment 1 – USACE Wetland Determination Data Forms



- Observation Point
 - Approximate Parcel Boundary
 - - - Approximate Location of On-site Stream
 - - - +/- 500 feet from Centerline of Stream
 - - - Field Delineated Wetland
 - - - Wetland Area
 - - - Upland Area
- Notes:**
 Parcel data shown on this figure from Oakland County Open Data.
 Stream shown on this figure from National Hydrography Dataset.



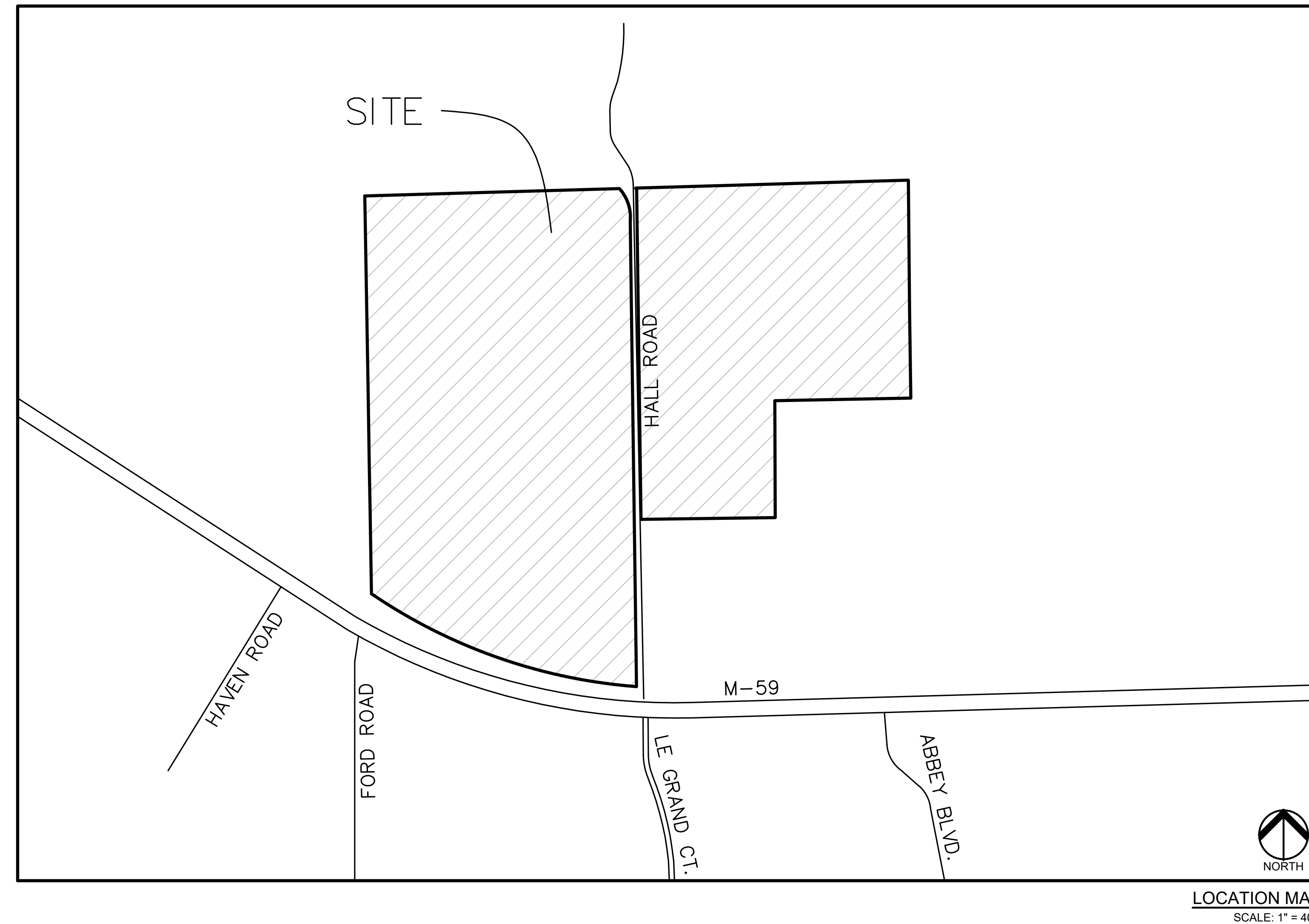
SITE OVERVIEW
WETLAND DELINEATION
 Hill Road
 M. Shapiro Real Estate Group
 White Lake Township, Michigan

FIGURE 3



PRELIMINARY SITE PLANS
THE AVALON
 HIGHLAND ROAD
 WHITE LAKE TOWNSHIP, OAKLAND COUNTY, MICHIGAN

PERMIT / APPROVAL SUMMARY			
DATE SUBMITTED	DATE APPROVED	PERMIT / APPROVAL	NOTES
12/8/2021		TWP PRELIMINARY SITE PLAN APPROVAL	
		TWP ENGINEERING APPROVAL	
		EGL ACT 399 PERMIT	
		EGL PART 41 CONSTRUCTION PERMIT	
		EGL PART 301/303	
		RCOC R.O.W.	PRELIM REVIEW AND DISCUSSION
		OCWRC STORMWATER	
		OCWRC SESC	
		MDOT R.O.W.	PRELIM REVIEW AND DISCUSSION



INDEX OF DRAWINGS	
NUMBER	TITLE
	COVER SHEET
P-1.0	OVERALL TOPOGRAPHIC SURVEY
P-1.1	TOPOGRAPHIC SURVEY - 1
P-1.2	TOPOGRAPHIC SURVEY - 2
P-1.3	TOPOGRAPHIC SURVEY - 3
P-1.4	TOPOGRAPHIC SURVEY - 4
P-2.0	OVERALL PRELIMINARY SITE PLAN
P-2.1	PRELIMINARY SITE PLAN - 1
P-2.2	PRELIMINARY SITE PLAN - 2
P-2.3	PRELIMINARY SITE PLAN - 3
P-2.4	PRELIMINARY SITE PLAN - 4
P-3.1	PRELIMINARY GRADING PLAN - 1
P-3.2	PRELIMINARY GRADING PLAN - 2
P-3.3	PRELIMINARY GRADING PLAN - 3
P-3.4	PRELIMINARY GRADING PLAN - 4
P-4.1	PRELIMINARY UTILITY PLAN - 1
P-4.2	PRELIMINARY UTILITY PLAN - 2
P-4.3	PRELIMINARY UTILITY PLAN - 3
P-4.4	PRELIMINARY UTILITY PLAN - 4
P-5.1	DRAINAGE CALCULATIONS - SINGLE FAMILY
P-5.2	DRAINAGE CALCULATIONS - MULTI FAMILY
P-6.0	PRELIMINARY OPEN SPACE PLAN
P-7.0	NOTES AND DETAILS
P-8.0	FIRE TRUCK TURNING TEMPLATE
<u>ARCHITECTURAL PLANS</u>	
<u>RANCH CONDOS</u>	
1	UNIT FLOOR PLAN
2	BUILDING PLAN
3	BUILDING ELEVATIONS FRONT A, B, & C
4	REAR & SIDE ELEVATIONS
<u>6-PLEX & 12-PLEX CONDOS</u>	
2	FIRST FLOOR PLAN
3-A	SECOND FLOOR PLAN
3-B	SECOND FLOOR PLAN
4-A	ELEVATIONS
4-B	ELEVATIONS

DESIGN TEAM

<p>OWNER/APPLICANT/DEVELOPER</p> <p>WHITE LAKE HILL, LLC 31550 NORTHWESTERN HWY FARMINGTON HILLS, MI 48334 CONTACT: DON CUCCO PHONE: 248.687.9290 EMAIL: DCUCCO@MSHAPIROREALESTATE.COM</p>	<p>CIVIL ENGINEER</p> <p>PEA GROUP 7927 NEMCO WAY, STE. 115 BRIGHTON, MI 48116 CONTACT: JONATHAN E. CURRY, PE PHONE: 844.813.2949 EMAIL: JCURRY@PEAGROUP.COM</p>
--	--

ARCHITECT

ALEXANDER V. BOGAERTS + ASSOCIATES, P.C.
 2445 FRANKLIN ROAD
 BLOOMFIELD HILLS, MI 48302
 CONTACT: MARK ABANTHA
 PHONE: 248.334.5000
 EMAIL: MABANTHA@BOGAERTS.US



REVISIONS	
DESCRIPTION	DATE
ORIGINAL ISSUE DATE	12/8/2021
OWNER REVIEW	11/29/2021
TWP PRELIMINARY SITE PLAN REVIEW	2/25/2022
PER TWP PRELIMINARY SITE REVIEW, DATED 03/15/22	4/4/2022



LEGEND

● IRON FOUND	⊗ BRASS PLUG SET	⊙ SEC. CORNER FOUND
⊗ IRON SET	⊗ MONUMENT FOUND	R RECORDED
⊗ NAIL FOUND	⊗ MONUMENT SET	M MEASURED
⊗ NAIL & CAP SET		C CALCULATED

EXISTING

—OH-ELEC—	ELEC. PHONE OR CABLE TV O/L LINE, POLE & GUY WIRE
—UG-CATV—	UNDERGROUND CABLE TV, CATV PEDESTAL
⊗ UG-PHONE	TELEPHONE U.G. CABLE, PEDESTAL & MANHOLE
⊗ UG-ELEC	ELECTRIC U.G. CABLE, MANHOLE, METER & MANHOLE
⊗ GAS	GAS MAIN, VALVE & GAS LINE MARKER
⊗ W	WATERMAIN, HYD. GATE VALVE, TAPPING SLEEVE & VALVE
⊗ S	SANITARY SEWER, CLEANOUT & MANHOLE
⊗ SS	STORM SEWER, CLEANOUT & MANHOLE
⊗ CS	COMBINED SEWER & MANHOLE
⊗ S&B	SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
⊗ R	POST INDICATOR VALVE
⊗ W	WATER VALVE BOX/HYDRANT VALVE BOX, SERVICE SHUTOFF
⊗ M	MAILBOX, TRANSFORMER, IRRIGATION CONTROL VALVE
⊗ U	UNIDENTIFIED STRUCTURE
⊗ S	SPOT ELEVATION
—670—	CONTOUR LINE
—X—X—X—	FENCE
— — — — —	GUARDRAIL
—L—L—L—L—	STREET LIGHT
—S—S—S—S—	SIGN
—C—C—C—C—	CONCRETE
—A—A—A—A—	ASPHALT
—G—G—G—G—	GRAVEL SHOULDER
—W—W—W—W—	WETLAND

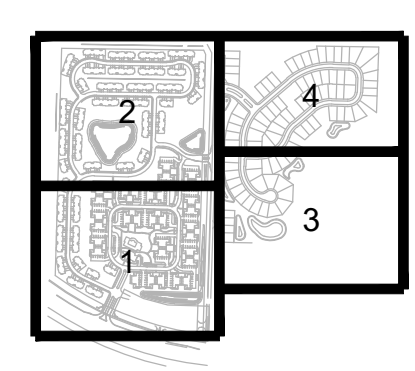
NORTH

0 75 150 300

SCALE: 1" = 150'

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

CAUTION!
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LEGAL DESCRIPTION
(Per Hubbell, Roth & Clark, Inc.)

PARCEL ID 12-20-101-003

That part of the West 1/4 of the Northwest 1/4 of Section 20, Township 3 North, Range 8 East, White Lake Township, Oakland County, Michigan, lying northerly of Highland Road (M-59), more particularly described as: BEGINNING at the Northwest corner of said section; thence South 01 degrees 14 minutes 20 seconds West 2443.61 feet to the northerly right of way line of Highland Road (M-59); thence along said right of way and a curve to the right 1423.36 feet, said curve having a radius of 2664.79 feet, a central angle of 30 degrees 36 minutes 14 seconds, and a chord bearing North 69 degrees 03 minutes 39 seconds West 1406.50 feet to the west section line; thence North 01 degrees 01 minutes 40 seconds East 1948.57 feet along said section line to the POINT OF BEGINNING. Said property contains 68.96 acres, more or less.

PARCEL ID 12-20-126-006

Part of the Northwest 1/4 of Section 20, Township 3 North, Range 8 East, White Lake Township, Oakland County, Michigan, described as: BEGINNING at the North 1/4 corner of said section; thence South 01 degrees 26 minutes 55 seconds West 1067.66 feet along the North-South 1/4 line of said section; thence North 89 degrees 02 minutes 22 seconds West 665.95 feet; thence South 01 degrees 22 minutes 34 seconds West 575.58 feet; thence North 88 degrees 42 minutes 12 seconds West 660.13 feet; thence North 01 degrees 14 minutes 20 seconds East 1624.88 feet to the north line of said section; thence South 89 degrees 39 minutes 41 seconds East 1331.52 feet along said north line to the POINT OF BEGINNING. Said property contains 41.06 acres, more or less.

BENCHMARK:
ARROW ON A HYDRANT LOCATED AT THE ENTRANCE OF A MULTI-USE COMMERCIAL BUILDING, APPROX. 60' EAST FROM THE CENTERLINE OF HILL ROAD AND APPROX. 230' NORTH FROM THE CENTERLINE OF THE WEST BOUND LANE OF M-59/HIGHLAND ROAD.
ELEV. = 974.59 NAVD88 DATUM (USGS)

FLOODPLAIN NOTE:
BY GRAPHICAL PLOTTING, SITE IS WITHIN ZONE "X" AREA DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN PER FLOOD INSURANCE RATE MAP NUMBER 26125C0318F, EFFECTIVE SEPTEMBER 29, 2006.

CLIENT
WHITE LAKE HILL, LLC
31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
OVERALL TOPOGRAPHIC SURVEY

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:

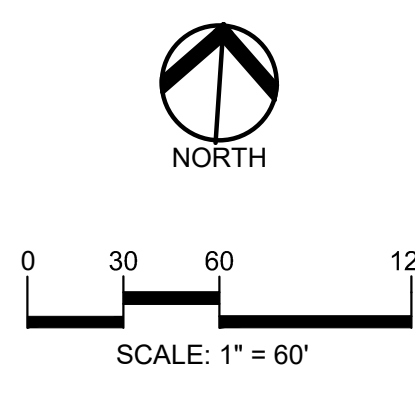
NOT FOR CONSTRUCTION **P-1.0**



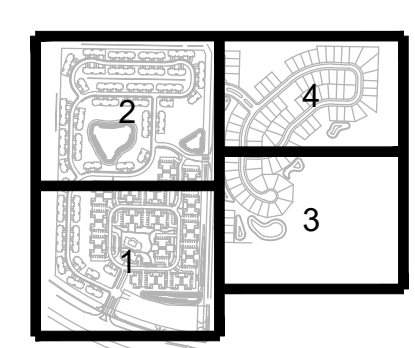
S:\PROJECTS\2021\0021-0084 WHITE LAKE HILL (USE\DWG\SITE PLANS\P-1) OVERALL TOPO-210084.dwg

LEGEND

- IRON FOUND
 - ⊗ BRASS PLUG SET
 - ⊙ MONUMENT FOUND
 - ⊙ SEC. CORNER FOUND
 - ⊙ NAIL FOUND
 - ⊙ NAIL & CAP SET
 - R RECORDED
 - M MEASURED
 - C CALCULATED
- EXISTING
- OH-ELEC— Pole & Guy Wire
 - UG-CATV — UNDERGROUND CABLE TV, CATV PEDESTAL
 - UG-PHONE — TELEPHONE U.G. CABLE, MANHOLE, METER & HANDHOLE
 - UG-ELEC — ELECTRIC U.G. CABLE, MANHOLE, METER & HANDHOLE
 - GAS VALVE & GAS LINE MARKER
 - WATERMAN, HYD. GATE VALVE, TAPPING BLEEVE & VALVE
 - SANITARY SEWER, CLEANOUT & MANHOLE
 - STORM SEWER, CLEANOUT & MANHOLE
 - COMBINED SEWER & MANHOLE
 - SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
 - POST INDICATOR VALVE
 - WATER VALVE BODY/HYDRANT VALVE BOX, SERVICE SHUTOFF
 - MAILBOX, TRANSFORMER, IRRIGATION CONTROL VALVE
 - UNIDENTIFIED STRUCTURE
 - SPOT ELEVATION
 - CONTOUR LINE
 - FENCE
 - GUARD RAIL
 - STREET LIGHT
 - SIGN
 - CONC. — CONCRETE
 - ASPHL — ASPHALT
 - GRAVEL — GRAVEL SHOULDER
 - WETLAND



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 31550 NORTHWESTERN HWY
 FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
 HIGHLAND ROAD
 WHITE LAKE, MI

REVISIONS	

TOWNSHIP PSP REVIEW 4-4-2022
 TOWNSHIP PSP REVIEW 2-25-2022
 OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
 DRAFT 12-8-2021

DRAWING TITLE
TOPOGRAPHIC SURVEY - 1

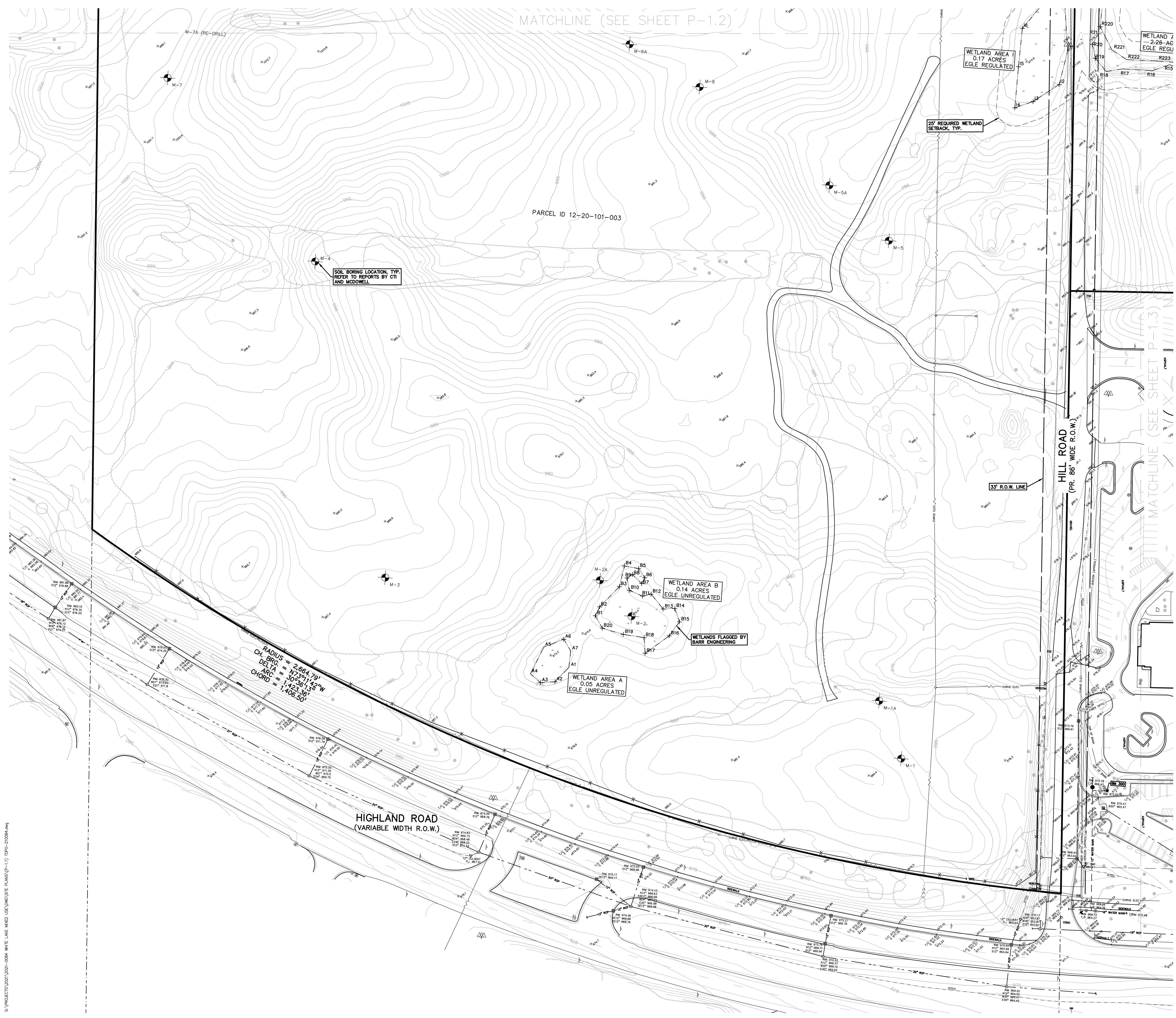
PEA JOB NO.	2021-0084
P.M.	JC
DN.	KMB
DES.	DSK
DRAWING NUMBER:	

NOT FOR CONSTRUCTION

P-1.1

MATCHLINE (SEE SHEET P-1.2)

MATCHLINE (SEE SHEET P-1.3)



PARCEL ID 12-20-101-003

WETLAND Z
2.26-AC
EGLE REGU

WETLAND AREA 1
0.17 ACRES
EGLE UNREGULATED

25' REQUIRED WETLAND SETBACK, TYP.

33' R.O.W. LINE

WETLAND AREA B
0.14 ACRES
EGLE UNREGULATED

WETLANDS FLAGGED BY
BARR ENGINEERING

WETLAND AREA A
0.05 ACRES
EGLE UNREGULATED

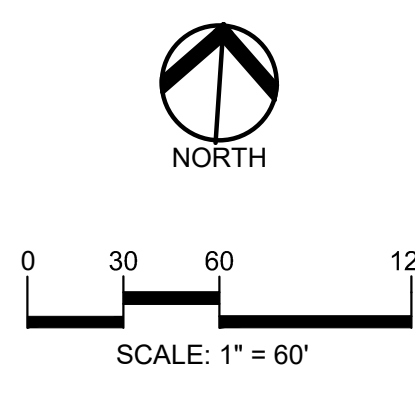
RADIUS = 2,664.79'
 CH. ORG. = N139°11'12"W
 DELTA = 30,261.13'
 ARG = 142°38'
 CHORD = 1,406.50'

HIGHLAND ROAD
(VARIABLE WIDTH R.O.W.)

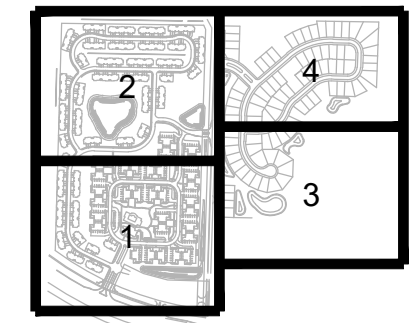
HILL ROAD
(PR. 86' WIDE R.O.W.)

LEGEND

- IRON FOUND
 - ⊗ IRON SET
 - ⊗ NAIL FOUND
 - ⊗ NAIL & CAP SET
 - ⊗ BRASS PLUG SET
 - ⊗ MONUMENT FOUND
 - ⊗ MONUMENT SET
 - ⊗ SEC. CORNER FOUND
 - ⊗ R. RECORDED
 - ⊗ M. MEASURED
 - ⊗ C. CALCULATED
- EXISTING
- OH-ELEC- Pole or Cable TV, U.G. Line, Pole & Guy Wire
 - UG-CATV- Underground Cable TV, CATV Pedestal
 - UG-PHONE- Telephone U.G. Cable, Pedestal & Manhole
 - UG-ELEC- Electric U.G. Cable, Manhole, Meter & Manhole
 - Gas Main, Valve & Gas Line Marker
 - Watermain, Hyd., Gate Valve, Tapping Bleeve & Valve
 - Sanitary Sewer, Cleanout & Manhole
 - Storm Sewer, Cleanout & Manhole
 - Combined Sewer & Manhole
 - Square, Round & Beehive Catch Basin, Yard Drain
 - Post Indicator Valve
 - Water Valve Box/Hydrant Valve Box, Service Shutoff
 - Mailbox, Transformer, Irrigation Control Valve
 - Unidentified Structure
 - Spot Elevation
 - Contour Line
 - Fence
 - Guard Rail
 - Street Light
 - Sign
 - CONC. Concrete
 - ASPH. Asphalt
 - GRAVEL Gravel Shoulder
 - WETLAND Wetland



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CLIENT
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31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS	

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
TOPOGRAPHIC SURVEY - 3

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:

NOT FOR CONSTRUCTION

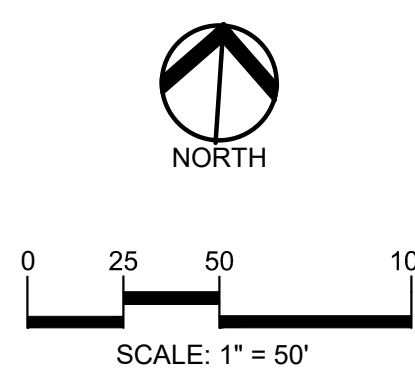
P-1.3



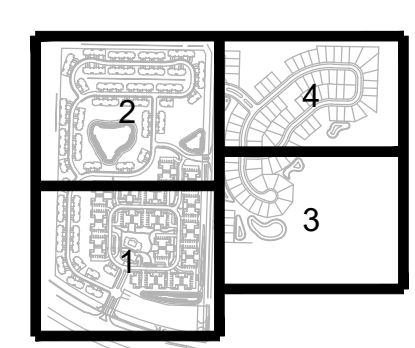
MATCHLINE (SEE SHEET P-1.1)

MATCHLINE (SEE SHEET P-1.4)

S:\PROJECTS\2021\0084-WHITE LAKE HILL\ASB\SITE PLANS(P-1.1)_TOPO-210084.dwg



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CLIENT
WHITE LAKE HILL, LLC
31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS

NO.	DESCRIPTION	DATE

TOWNSHIP PSP REVIEW 4-1-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021
ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
PRELIMINARY SITE PLAN - 4

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:

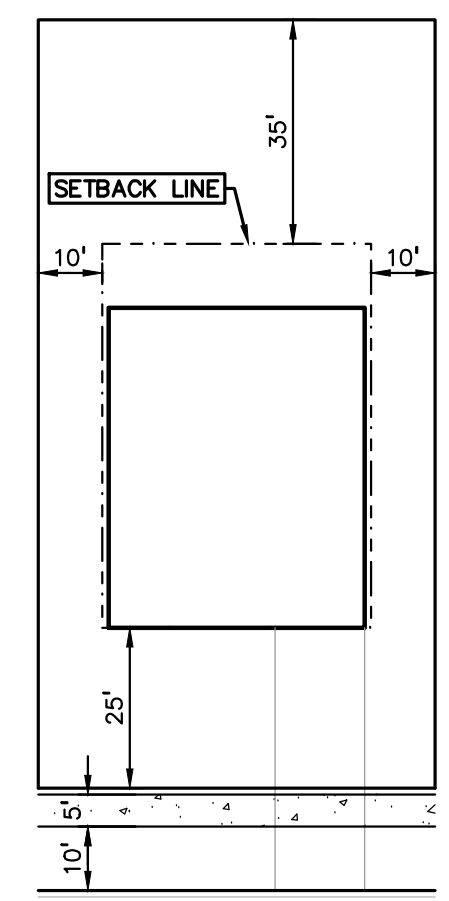
N86°12'16"E 1331.52'

S02°41'08"E 1067.66'

MATCHLINE (SEE SHEET P-2.2)

MATCHLINE (SEE SHEET P-2.3)

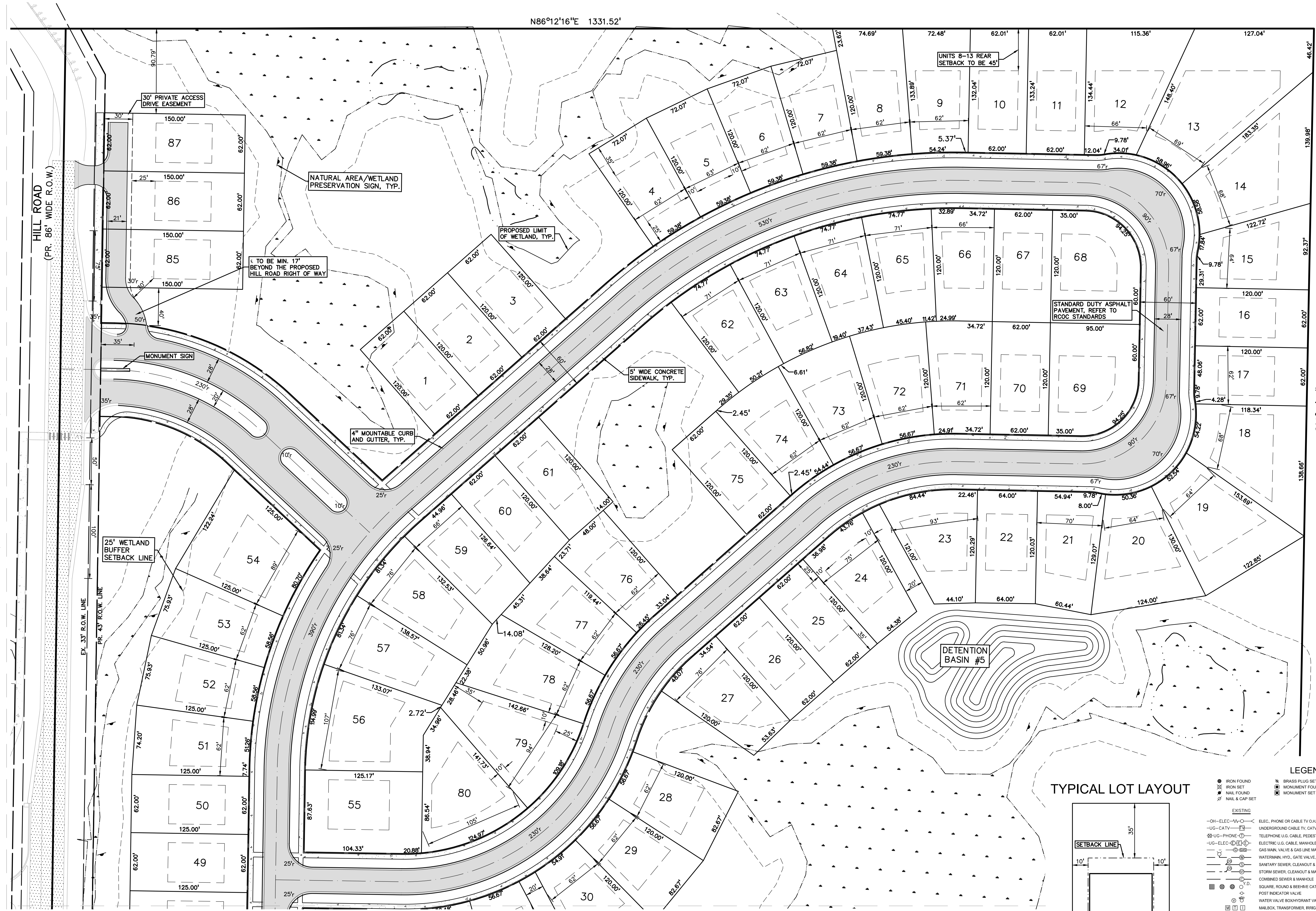
TYPICAL LOT LAYOUT



NOTE:
BUILDING STRUCTURES, INCLUDING DECKS, DRIVES, SIDEWALKS, ETC. ARE RESTRICTED FROM ENCRoACHING THE 25' WETLAND BUFFER SETBACK.

LEGEND

EXISTING	PROPOSED
● IRON FOUND	● BRASS PLUG SET
⊗ IRON SET	⊗ MONUMENT FOUND
● NAIL FOUND	● MONUMENT SET
⊗ NAIL & CAP SET	● SEC. CORNER FOUND
	● R. RECORDED
	● M. MEASURED
	● C. CALCULATED
—OH—ELEC—W—	● ELEC. PHONE OR CABLE TV O.H. LINE POLE & GUY WIRE
—UC—CATV—	● UNDERGROUND CABLE TV, CATV PESTAL
—UC—PHONE—	● TELEPHONE U.G. CABLE, PEDESTAL & MANHOLE
—UC—ELEC—	● ELECTRIC U.G. CABLE, MANHOLE, METER & HANDHOLE
—GAS—	● GAS MAIN, VALVE & GAS LINE MARKER
—WATER—	● WATERMAIN, HYD. GATE VALVE, TAPPING SLEEVE & VALVE
—SEWER—	● SANITARY SEWER, CLEANOUT & MANHOLE
—STORM—	● STORM SEWER, CLEANOUT & MANHOLE
—COMB—	● COMBINED SEWER & MANHOLE
—SQUARE—	● SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
—POST—	● POST INDICATOR VALVE
—WATER VALVE—	● WATER VALVE BOX/HYDRANT VALVE BOX, SERVICE SHUTOFF
—METER BOX—	● METER BOX, TRANSFORMER, IRRIGATION CONTROL, VALVE
—UNIDENTIFIED—	● UNIDENTIFIED STRUCTURE
● SPOT ELEVATION	● SPOT ELEVATION
—CONTOUR—	● CONTOUR LINE
—FENCE—	● FENCE
—GUARD RAIL—	● GUARD RAIL
—STREET LIGHT—	● STREET LIGHT
—SIGN—	● SIGN
—CONC.—	● CONCRETE
—ASPH.—	● ASPHALT
—GRAVEL—	● GRAVEL SHOULDER
—WETLAND—	● WETLAND
—STD. HEAVY R.O.W.—	● STD. HEAVY R.O.W. DUTY ONLY
—STD. HEAVY DEEP DUTY—	● STD. HEAVY DEEP DUTY STRENGTH

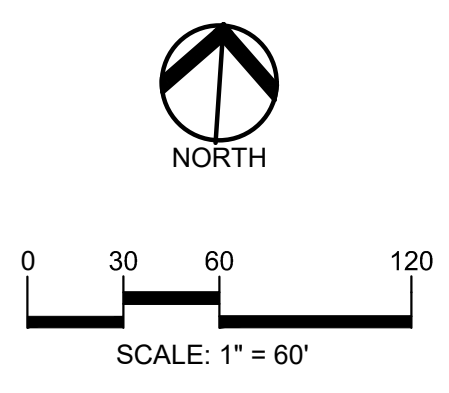


MATCHLINE (SEE SHEET P-3.2)

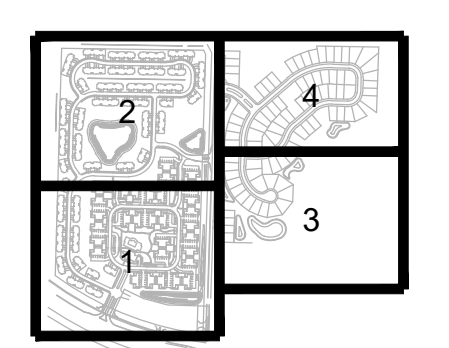
LEGEND

- IRON FOUND
 - IRON SET
 - NAIL FOUND
 - NAIL & CAP SET
 - BRASS PLUG SET
 - MONUMENT FOUND
 - MONUMENT SET
 - SEC. CORNER FOUND
 - R. RECORDED
 - M. MEASURED
 - C. CALCULATED
- EXISTING
- OH-ELEC
 - UG-CATV
 - UG-PHONE
 - UG-ELEC
 - GAS MARK, VALVE & GAS LINE MARKER
 - WATERMAN, HYD. GATE VALVE, TAPPING BLEEVE & VALVE
 - SANITARY SEWER, CLEANOUT & MANHOLE
 - STORM SEWER, CLEANOUT & MANHOLE
 - COMBINED SEWER & MANHOLE
 - SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
 - POST INDICATOR VALVE
 - WATER VALVE BODY/HYDRANT VALVE BOX, SERVICE SHUTOFF
 - MAILBOX, TRANSFORMER, IRRIGATION CONTROL VALVE
 - UNIDENTIFIED STRUCTURE
 - SPOT ELEVATION
 - CONTOUR LINE
 - FENCE
 - GUARD RAIL
 - STREET LIGHT
 - SIEN
 - CONC.
 - ASPH.
 - GRAVEL
 - WETLAND
- PROPOSED
- 671.21
 - 671
 - 310 HEAVY FLOW DUTY ONLY
 - 310 HEAVY BEEP DUTY STRENGTH

NOTE:
PRIOR TO ANY CONSTRUCTION OR GRADING ON THE SITE, SILT FENCE SHALL BE INSTALLED AT THE UPLAND EDGE OF NATURAL FEATURES SETBACKS OR ANY PROPOSED LIMIT OF GRADING. THE SILT FENCING SHALL BE REMOVED AFTER CONSTRUCTIONS ONCE THE AREA IS STABILIZED AND VEGETATION HAD BEEN ESTABLISHED



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CLIENT
WHITE LAKE HILL, LLC
31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS	

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
PRELIMINARY GRADING PLAN - 1

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:

NOT FOR CONSTRUCTION

P-3.1



RADIUS = 2,664.70'
CH. BEG. = N73°11'45"W
DELTA = 30°36'14.50"W
ARC = 1,423.36'
CHORD = 1,406.50'

HIGHLAND ROAD (M-59)
(VARIABLE WIDTH R.O.W.)

DETENTION BASIN #2

MATCHLINE (SEE SHEET P-3.3)

LEGEND

● IRON FOUND	⊗ BRASS PLUG SET	⊙ SEC. CORNER FOUND
⊗ IRON SET	⊗ MONUMENT FOUND	⊙ R. RECORDED
⊗ NAIL FOUND	⊗ MONUMENT SET	⊙ M. MEASURED
⊗ NAIL & CAP SET		⊙ C. CALCULATED

EXISTING

- ELEC.—PHONE—CABLE TV—D.U. LINE, POLE & GUY WIRE
- UG—CATV—UNDERGROUND CABLE TV, CATV PEDESTAL
- UG—PHONE—TELEPHONE U.G. CABLE, PEDESTAL & MANHOLE
- UG—ELEC.—ELECTRIC U.G. CABLE, MANHOLE, METER & HANDHOLE
- GAS—GAS MARK, VALVE & GAS LINE MARKER
- WATER—WATERMAIN, HYD. GATE VALVE, TAPPING BREECH & VALVE
- SEWER—SANITARY SEWER, CLEANOUT & MANHOLE
- STORM—STORM SEWER, CLEANOUT & MANHOLE
- COMB.—COMBINED SEWER & MANHOLE
- SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
- POST—POST INDICATOR VALVE
- WATER VALVE BOX/HYDRANT VALVE BOX, SERVICE SHUTOFF
- MAILBOX, TRANSFORMER, IRRIGATION CONTROL VALVE
- UNIDENTIFIED STRUCTURE
- SPOT ELEVATION
- CONTOUR LINE
- FENCE
- GUARD RAIL
- STREET LIGHT
- SIGN

PROPOSED

- CONC.—CONCRETE
- ASPH.—ASPHALT
- GRAVEL—GRAVEL SHOULDER
- WETLAND
- 3TD HEAVY FLOW DUTY ONLY
- STD HEAVY DUTY STRENGTH

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

CAUTION!!
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FARMINGTON HILLS, MI 48334

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THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

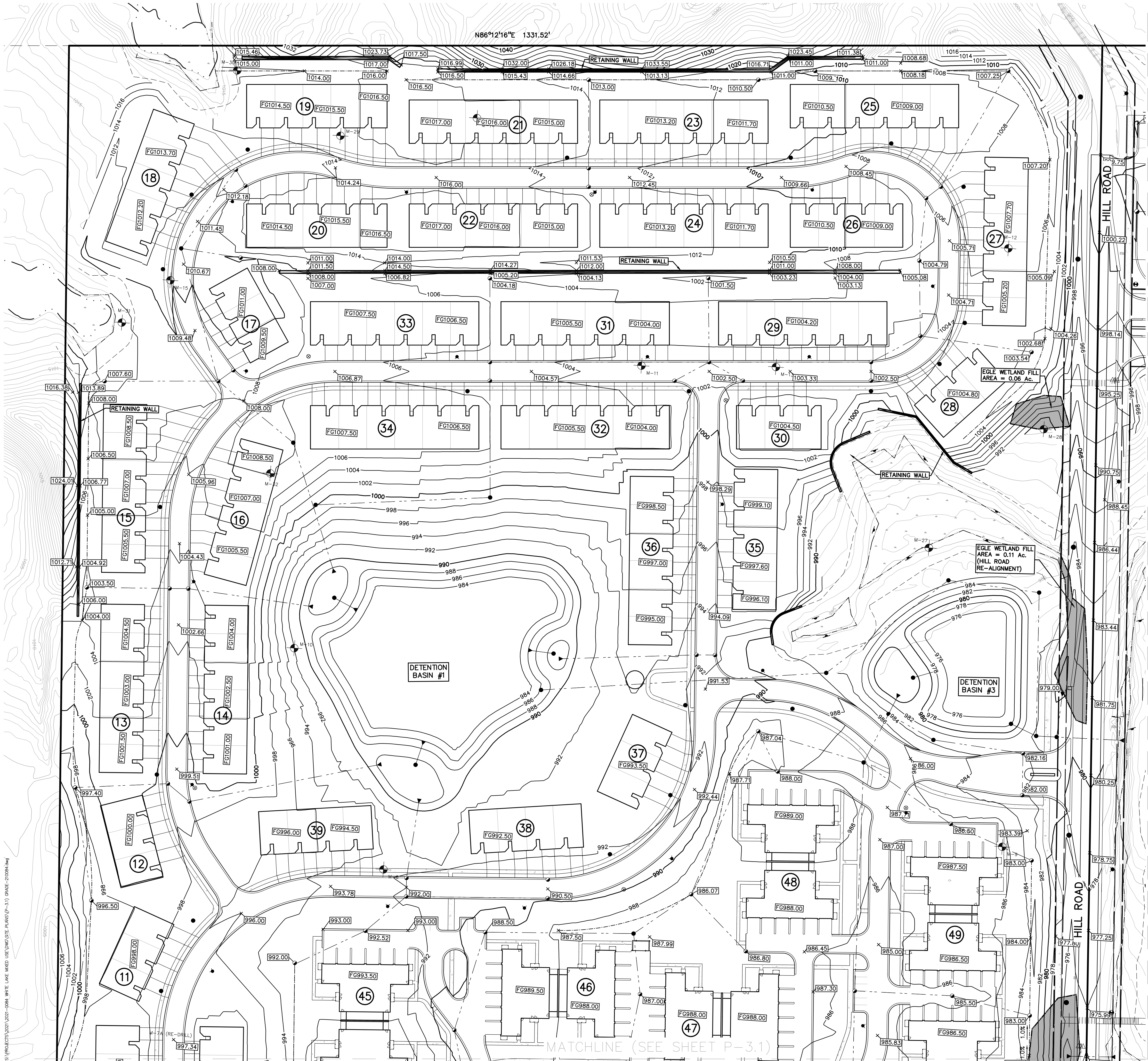
ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
PRELIMINARY GRADING PLAN - 2

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:

NOT FOR CONSTRUCTION

P-3.2



S:\PROJECTS\2021\0084 WHITE LAKE HILL (USE\DWG\STEP PLANS\1-1) GRADE-210084.dwg

MATCHLINE (SEE SHEET P-4.2)

MATCHLINE (SEE SHEET P-4.3)

LEGEND

● IRON FOUND	⊗ BRASS PLUG SET	⊗ SEC. CORNER FOUND
⊗ IRON SET	⊗ MONUMENT FOUND	⊗ R. RECORDED
⊗ NAIL FOUND	⊗ MONUMENT SET	⊗ M. MEASURED
⊗ NAIL & CAP SET		⊗ C. CALCULATED

—ELEC—	ELEC. PHONE OR CABLE TV O/L LINE, POLE & GUY WIRE
—UG-CATV—	UNDERGROUND CABLE TV, CATV PEDESTAL
—UG-PHONE—	TELEPHONE U.G. CABLE, MANHOLE, METER & MANHOLE
—ELEC-U.G.—	ELECTRIC U.G. CABLE, MANHOLE, METER & MANHOLE
—GAS-MARK—	GAS MARK, VALVE & GAS LINE MARKER
—WATERMAN—	WATERMAIN, HYD. GATE VALVE, TAPPING BREEVIE & VALVE
—SANITARY—	SANITARY SEWER, CLEANOUT & MANHOLE
—STORM—	STORM SEWER, CLEANOUT & MANHOLE
—COMBINED—	COMBINED SEWER & MANHOLE
—SQUARE—	SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
—POST—	POST INDICATOR VALVE
—WATER VALVE—	WATER VALVE BOX/HYDRANT VALVE BOX, SERVICE SHUTOFF
—MAILBOX—	MAILBOX, TRANSFORMER, IRRIGATION CONTROL VALVE
—UNIDENTIFIED—	UNIDENTIFIED STRUCTURE
—SPOT—	SPOT ELEVATION
—CONTOUR—	CONTOUR LINE
—FENCE—	FENCE
—GUARDRAIL—	GUARDRAIL
—STREET LIGHT—	STREET LIGHT
—SIGN—	SIGN
—CONC.—	CONCRETE
—ASPH.—	ASPHALT
—GRAVEL—	GRAVEL SHOULDER
—WETLAND—	WETLAND

310	HEAVY FLOW DUTY ONLY
315	HEAVY DEEP DUTY STRENGTH

GENERAL UTILITY NOTES:

- ALL UTILITY LINES, STRUCTURES AND TRENCHES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARDS AND REQUIREMENTS OF WHITE LAKE TOWNSHIP, THE COUNTY OF OAKLAND AND MDOT.
- ALL WATER MAIN AND FITTINGS (3" DIAMETER AND LARGER) SHALL BE DUCTILE IRON, CLASS 54.
- WATER MAIN SERVICE LEADS SHALL BE TYPE 'K' ANNEALED SEAMLESS COPPER WITH FLARED FITTINGS, UNLESS OTHERWISE NOTED.
- ALL HYDRANTS TO BE A MINIMUM OF 5' FROM BACK OF CURB.
- A 20' WIDE WATER MAIN EASEMENT SHALL BE PROVIDED ALONG CENTER ON THE WATER MAIN.
- ALL STORM SEWER 12" DIAMETER OR LARGER SHALL BE REINFORCED CONCRETE PIPE (RCP C-76) CLASS IV WITH MODIFIED TONGUE AND GROOVE JOINT WITH RUBBER GASKETS UNLESS SPECIFIED OTHERWISE (ASTM C-443).
- SANITARY SEWER WILL BE 8" DIAMETER PIPE OR LARGER.
- A 20' WIDE SANITARY SEWER EASEMENT SHALL BE PROVIDED ALONG CENTER OF SANITARY SEWER MAIN.
- THE SANITARY LIFT STATION NEAR MEJER SHALL BE INVESTIGATED TO DETERMINE IF UPGRADES ARE REQUIRED.
- FRANCHISE UTILITIES (ELECTRIC, TELEPHONE, NATURAL GAS, CABLE) SHALL BE PROVIDED A 10' WIDE EASEMENT. EXACT LOCATION SHALL BE COORDINATED WITH UTILITY COMPANIES.

PROPOSED SANITARY SEWER BASIS OF DESIGN:

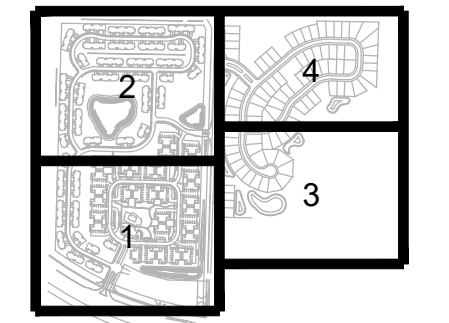
Unit Factors Based on Oakland County Unit Assignment Factors)	
Townhouses	
Number of units	190
Unit Factor	0.6 per unit
REU	114.0
Population (P) (3.5 PEOPLE/EDU)	399.0 People
Multi-Family Apartments	
Number of units	216
Unit Factor	0.6 per unit
REU	129.6
Population (P) (3.5 PEOPLE/EDU)	453.6 People
Single Family Residential	
Number of units	88
Unit Factor	1 per unit
REU	88.0
Population (P) (3.5 PEOPLE/EDU)	308.0 People
TOTAL	
REU	331.6
Average Flow (100 GPCPD)	1161 People
P (1000s)	1.161
Peaking Factor (PF)	3.76
PF = (18+sqrt(P))/4+sqrt(P)	
Peak Flow (G.D.P.)	436,218 G.P.D.
Peak Flow (C.F.S.)	0.875 C.F.S.
8" at 0.5% Pipe Capacity Provided	1,013 C.F.S.

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

CAUTION!!
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0 30 60 120
 SCALE: 1" = 60'

NORTH



CLIENT
WHITE LAKE HILL, LLC
 31550 NORTHWESTERN HWY
 FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
 HIGHLAND ROAD
 WHITE LAKE TWP, MI

REVISIONS

NO.	DESCRIPTION	DATE

TOWNSHIP PSP REVIEW 4-4-2022
 TOWNSHIP PSP REVIEW 2-25-2022
 OWNER REVIEW 11-29-2021
 ORIGINAL ISSUE DATE:
 DRAFT 12-8-2021

DRAWING TITLE
PRELIMINARY UTILITY PLAN - 1

PEA JOB NO. 2021-0084
 P.M. JC
 DN. KMB
 DES. DSK
 DRAWING NUMBER:

NOT FOR CONSTRUCTION

P-4.1



S:\PROJECTS\2021\0084\0084_WHITE LAKE HILL\DWG\SITE PLANS\P-4.1\UTIL-210084.dwg

LEGEND

● IRON FOUND	⊗ BRASS PLUG SET	⊙ SEC. CORNER FOUND
⊗ IRON SET	⊗ MONUMENT FOUND	R RECORDED
⊗ NAIL FOUND	⊗ MONUMENT SET	M MEASURED
⊗ NAIL & CAP SET		C CALCULATED

EXISTING

- OH-ELEC—ELEC. PHONE OR CABLE TV O.H. LINE, POLE & GUY WIRE
- UG-CATV—UNDERGROUND CABLE TV, CATV PEDESTAL
- UG-PHONE—TELEPHONE U.G. CABLE, PEDESTAL & MANHOLE
- UG-ELEC—ELECTRIC U.G. CABLE, MANHOLE, METER & HANDHOLE
- GAS—GAS MAIN, VALVE & GAS LINE MARKER
- WATER—WATERMAIN, HYD. GATE VALVE, TAPPING BLEWIE & VALVE
- SEWER—SANITARY SEWER, CLEANOUT & MANHOLE
- STORM—STORM SEWER, CLEANOUT & MANHOLE
- COMBINED—COMBINED SEWER & MANHOLE
- SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
- POST INDICATOR VALVE
- WATER VALVE BOX/HYDRANT VALVE BOX, SERVICE SHUTOFF
- MAILBOX, TRANSFORMER, IRRIGATION CONTROL VALVE
- UNIDENTIFIED STRUCTURE
- SPOT ELEVATION
- CONTOUR LINE
- FENCE
- GUARD RAIL
- STREET LIGHT
- SIGN
- CONC.—CONCRETE
- ASPH.—ASPHALT
- GRAVEL—GRAVEL SHOULDER
- WETLAND

PROPOSED

- ELEC.—ELEC. PHONE OR CABLE TV O.H. LINE, POLE & GUY WIRE
- UG-CATV—UNDERGROUND CABLE TV, CATV PEDESTAL
- UG-PHONE—TELEPHONE U.G. CABLE, PEDESTAL & MANHOLE
- UG-ELEC—ELECTRIC U.G. CABLE, MANHOLE, METER & HANDHOLE
- GAS—GAS MAIN, VALVE & GAS LINE MARKER
- WATER—WATERMAIN, HYD. GATE VALVE, TAPPING BLEWIE & VALVE
- SEWER—SANITARY SEWER, CLEANOUT & MANHOLE
- STORM—STORM SEWER, CLEANOUT & MANHOLE
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- SQUARE, ROUND & BEEHIVE CATCH BASIN, YARD DRAIN
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- CONC.—CONCRETE
- ASPH.—ASPHALT
- GRAVEL—GRAVEL SHOULDER
- WETLAND

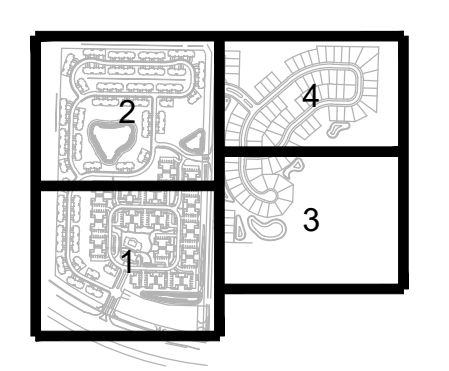
NORTH

0 30 60 120

SCALE: 1" = 60'

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CLIENT
WHITE LAKE HILL, LLC
31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
PRELIMINARY UTILITY PLAN - 2

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:

NOT FOR CONSTRUCTION

P-4.2



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LEGEND

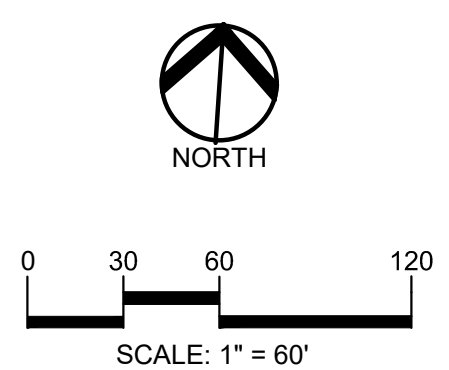
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⊗ IRON SET	⊗ MONUMENT FOUND	R RECORDED
⊗ NAIL FOUND	⊗ MONUMENT SET	M MEASURED
⊗ NAIL & CAP SET		C CALCULATED

EXISTING

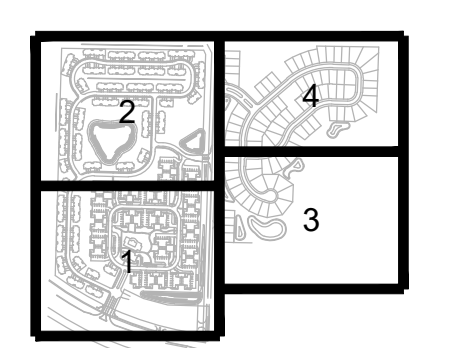
- OH-ELEC- Pole or Cable TV, D.U. Line, Pole & Guy Wire
- UG-CATV- Underground Cable TV, CATV Pedestal
- UG-PHONE- Telephone U.G. Cable, Pedestal & Manhole
- UG-ELEC- Electric U.G. Cable, Manhole, Meter & Handhole
- Gas Main, Valve & Gas Line Marker
- Watermain, Hyd., Gate Valve, Tapping Sleeve & Valve
- Sanitary Sewer, Cleanout & Manhole
- Storm Sewer, Cleanout & Manhole
- Combined Sewer & Manhole
- Square, Round & Beehive Catch Basin, Yard Drain
- Post Indicator Valve
- Water Valve, Box/Hydrant Valve Box, Service Shutoff
- Mailbox, Transformer, Irrigation Control Valve
- Unidentified Structure
- Spot Elevation
- Contour Line
- Fence
- Guard Rail
- Street Light
- Sign
- CONC. Concrete
- ASPH. Asphalt
- GRAVEL Gravel Shoulder
- WETLAND Wetland

PROPOSED

- 671.21
- 310 HEAVY FLOW DUTY ONLY
- 310 HEAVY FLOW DUTY STRENGTH



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31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

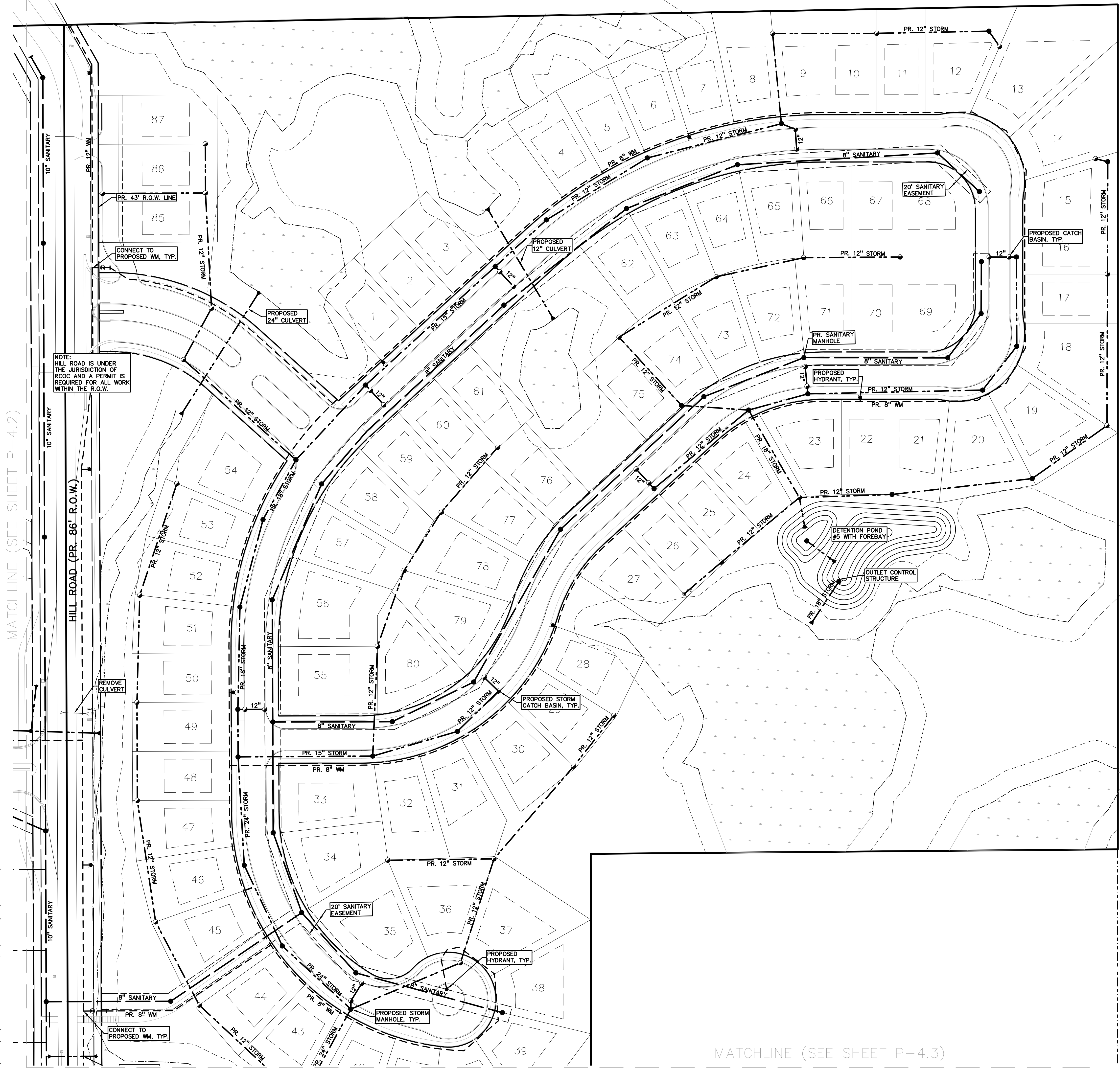
REVISIONS	

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

DRAWING TITLE
PRELIMINARY UTILITY PLAN - 4

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK
DRAWING NUMBER:



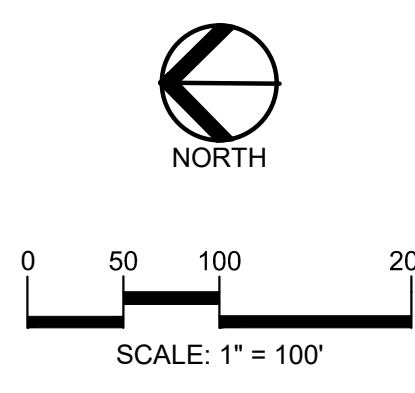
MATCHLINE (SEE SHEET P-4.2)

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MATCHLINE (SEE SHEET P-4.3)

NOT FOR CONSTRUCTION

P-4.4



CAUTION!
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CLIENT
WHITE LAKE HILL, LLC
31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

REVISIONS

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

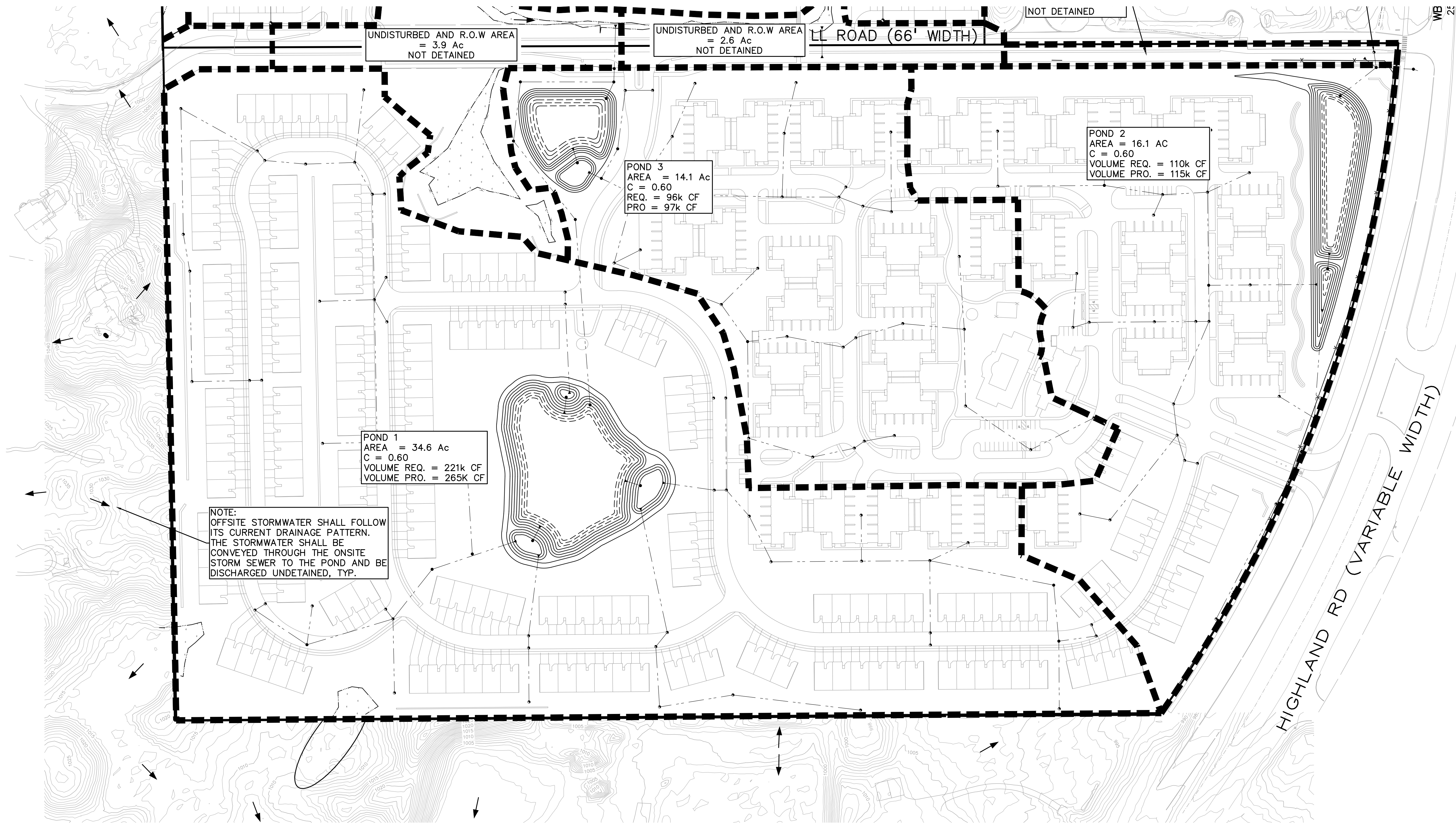
DRAWING TITLE
DRAINAGE CALCULATIONS - MULTI FAMILY

PEA JOB NO. 2021-0084
P.M. JC
DN. KMB
DES. DSK

DRAWING NUMBER:

P-5.2

NOT FOR CONSTRUCTION



NOTE:
OFFSITE STORMWATER SHALL FOLLOW ITS CURRENT DRAINAGE PATTERN. THE STORMWATER SHALL BE CONVEYED THROUGH THE ONSITE STORM SEWER TO THE POND AND BE DISCHARGED UNDETAINED, TYP.

UNDISTURBED AND R.O.W AREA = 3.9 Ac NOT DETAINED

UNDISTURBED AND R.O.W AREA = 2.6 Ac NOT DETAINED

POND 2
AREA = 16.1 AC
C = 0.60
VOLUME REQ. = 110k CF
VOLUME PRO. = 115k CF

POND 3
AREA = 14.1 Ac
C = 0.60
REQ. = 96k CF
PRO = 97k CF

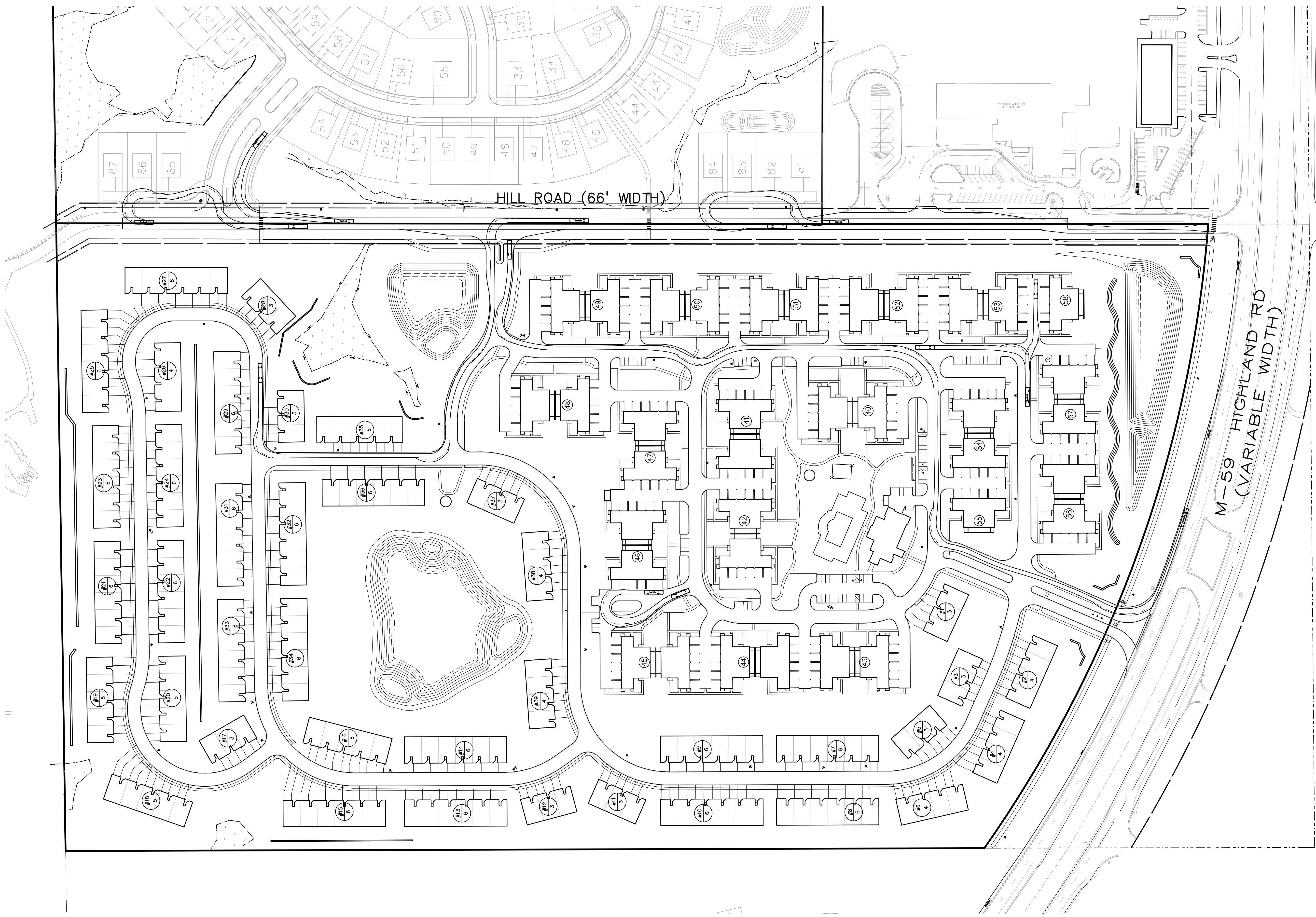
POND 1
AREA = 34.6 Ac
C = 0.60
VOLUME REQ. = 221k CF
VOLUME PRO. = 265K CF

Pond 1		
Total Area: (A1)	66.52 acre	
Drainage Area (A):	34.60 acre	
Weighted Coefficient of Runoff (C):	0.60	
Pretreatment		
Forebay: Vf = (545)/CA	11,314 cf	
CPVC: Channel Protection Volume		
Vcpcv = (4,719)/CA	97,966 cf	
CPRC: Channel Protection Rate Control Volume		
Vcprc = (6897)/CA (Extended Detention)	143,182 cf	
100-Year Allowable Outlet Rate (Qallow)		
Since 2<A1<100, Q100all= A1 x (-0.207xln(A1)+1.1055)		
Q100all =	0.24 cfs/ac	
100-Year Peak Allowable Discharge (Qo)		
Qo=Qallow(A)	8.19 cfs	
Rainfall Intensity		
Time of Concentration (Tc)	20 min	
I100=83.3/(Tc+9.17)^0.81	5.42 in/hr	
100-Year Peak Inflow (Qi)		
Qi=Ci(A)	112.53 cfs	
100-Year Runoff Volume (Vr)		
Vr=(18,985)/CA	394,129 cf	
Storage Ratio (Vr/Vs)		
Vr/Vs = 0.206-0.15 x ln(Qo/Qi)	0.5991	
100-Year Storage Volume (Vs)		
Vs =Vr/Storage Ratio	236,124 cf	

Pond 2		
Total Area: (A1)	66.52 acre	
Drainage Area (A):	16.10 acre	
Weighted Coefficient of Runoff (C):	0.60	
Pretreatment		
Forebay: Vf = (545)/CA	5,265 cf	
CPVC: Channel Protection Volume		
Vcpcv = (4,719)/CA	45,586 cf	
CPRC: Channel Protection Rate Control Volume		
Vcprc = (6897)/CA (Extended Detention)	66,625 cf	
100-Year Allowable Outlet Rate (Qallow)		
Since 2<A1<100, Q100all= A1 x (-0.207xln(A1)+1.1055)		
Q100all =	0.24 cfs/ac	
100-Year Peak Allowable Discharge (Qo)		
Qo=Qallow(A)	3.81 cfs	
Rainfall Intensity		
Time of Concentration (Tc)	20 min	
I100=83.3/(Tc+9.17)^0.81	5.42 in/hr	
100-Year Peak Inflow (Qi)		
Qi=Ci(A)	52.36 cfs	
100-Year Runoff Volume (Vr)		
Vr=(18,985)/CA	183,395 cf	
Storage Ratio (Vr/Vs)		
Vr/Vs = 0.206-0.15 x ln(Qo/Qi)	0.5991	
100-Year Storage Volume (Vs)		
Vs =Vr/Storage Ratio	109,873 cf	

Pond 3		
Total Area: (A1)	66.52 acre	
Drainage Area (A):	14.10 acre	
Runoff (C):	0.60	
Pretreatment		
Forebay: Vf = (545)/CA	4,611 cf	
CPVC: Channel Protection Volume		
Vcpcv = (4,719)/CA	39,923 cf	
CPRC: Channel Protection Rate Control Volume		
Vcprc = (6897)/CA (Extended Detention)	58,349 cf	
100-Year Allowable Outlet Rate (Qallow)		
Since 2<A1<100, Q100all= A1 x (-0.207xln(A1)+1.1055)		
Q100all =	0.24 cfs/ac	
100-Year Peak Allowable Discharge (Qo)		
Qo=Qallow(A)	3.34 cfs	
Rainfall Intensity		
Time of Concentration (Tc)	20 min	
I100=83.3/(Tc+9.17)^0.81	5.42 in/hr	
100-Year Peak Inflow (Qi)		
Qi=Ci(A)	45.86 cfs	
100-Year Runoff Volume (Vr)		
Vr=(18,985)/CA	160,613 cf	
Storage Ratio (Vr/Vs)		
Vr/Vs = 0.206-0.15 x ln(Qo/Qi)	0.5991	
100-Year Storage Volume (Vs)		
Vs =Vr/Storage Ratio	96,224 cf	

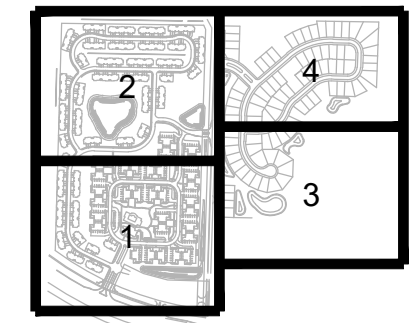
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0 50 100 200
SCALE: 1" = 100'



CAUTION!
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CLIENT
WHITE LAKE HILL, LLC
31550 NORTHWESTERN HWY
FARMINGTON HILLS, MI 48334

PROJECT TITLE
THE AVALON
HIGHLAND ROAD
WHITE LAKE TWP, MI

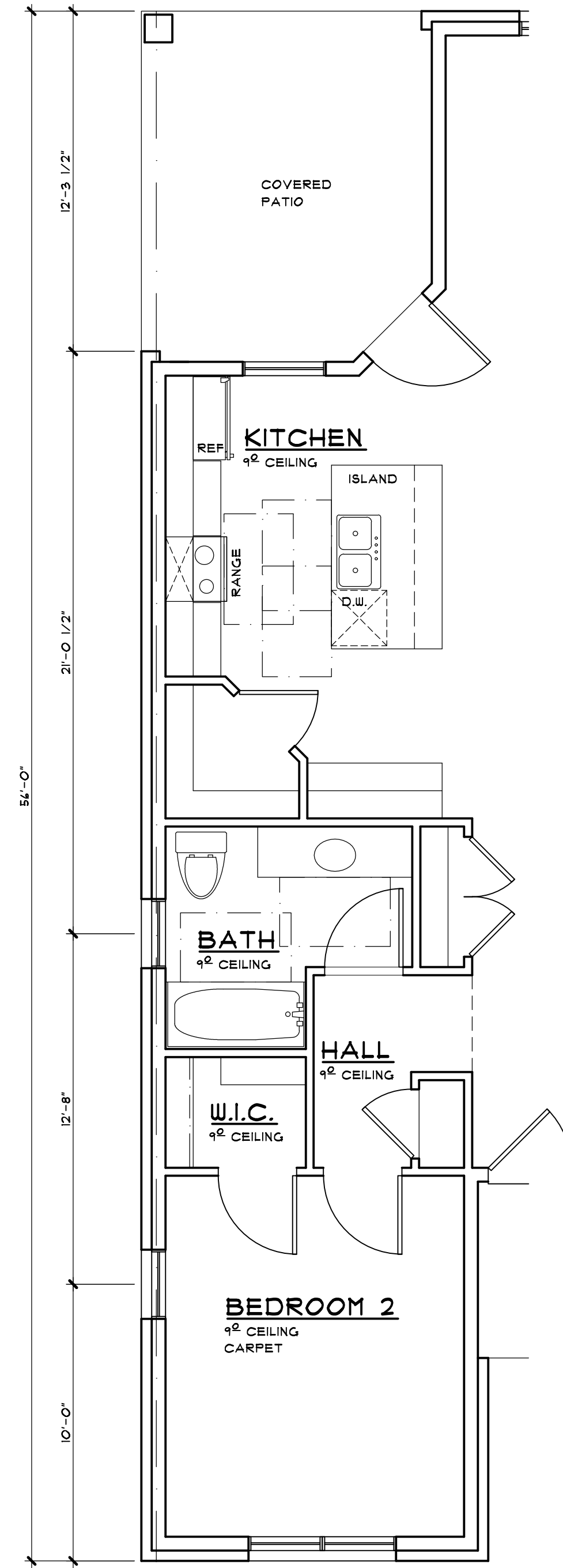
REVISIONS	

TOWNSHIP PSP REVIEW 4-4-2022
TOWNSHIP PSP REVIEW 2-25-2022
OWNER REVIEW 11-29-2021

ORIGINAL ISSUE DATE:
DRAFT 12-8-2021

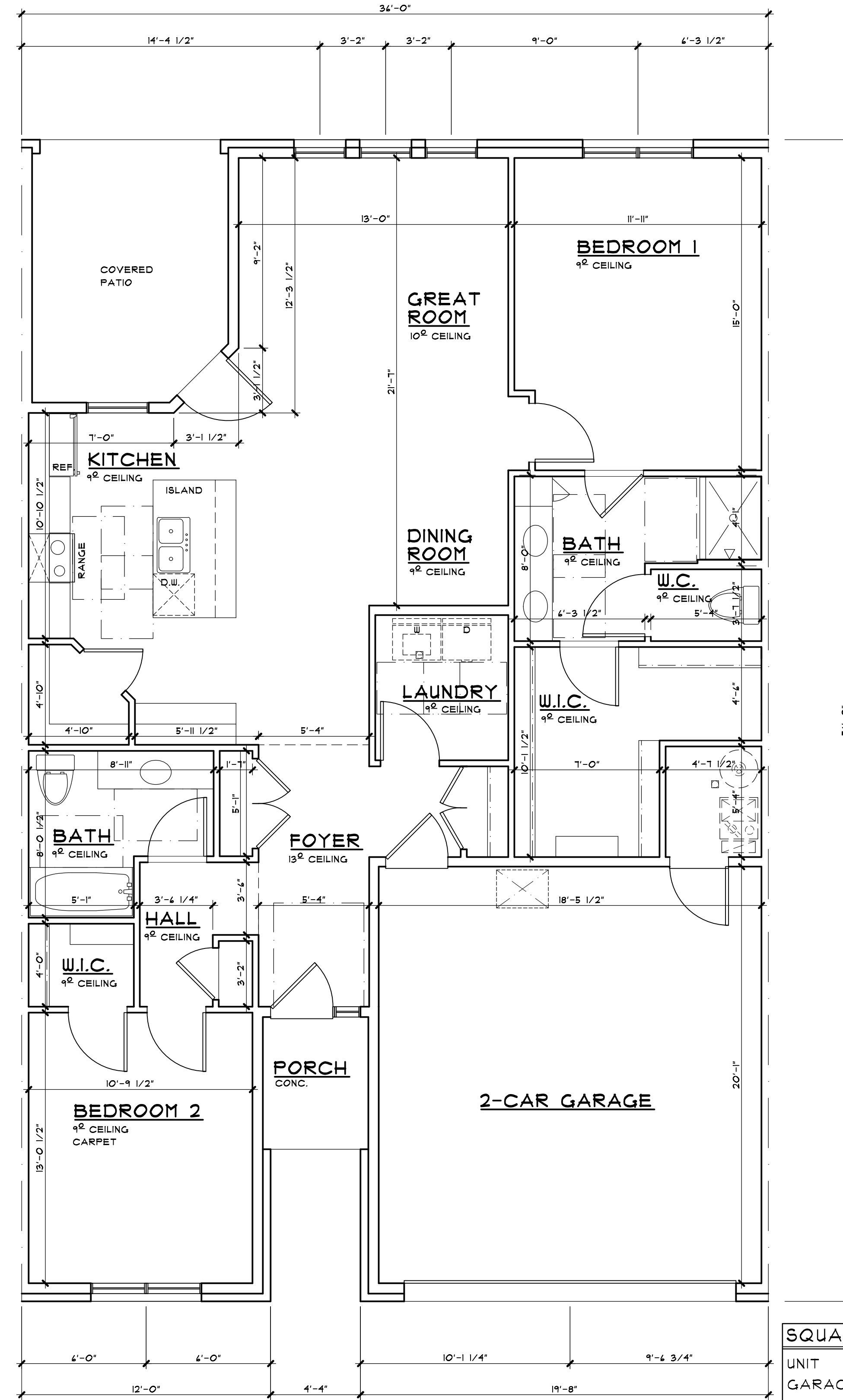
DRAWING TITLE
FIRE TRUCK TURNING TEMPLATE

PEA JOB NO.	2021-0084
P.M.	JC
DN.	KMB
DES.	DSK
DRAWING NUMBER:	



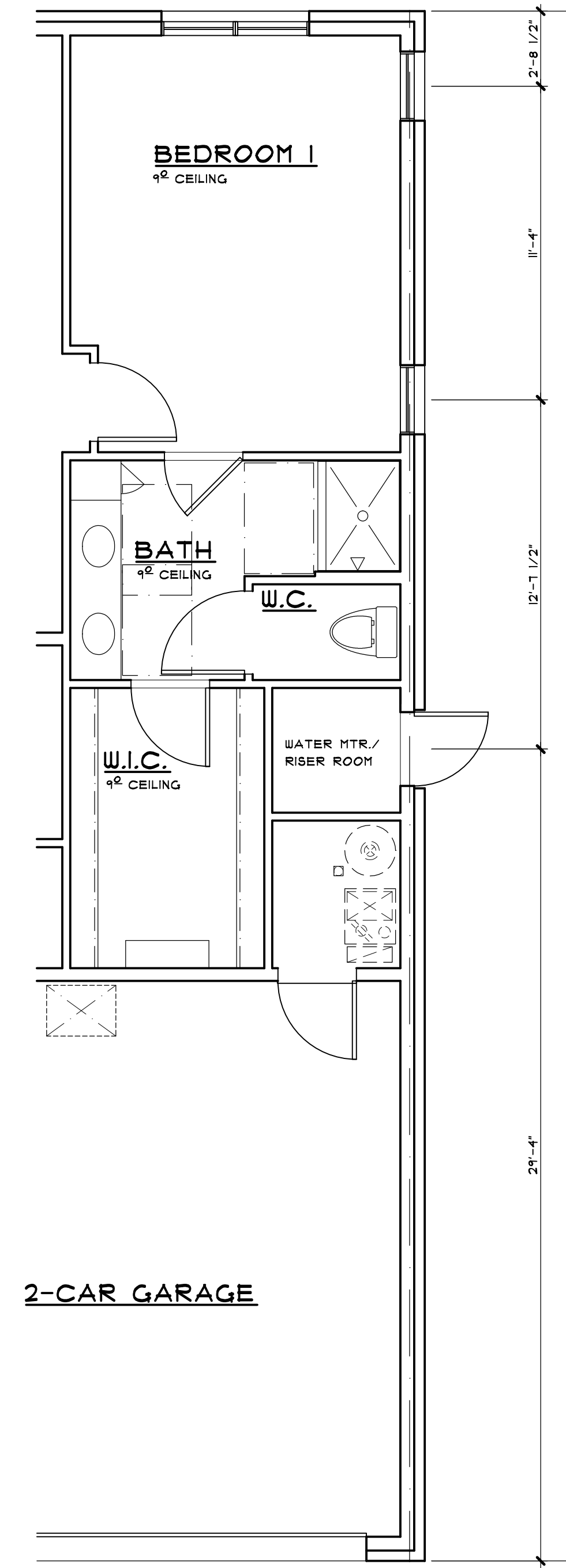
**UNIT FLOOR PLAN -
LEFT SIDE END**

SCALE: 1/4" = 1'-0"



UNIT FLOOR PLAN

SCALE: 1/4" = 1'-0"



**UNIT FLOOR PLAN -
RIGHT SIDE END**

SCALE: 1/4" = 1'-0"



Alexander V. Bogaerts + Associates, P.C. • Architecture • Planning • Interior Design

2445 Franklin Road
Bloomfield Hills, MI 48302
248-334-5000

Item A

UNIT FLOOR PLAN

WHITE LAKE HILL, LLC
AVALON - RANCHES

WHITE LAKE TOWNSHIP, MICHIGAN

CLIENT/PROJECT

REVISIONS

2022-03-29
SITE PLAN APPROVAL

PRELIMINARY
2022-03-29

□ BIDS

□ PERMITS

□ CONSTRUCTION

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ALEXANDER V.
BOGAERTS + ASSOC.

DRAWN BY

CAD FILENAME

CHECKED BY

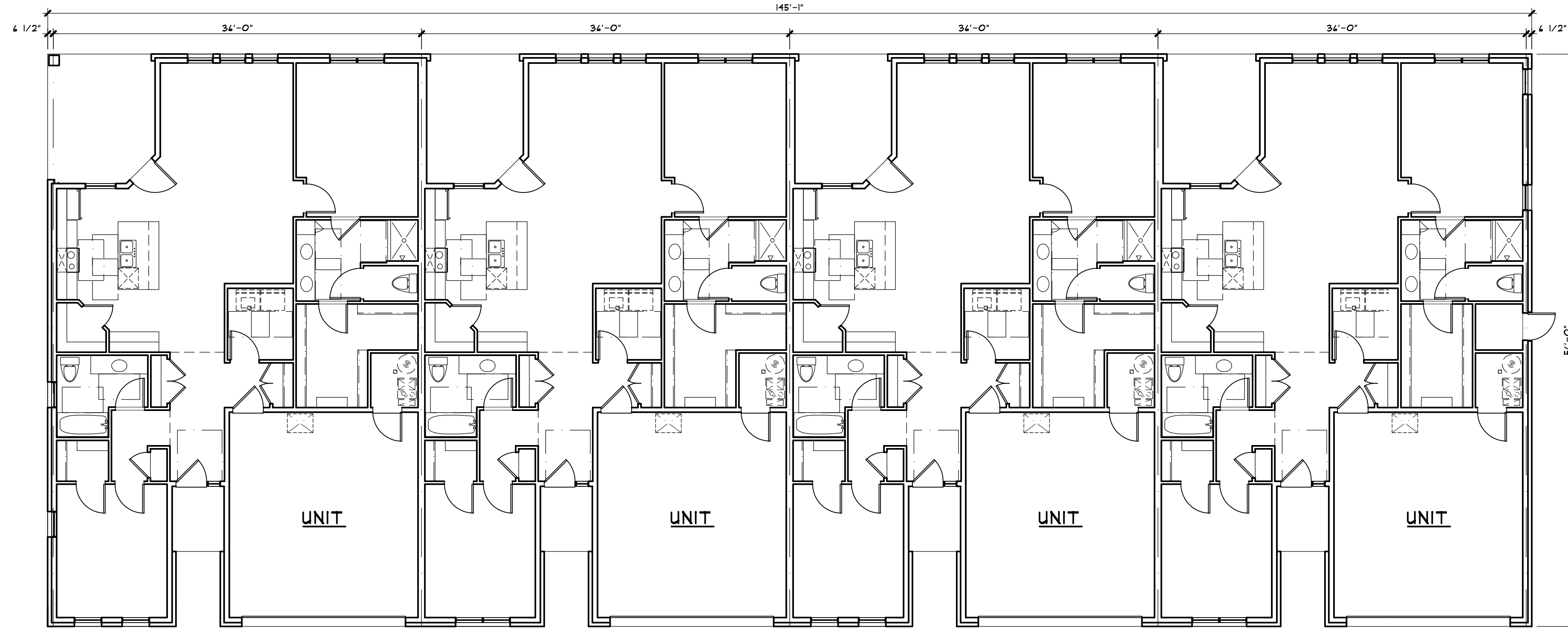
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DATE
2022-03-29

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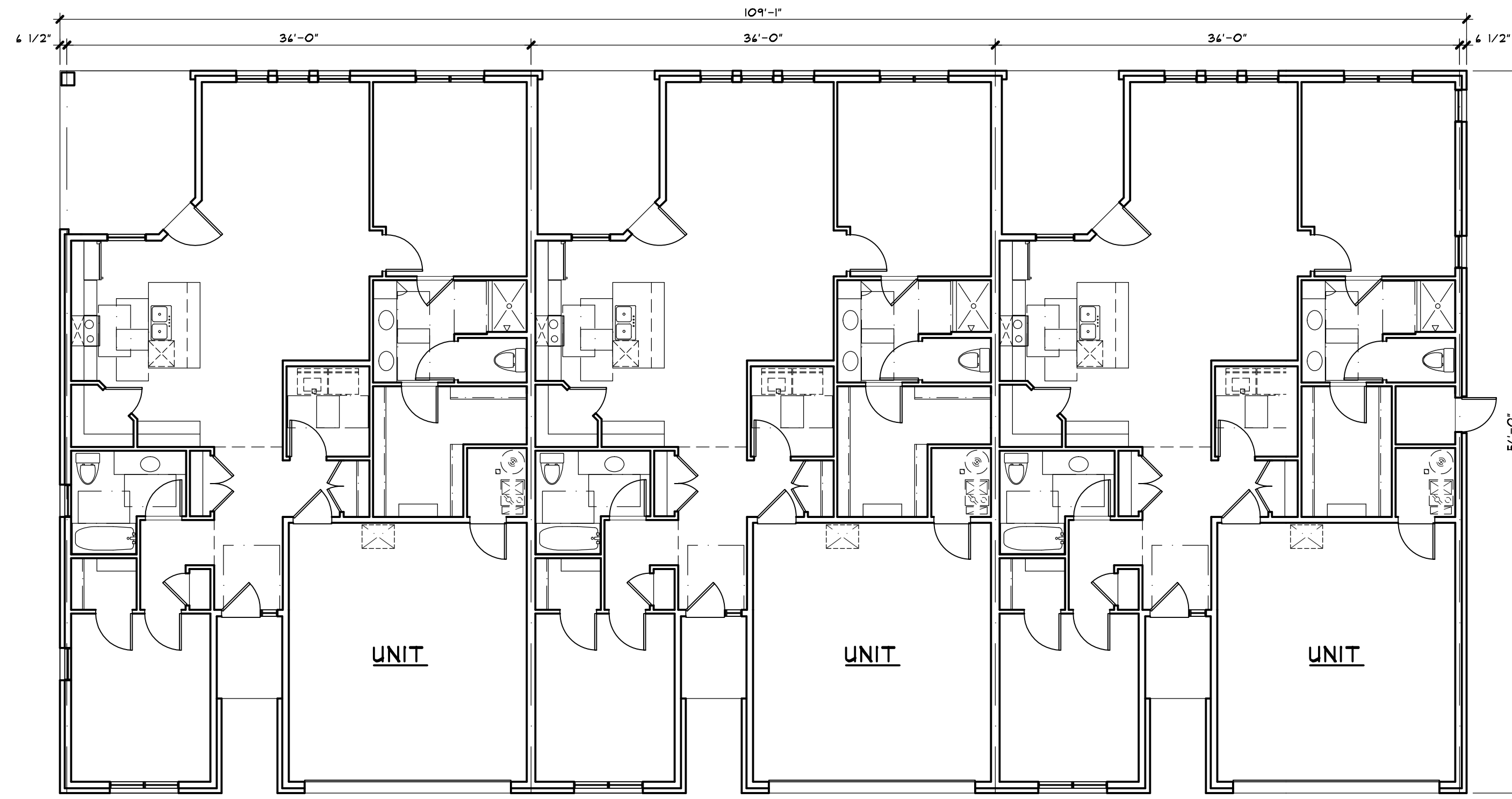
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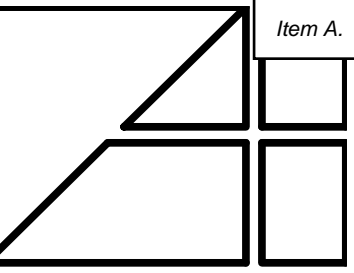
4 UNIT BUILDING FLOOR PLAN

SCALE: 1/8" = 1'-0"



3 UNIT BUILDING FLOOR PLAN

SCALE: 1/8" = 1'-0"



Interior Design
 2445 Franklin Road
 Bloomfield Hills, MI 48302
 248 • 334 • 5000

BUILDING FLOOR PLANS

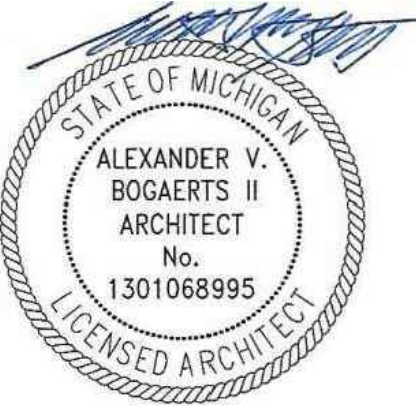
CLIENT/PROJECT
 WHITE LAKE HILL, LLC
 AVALON - RANCHES
 WHITE LAKE TOWNSHIP, MICHIGAN

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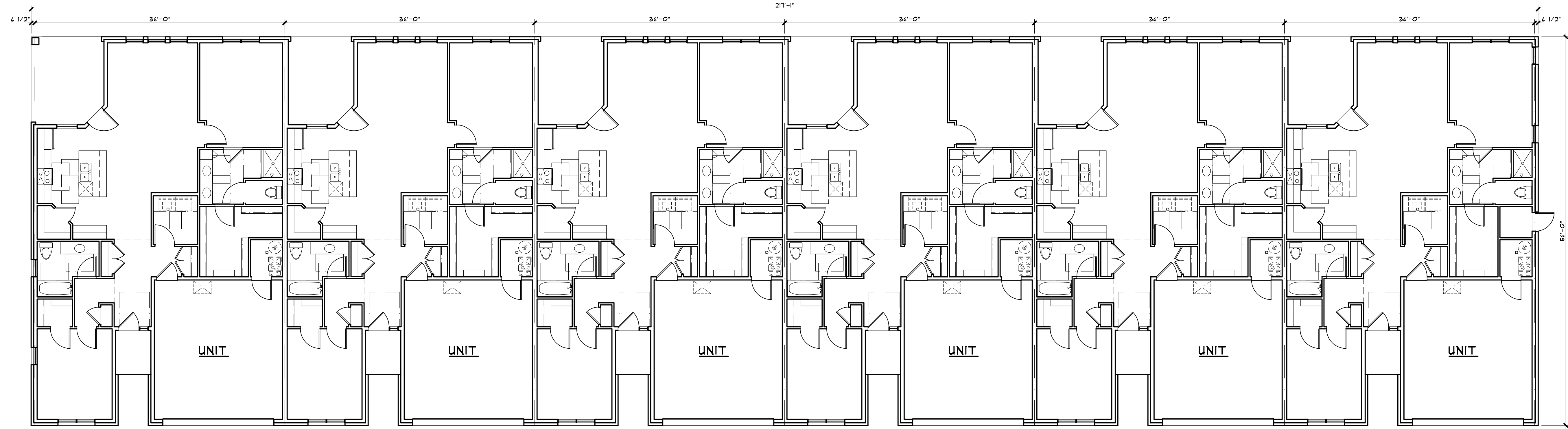
PRELIMINARY
 2022-03-29

REVISIONS
 2022-03-29
 SITE PLAN APPROVAL

DRAWN BY
 CAD FILENAME
 CHECKED BY
 JOB NUMBER
 2451
 DATE
 2022-03-29
 SHEET NUMBER

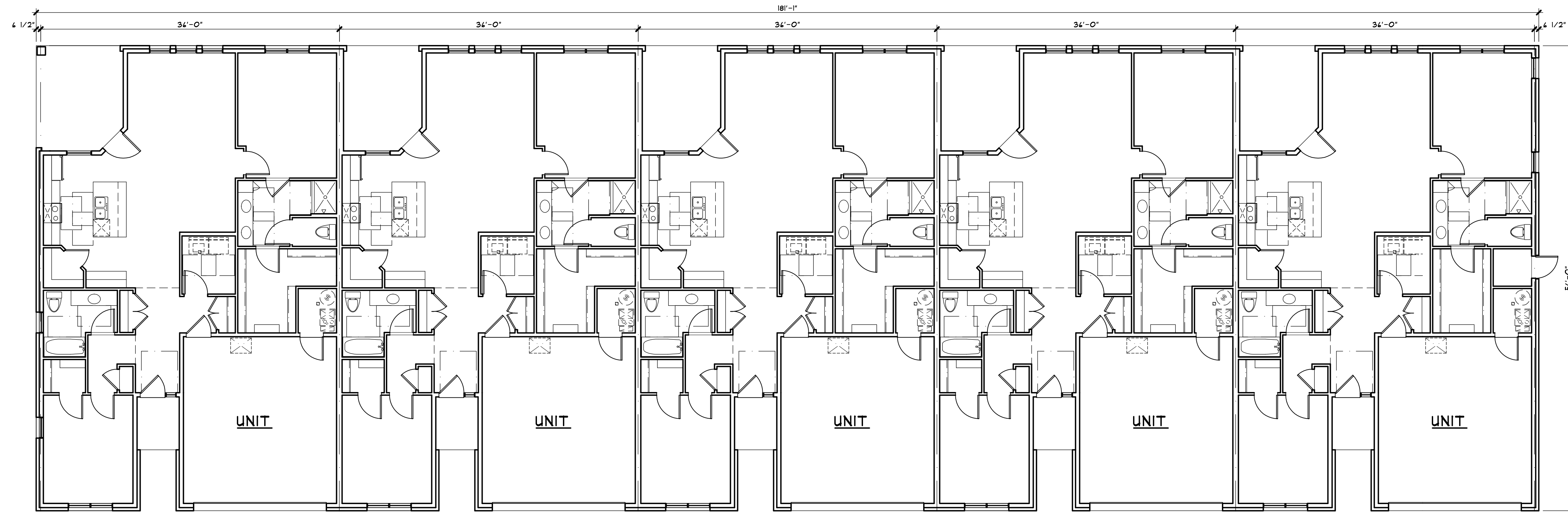


A101
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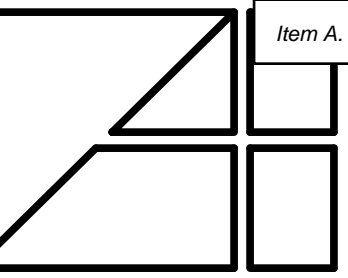
6 UNIT BUILDING FLOOR PLAN

SCALE: 1/8" = 1'-0"



5 UNIT BUILDING FLOOR PLAN

SCALE: 1/8" = 1'-0"



Item A.
 2445 Franklin Road
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 248 • 334 • 5000

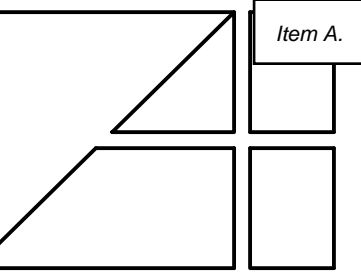
Alexander V. Bogaerts + Associates, P.C. • Architecture • Planning • Interior Design
 BUILDING FLOOR PLANS

CLIENT/PROJECT
 WHITE LAKE HILL, LLC
 AVALON - RANCHES
 WHITE LAKE TOWNSHIP, MICHIGAN

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 DATE
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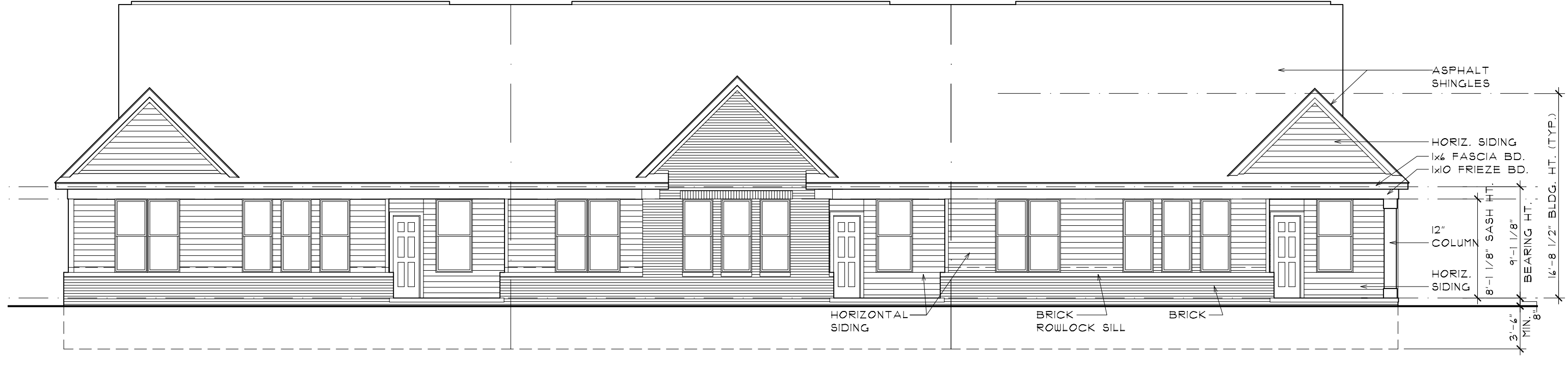
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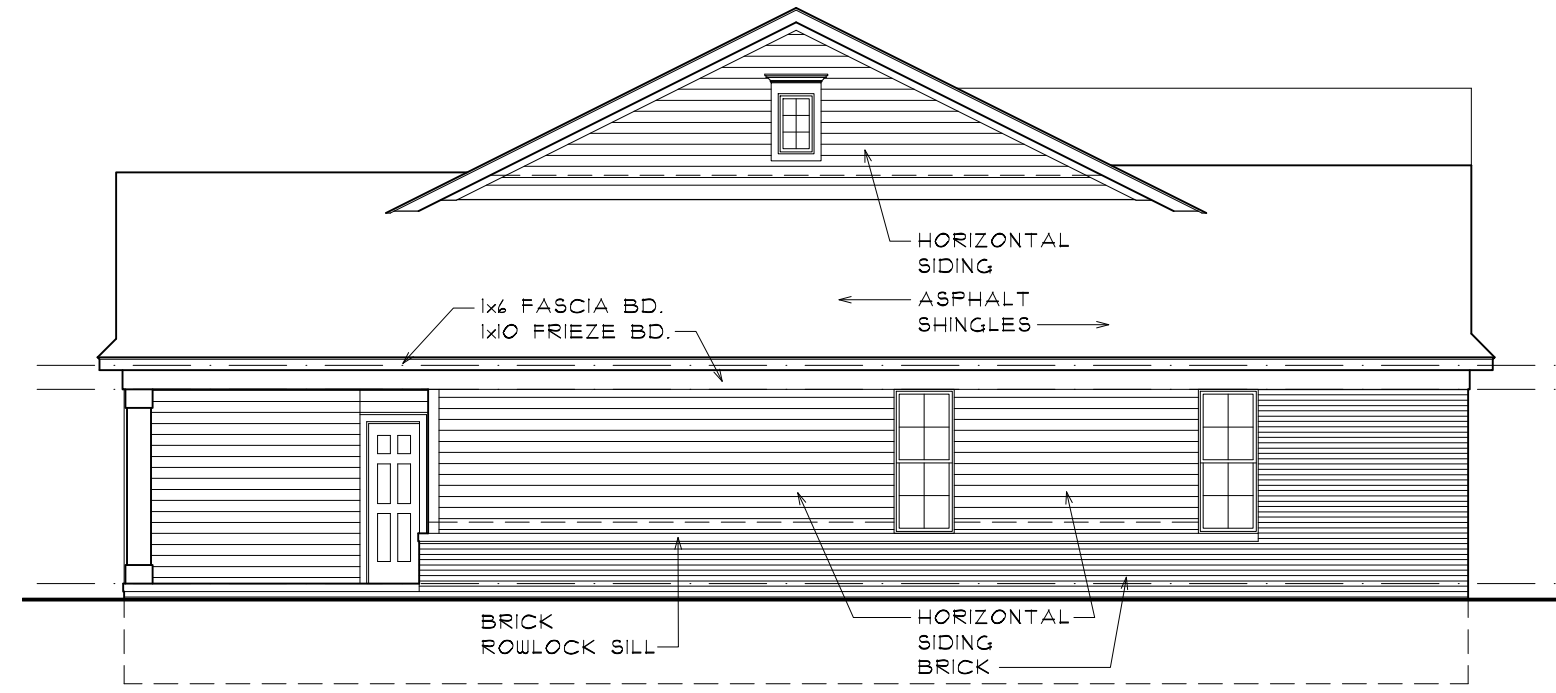
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SHEET NUMBER
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3 UNIT REAR ELEVATION 'A' and 'C' ('B' SIMILAR)

SCALE: 1/8" = 1'-0"



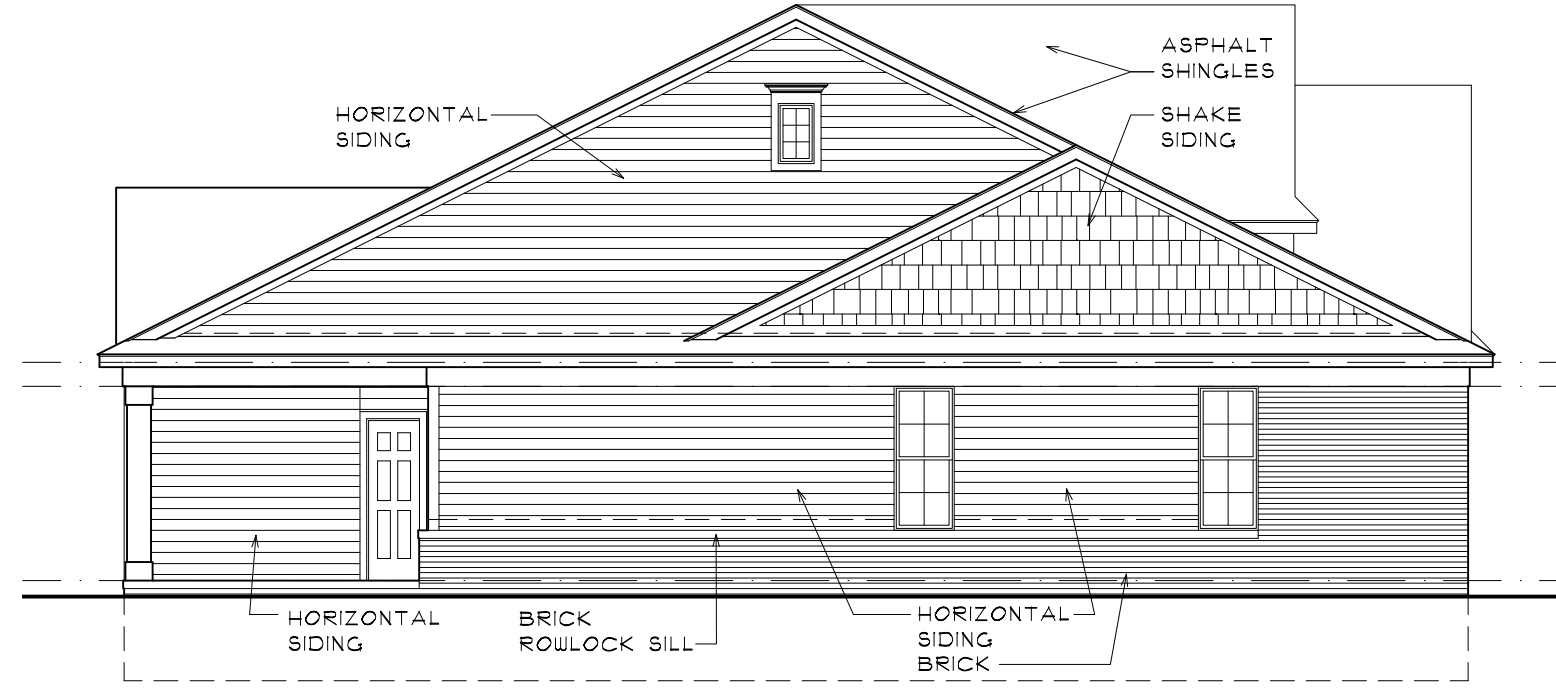
LEFT SIDE ELEVATION 'A' and 'C'

SCALE: 1/8" = 1'-0"



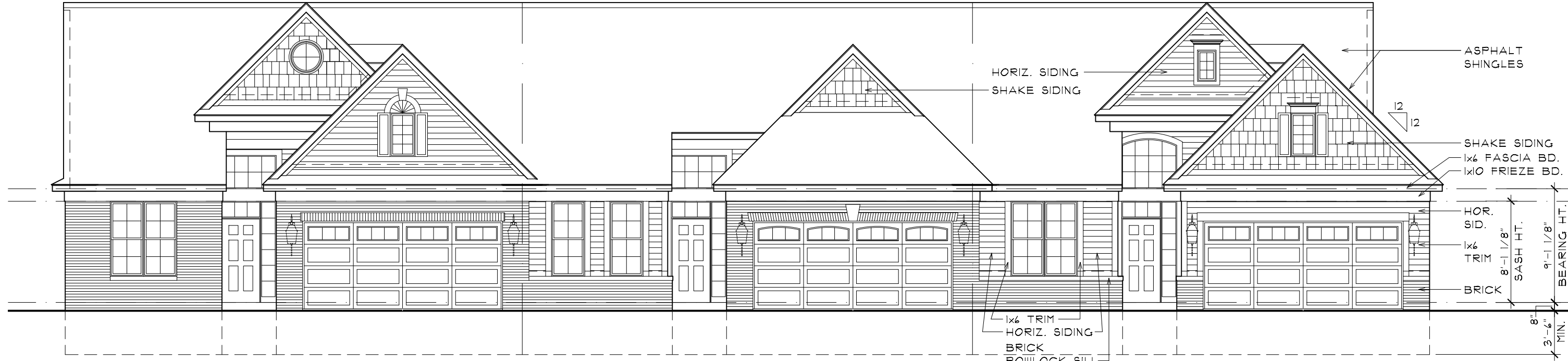
3 UNIT FRONT ELEVATION 'A'

SCALE: 1/8" = 1'-0"



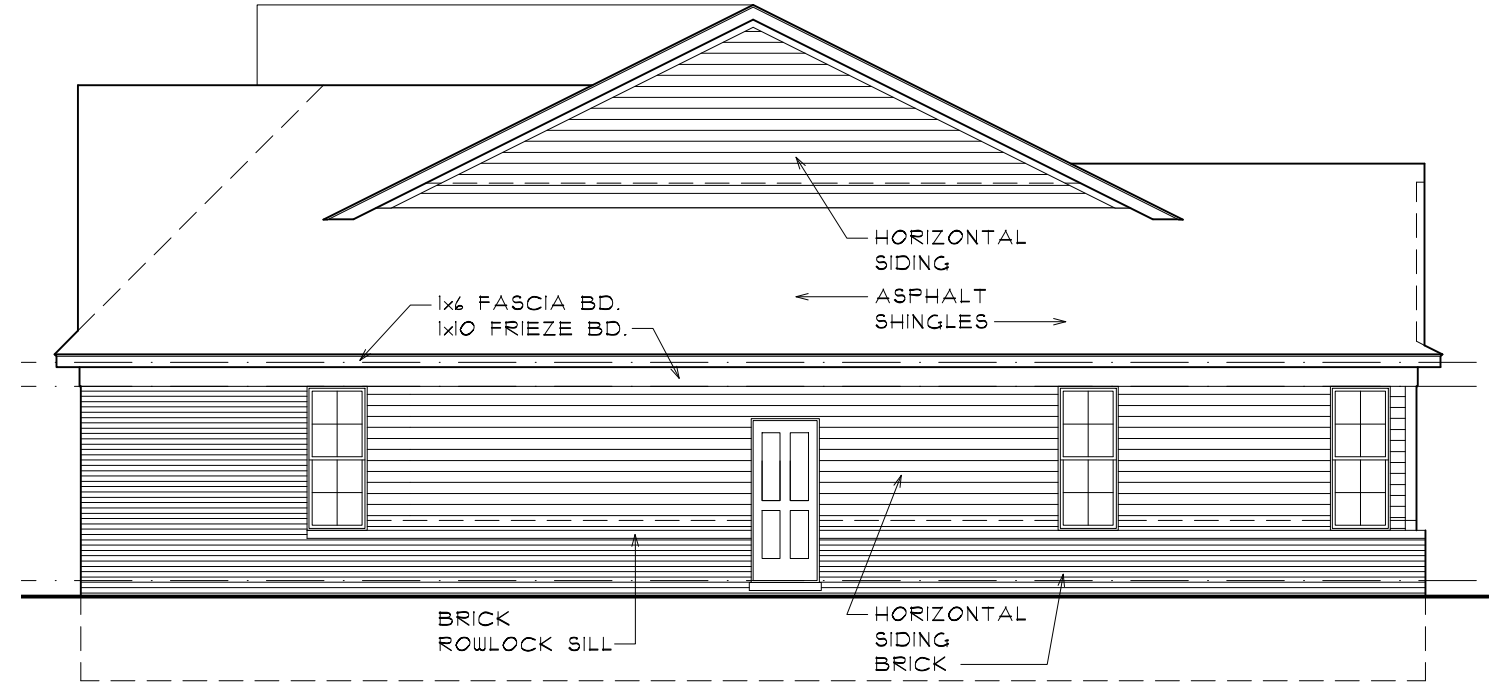
LEFT SIDE ELEVATION 'B'

SCALE: 1/8" = 1'-0"



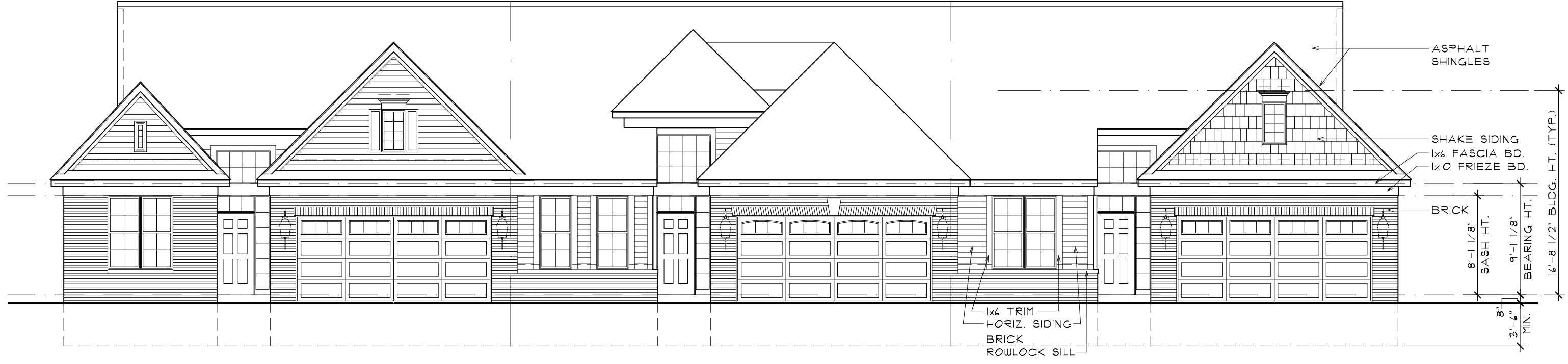
3 UNIT FRONT ELEVATION 'B'

SCALE: 1/8" = 1'-0"



RIGHT SIDE ELEVATION 'B' ('A' and 'C' SIMILAR)

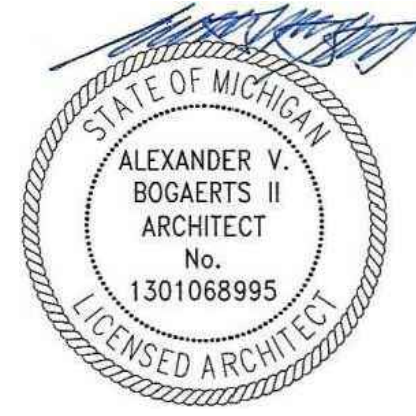
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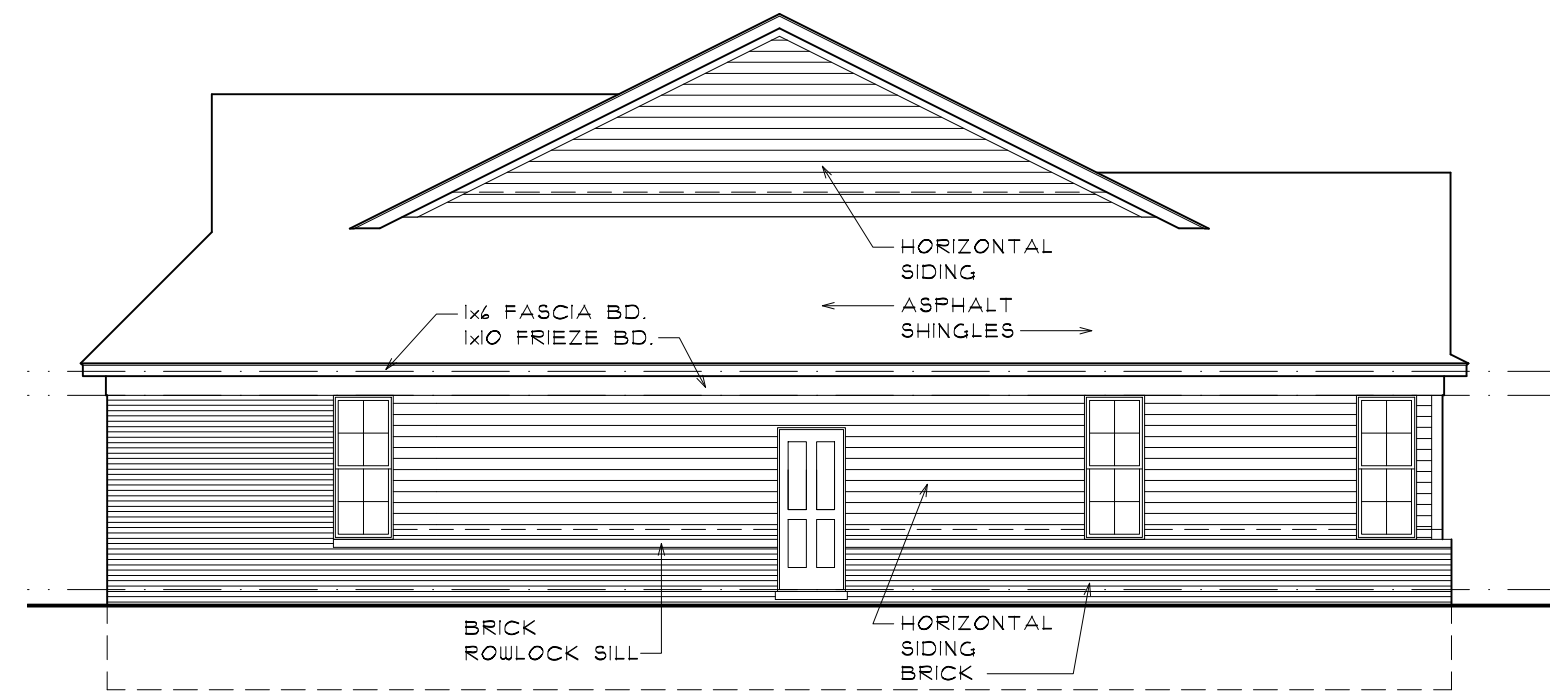


3 UNIT FRONT ELEVATION 'C'

SCALE: 1/8" = 1'-0"

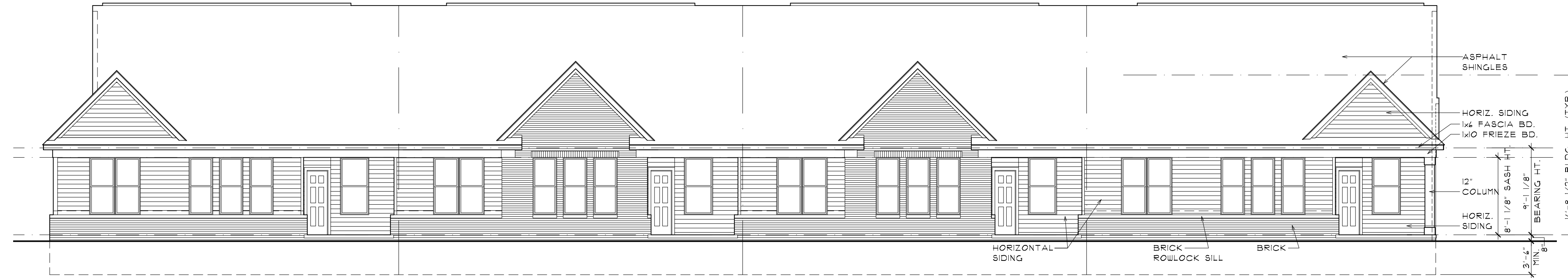
NOTE:
 SEE BUILDING RENDERINGS FOR ALL BUILDING MATERIAL COLORS. 3 DIFFERENT COLOR SCHEMES PROPOSED FOR A, B, AND C. 3RD SCHEME C SIMILAR TO 4 AND 4 UNIT RENDERINGS. ELEVATIONS RENDERED. 4 UNIT FRONT ELEVATION 'B' & UNIT FRONT ELEVATION 'A'





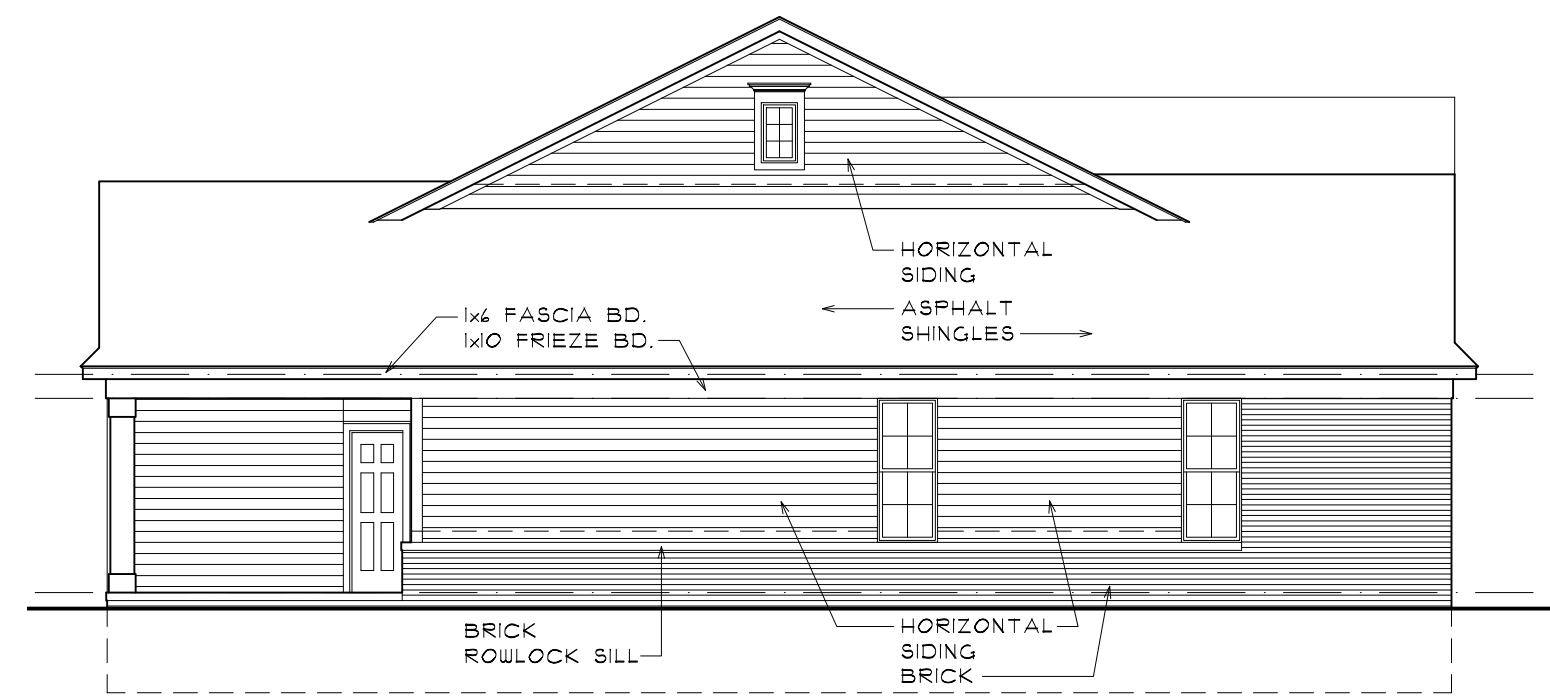
RIGHT SIDE ELEVATION 'B' ('A' and 'C' SIMILAR)

SCALE: 1/8" = 1'-0"



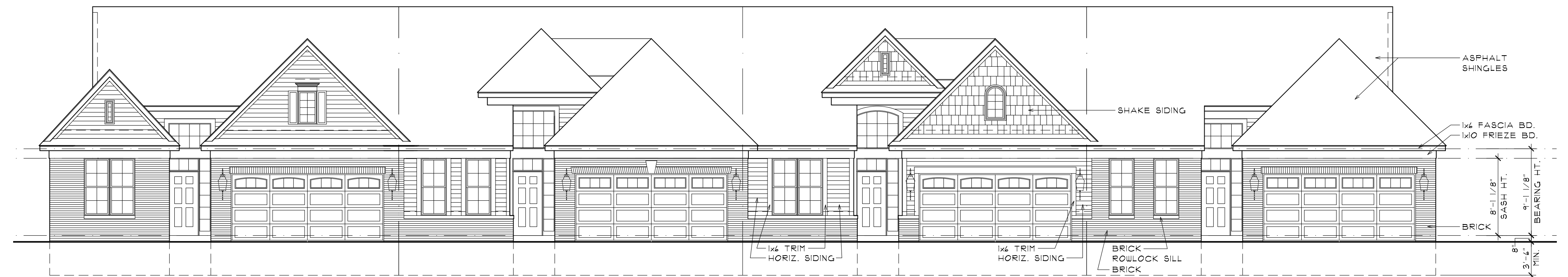
REAR ELEVATION 'A' and 'C' ('B' SIMILAR)

SCALE: 1/8" = 1'-0"



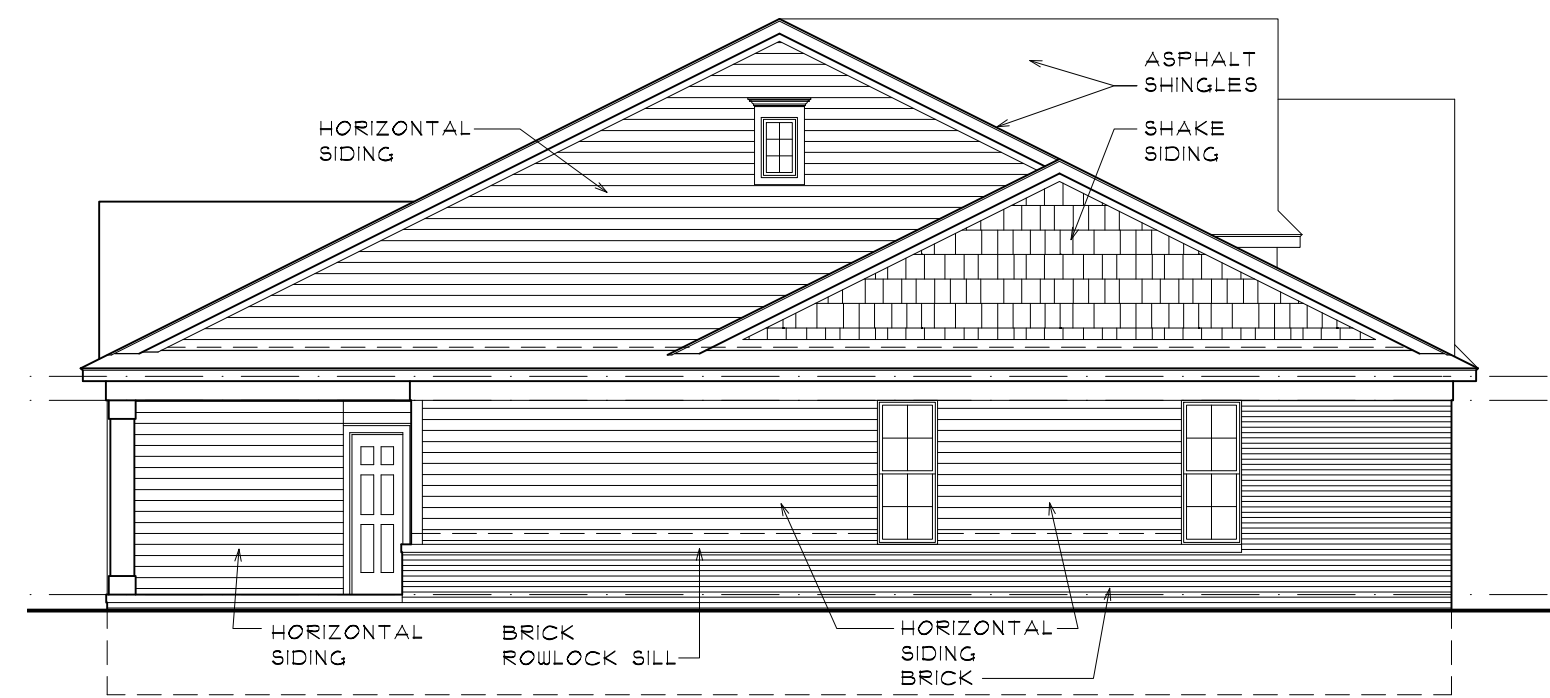
LEFT SIDE ELEVATION 'A' and 'C'

SCALE: 1/8" = 1'-0"



4 UNIT FRONT ELEVATION 'A'

SCALE: 1/8" = 1'-0"



LEFT SIDE ELEVATION 'B'

SCALE: 1/8" = 1'-0"



4 UNIT FRONT ELEVATION 'B'

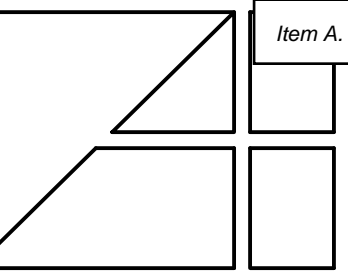
SCALE: 1/8" = 1'-0"



4 UNIT FRONT ELEVATION 'C'

SCALE: 1/8" = 1'-0"

NOTE:
SEE BUILDING RENDERINGS FOR ALL BUILDING MATERIAL COLORS. 3 DIFFERENT COLOR SCHEMES PROPOSED FOR A, B, AND C. 3RD SCHEME C SIMILAR TO 4 AND 6 UNIT RENDERINGS.
ELEVATIONS RENDERED: 4 UNIT FRONT ELEVATION 'B' & 4 UNIT FRONT ELEVATION 'A'



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Architect
BUILDING ELEVATIONS

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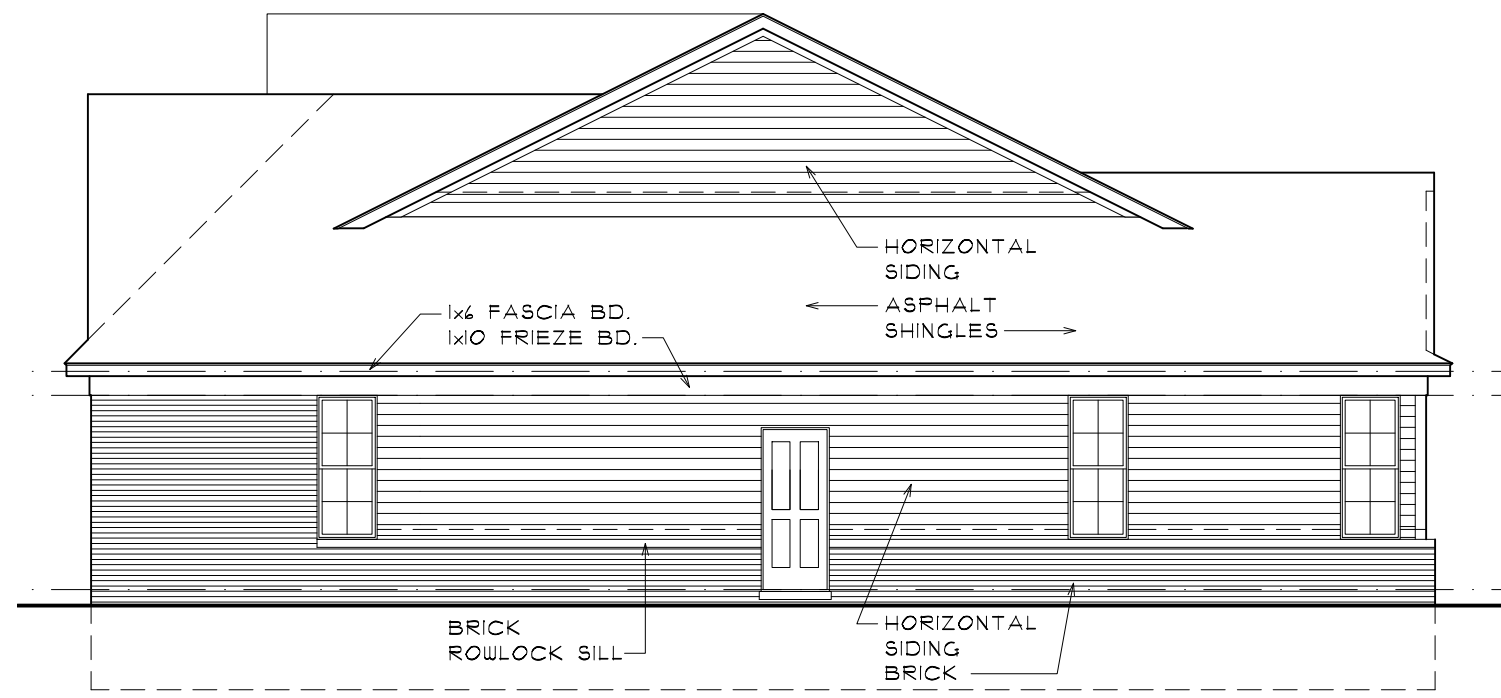
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SHEET NUMBER

A104

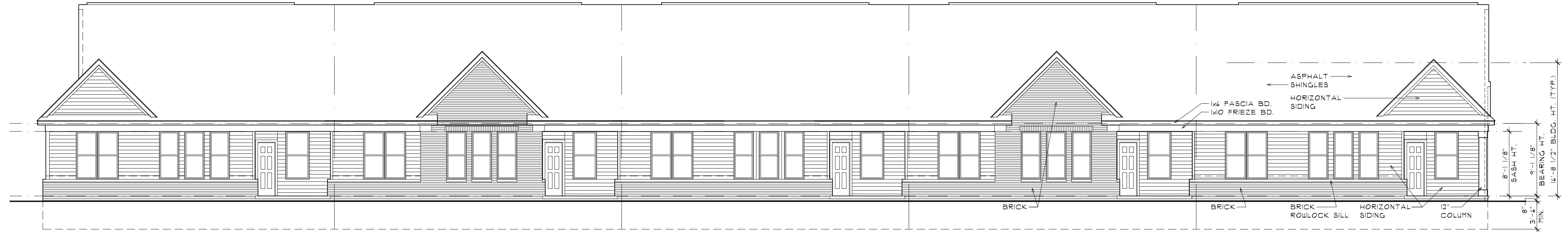
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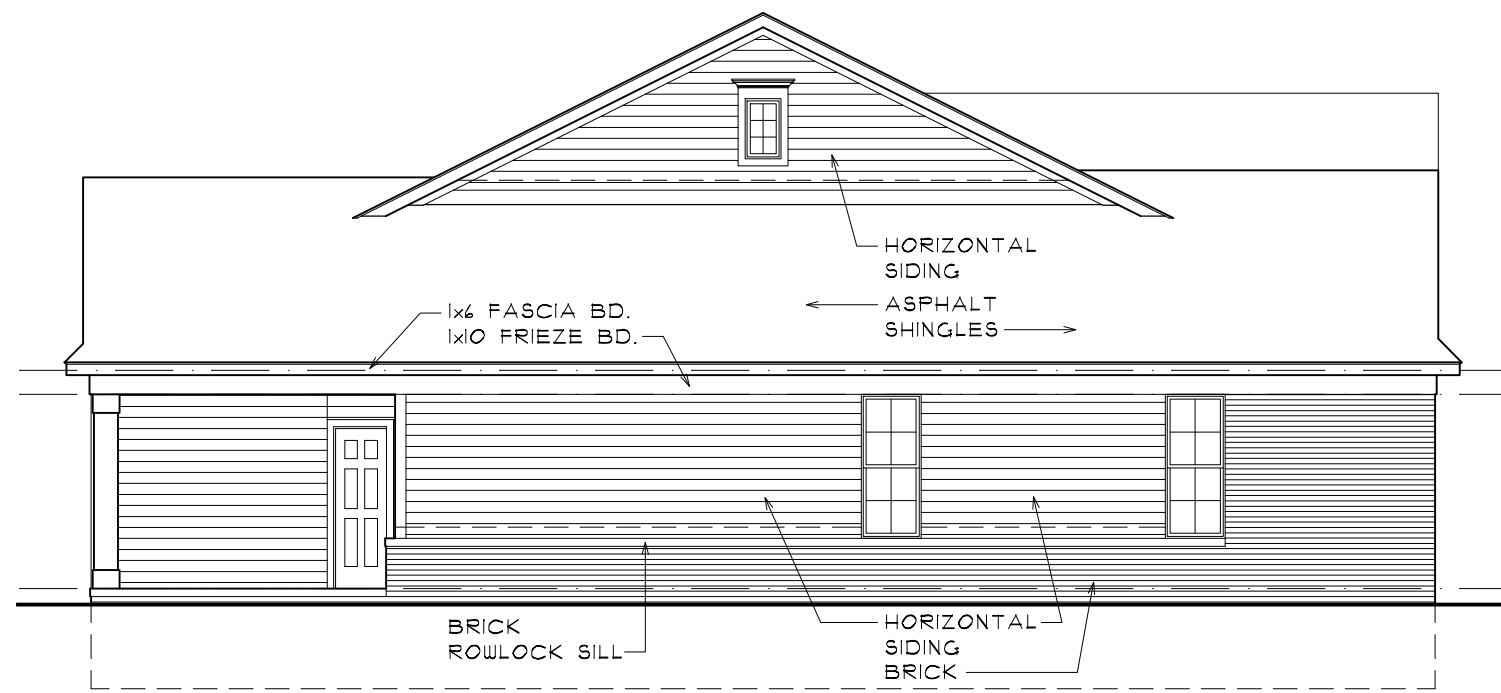
RIGHT SIDE ELEVATION 'B' ('A' and 'C' SIMILAR)

SCALE: 1/8" = 1'-0"



REAR ELEVATION 'A' and 'C' ('B' SIMILAR)

SCALE: 1/8" = 1'-0"



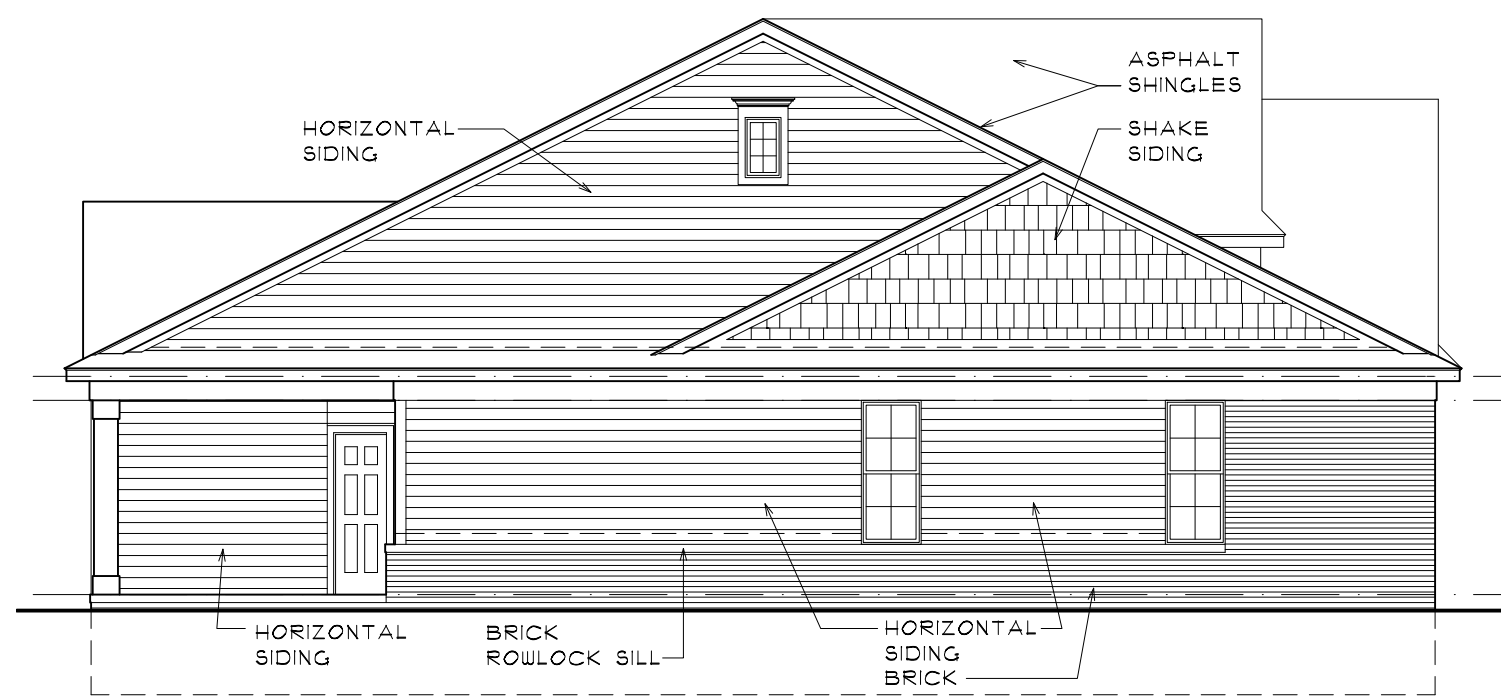
LEFT SIDE ELEVATION 'A' and 'C'

SCALE: 1/8" = 1'-0"



5 UNIT FRONT ELEVATION 'A'

SCALE: 1/8" = 1'-0"



LEFT SIDE ELEVATION 'B'

SCALE: 1/8" = 1'-0"



5 UNIT FRONT ELEVATION 'B'

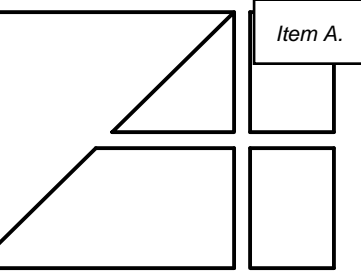
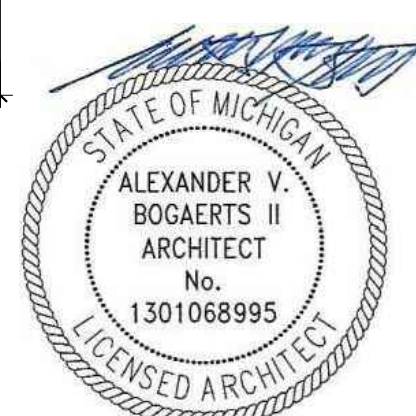
SCALE: 1/8" = 1'-0"



5 UNIT FRONT ELEVATION 'C'

SCALE: 1/8" = 1'-0"

NOTE:
SEE BUILDING RENDERINGS FOR ALL BUILDING MATERIAL COLORS. 3 DIFFERENT COLOR SCHEMES PROPOSED FOR A, B, AND C. 3RD SCHEME C SIMILAR TO 4 AND 2 UNIT RENDERINGS.
ELEVATIONS RENDERED:
4 UNIT FRONT ELEVATION 'B'
4 UNIT FRONT ELEVATION 'A'



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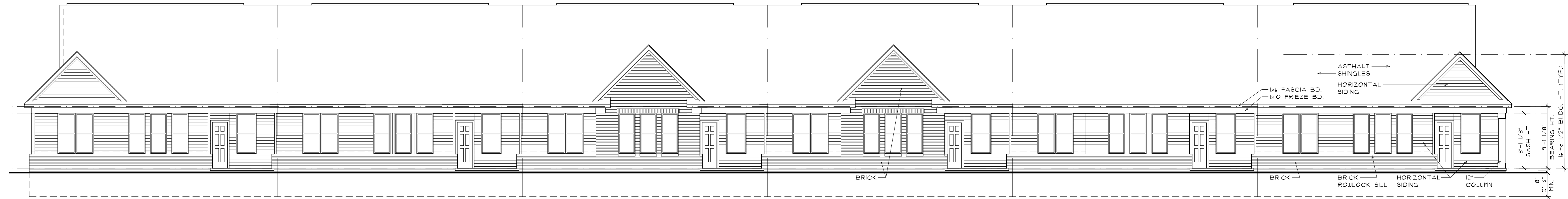
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REAR ELEVATION 'A' and 'C' ('B' SIMILAR)

SCALE: 1/8" = 1'-0"



6 UNIT FRONT ELEVATION 'A'

SCALE: 1/8" = 1'-0"

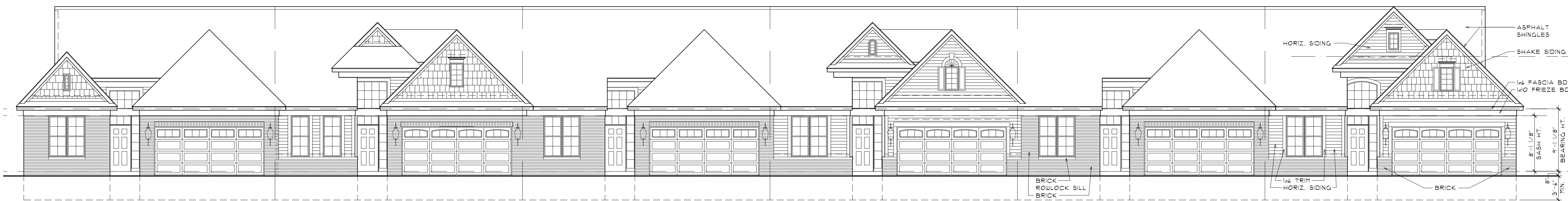


6 UNIT FRONT ELEVATION 'B'

SCALE: 1/8" = 1'-0"

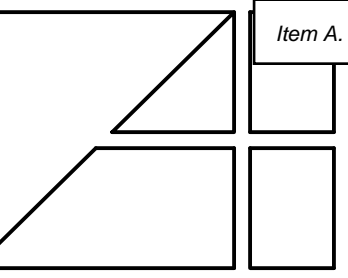
NOTE:
SEE BUILDING RENDERINGS FOR ALL BUILDING MATERIAL COLORS. 3 DIFFERENT COLOR SCHEMES PROPOSED FOR A, B, AND C. 3RD SCHEME C SIMILAR TO 4 AND 6 UNIT RENDERINGS.
ELEVATIONS RENDERED: 4 UNIT FRONT ELEVATION 'B' & 4 UNIT FRONT ELEVATION 'A'

NOTE:
REFER TO SHEET A105 FOR BUILDING SIDE ELEVATIONS



6 UNIT FRONT ELEVATION 'C'

SCALE: 1/8" = 1'-0"



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BUILDING ELEVATIONS

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PRELIMINARY
2022-03-29

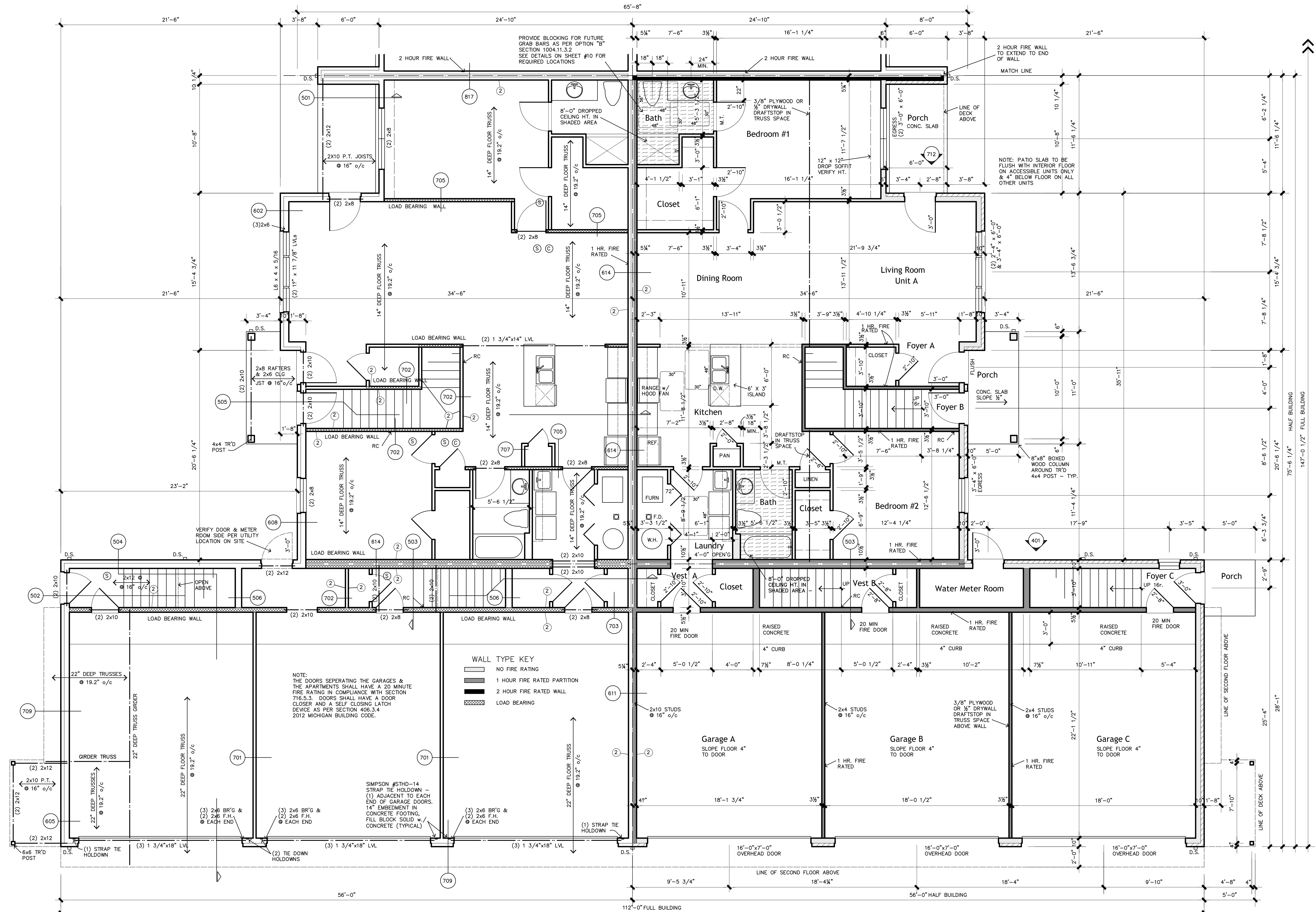
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2022-04-01
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CHECKED BY
JOB NUMBER
2451
DATE
2022-03-29
SHEET NUMBER



A106
236



WALL TYPE KEY

[White Box]	NO FIRE RATING
[Grey Box]	1 HOUR FIRE RATED PARTITION
[Black Box]	2 HOUR FIRE RATED WALL
[Hatched Box]	LOAD BEARING

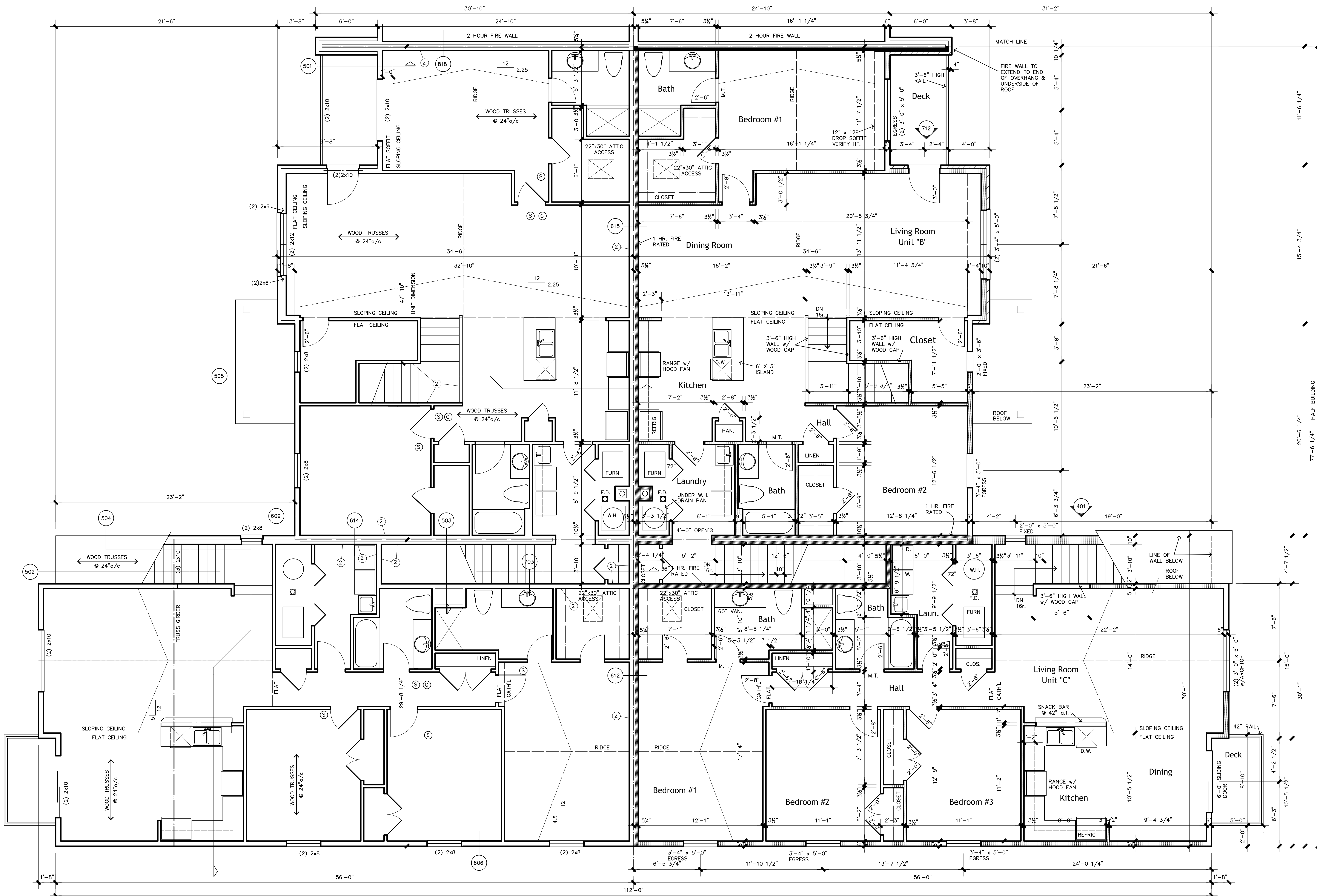
NOTE: THE DOORS SEPARATING THE GARAGES & THE APARTMENTS SHALL HAVE A 20 MINUTE FIRE RATING IN COMPLIANCE WITH SECTION 716.5.3. DOORS SHALL HAVE A DOOR CLOSER AND A SELF-CLOSING LATCH DEVICE AS PER SECTION 406.3.4 2012 MICHIGAN BUILDING CODE.

SIMPSON #5THD-14 STRAP TIE HOLDDOWN - (1) ADJACENT TO EACH END OF GARAGE DOORS. 14" EMBEDMENT IN CONCRETE FOOTING, FILL BLOCK SOLID W/ CONCRETE (TYPICAL)

First Floor Plan
Scale: 1/4" = 1'-0"

Type "B" Units
ALL UNITS EXCEPT FOR: BUILDINGS #3, #4 & #9 - SEE SHEET #10 BUILDING #10 - SEE SHEET #11

REPRODUCTION OF PRINTS IS PROHIBITED.



WALL TYPE KEY

(Thin solid line)	NO FIRE RATING
(Thick solid line)	1 HOUR FIRE RATED PARTITION
(Dashed line)	2 HOUR FIRE RATED WALL
(Cross-hatched pattern)	LOAD BEARING

Second Floor Plan
 Scale: 1/4" = 1'-0"

ALL UNITS "B" & "C" ARE NOT ACCESSIBLE UNITS.

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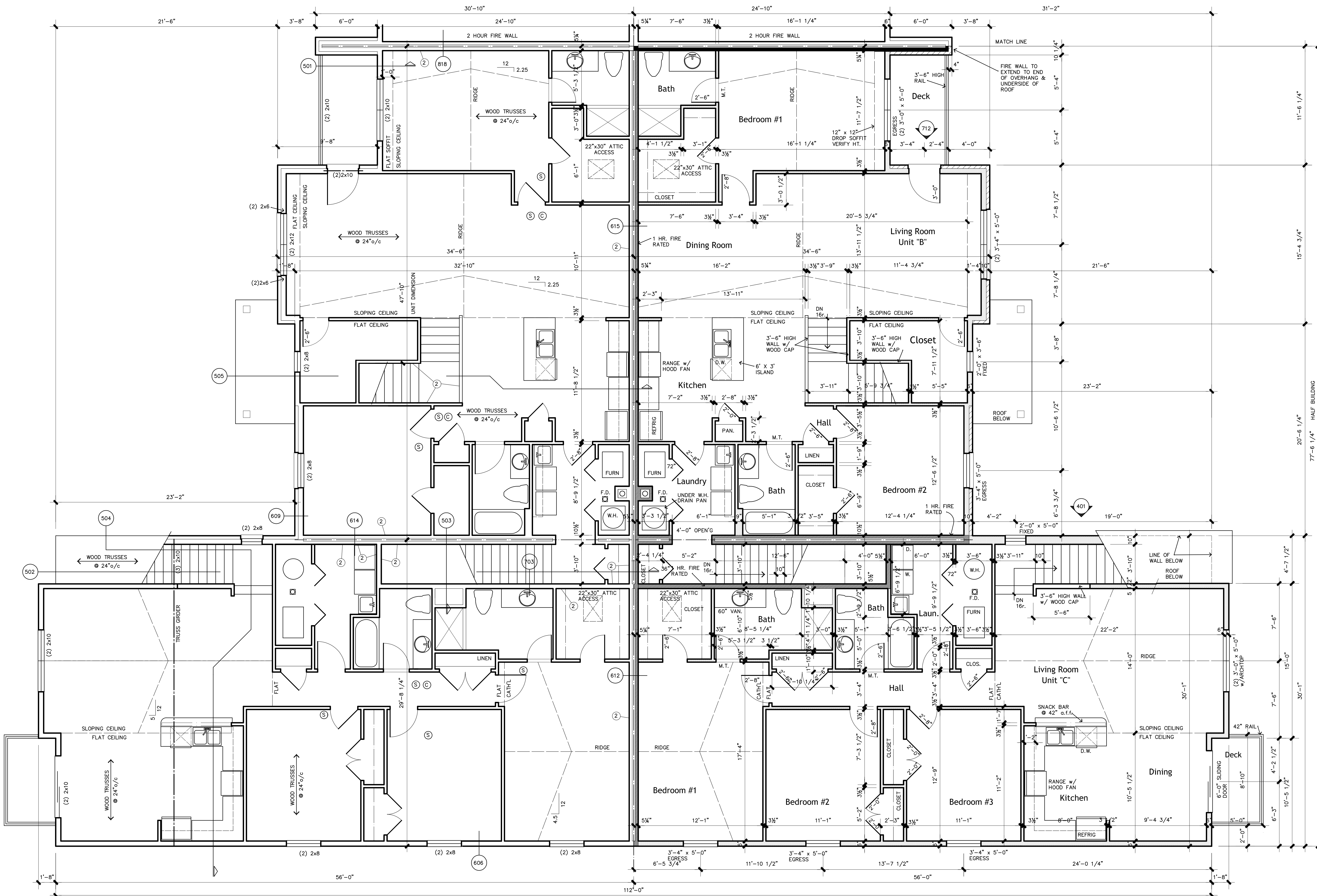
Proposed Condominiums for:
MJC
 12 - Plex Condominiums

Architects • Engineers • Historic Restorations
 110 W. St. Clair • Romeo • Michigan • 48065-4655
 Office 586-752-9010 • 586-201-1602 Cell
 greatarchitects@charter.net
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Sheet Contents:
 Second Floor
 Job: 18173
 Drawn by: REB
 Date: 17JUL18
 Sheet Number:

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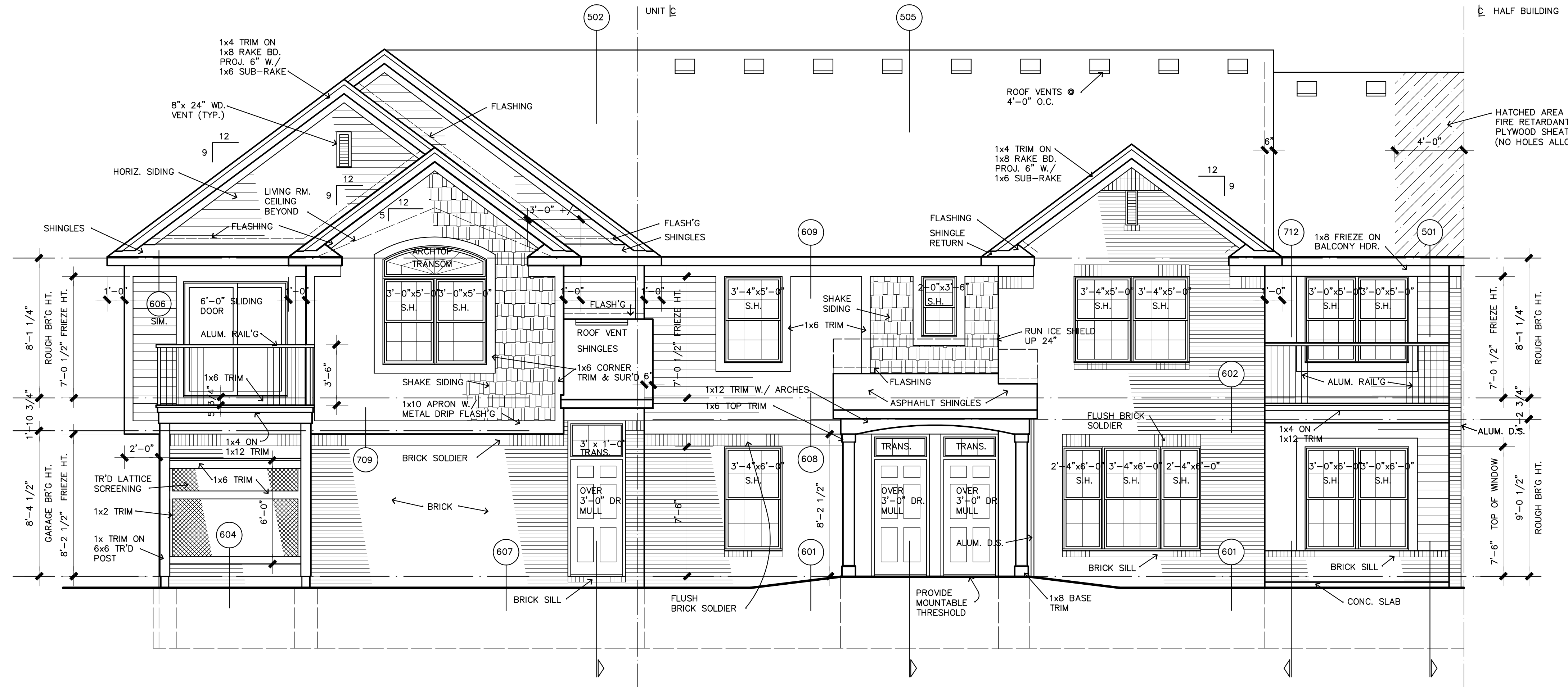


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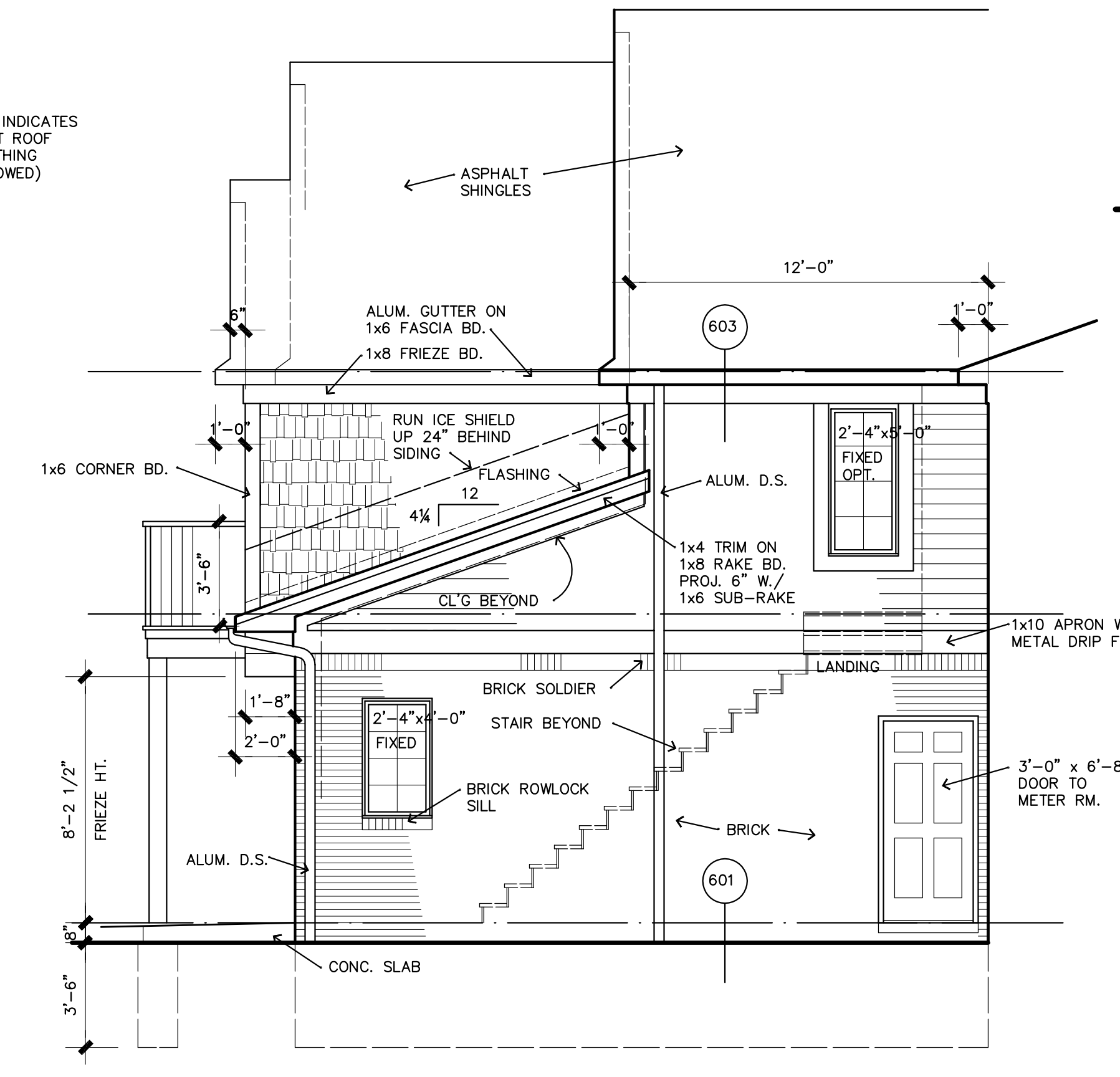
(Thin solid line)	NO FIRE RATING
(Dashed line)	1 HOUR FIRE RATED PARTITION
(Thick solid line)	2 HOUR FIRE RATED WALL
(Cross-hatched pattern)	LOAD BEARING

Second Floor Plan
 Scale: 1/4" = 1'-0"

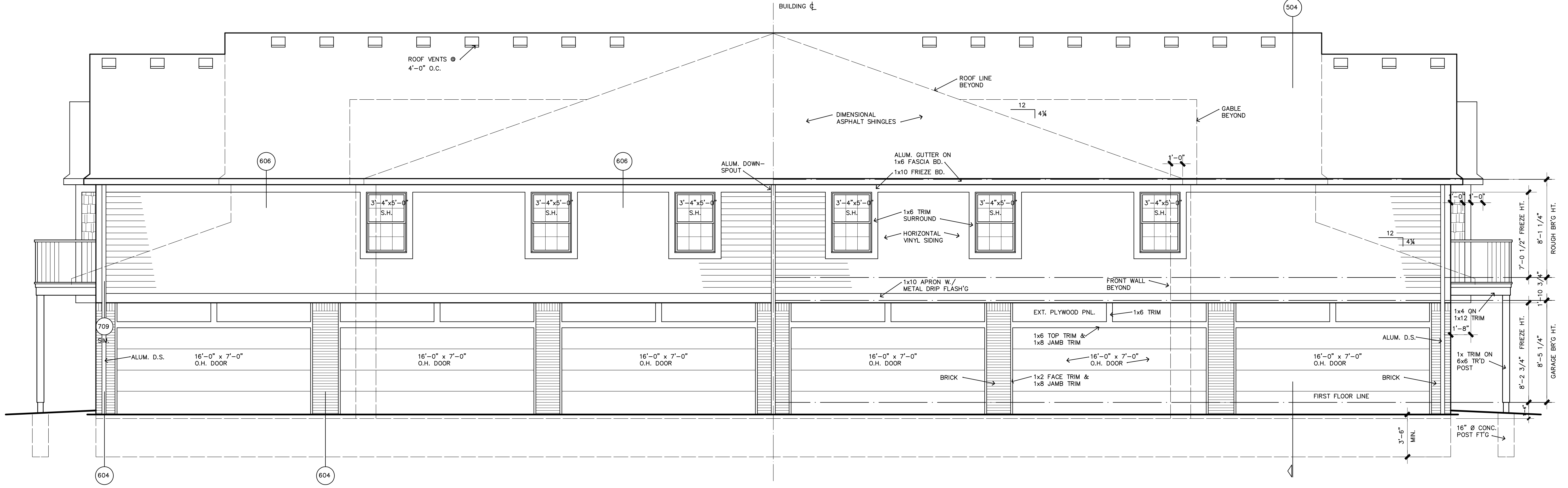
ALL UNITS "B" & "C" ARE NOT ACCESSIBLE UNITS.



Front/Rear Elevation "A"
 Scale: 1/4" = 1'-0"



401 Partial Elevation "A"
 Scale: 1/4" = 1'-0"

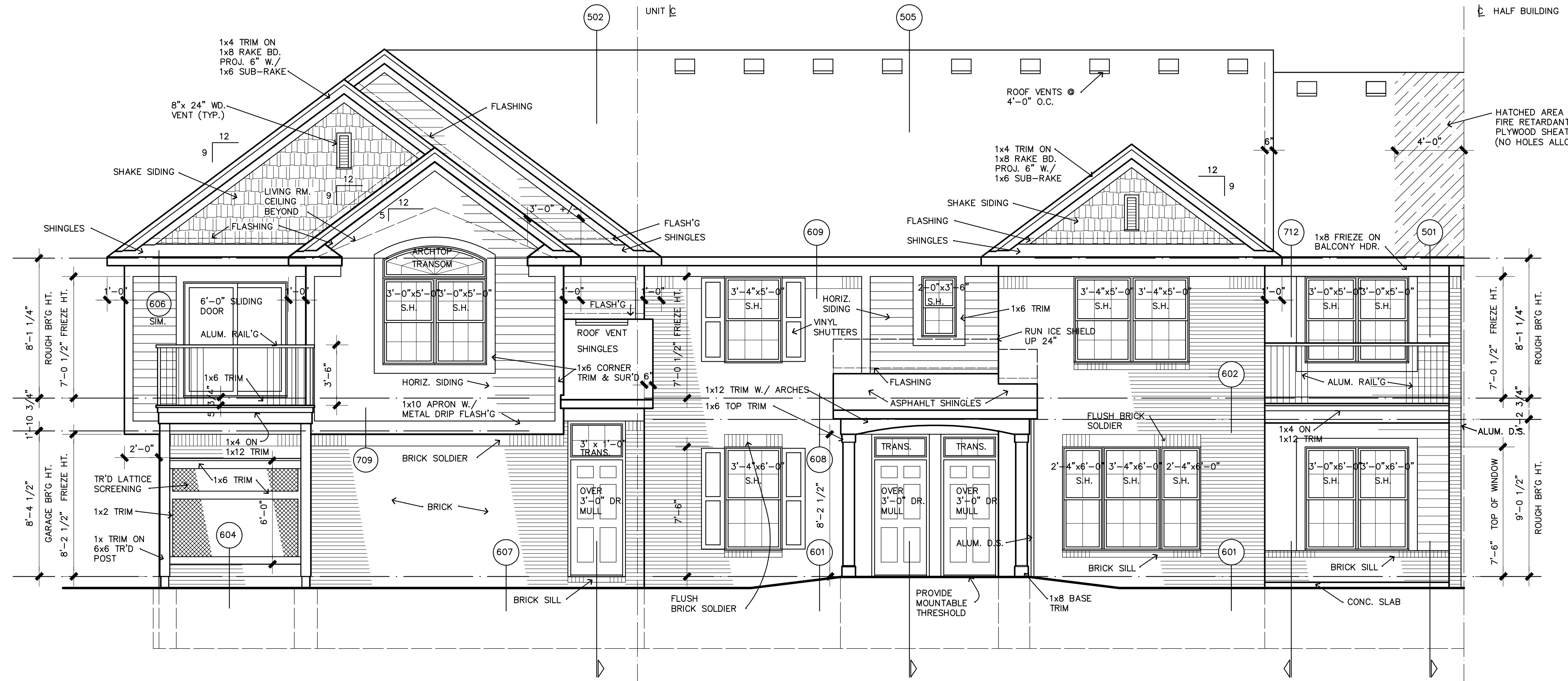


Side Elevation "A"
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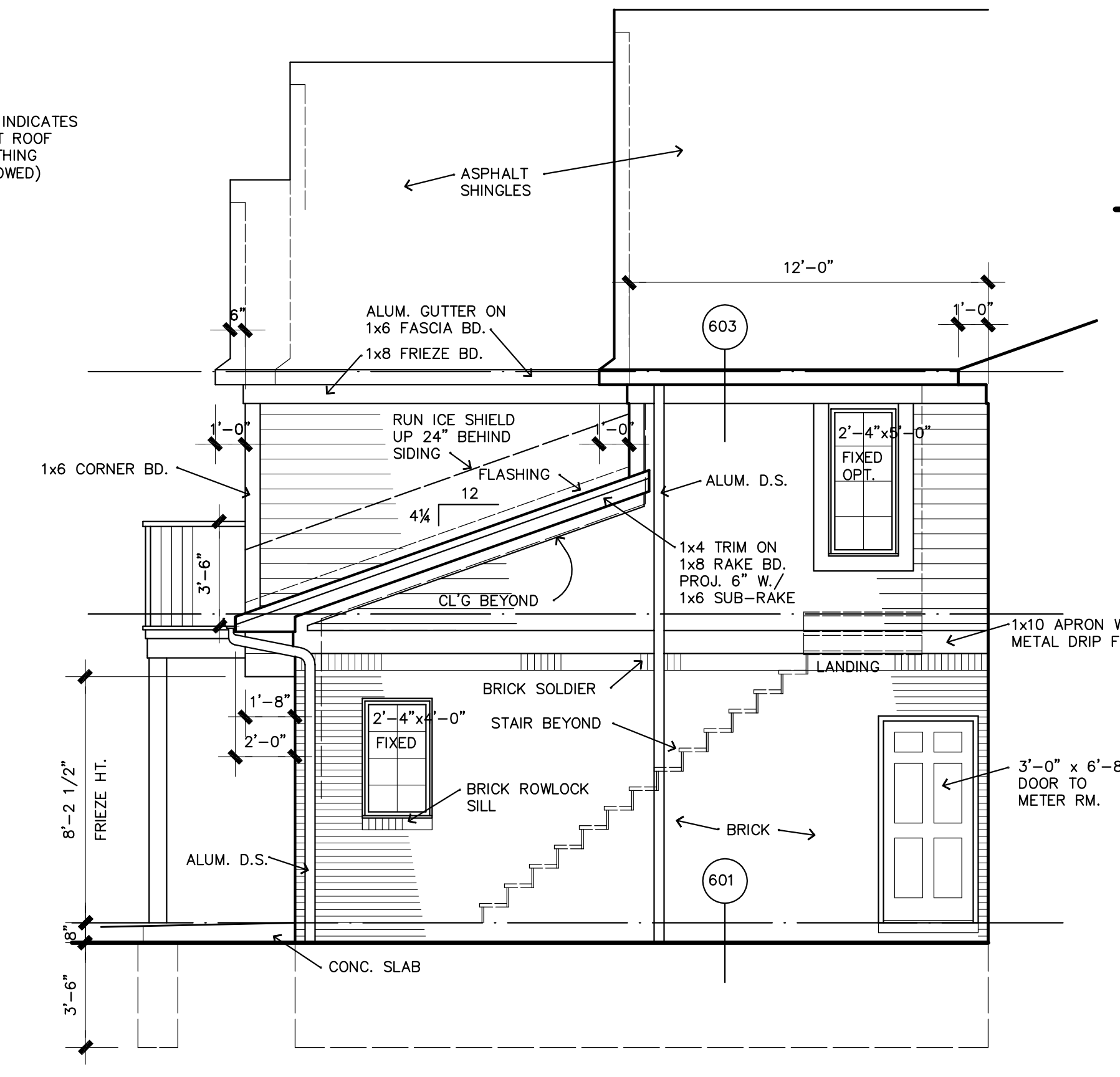
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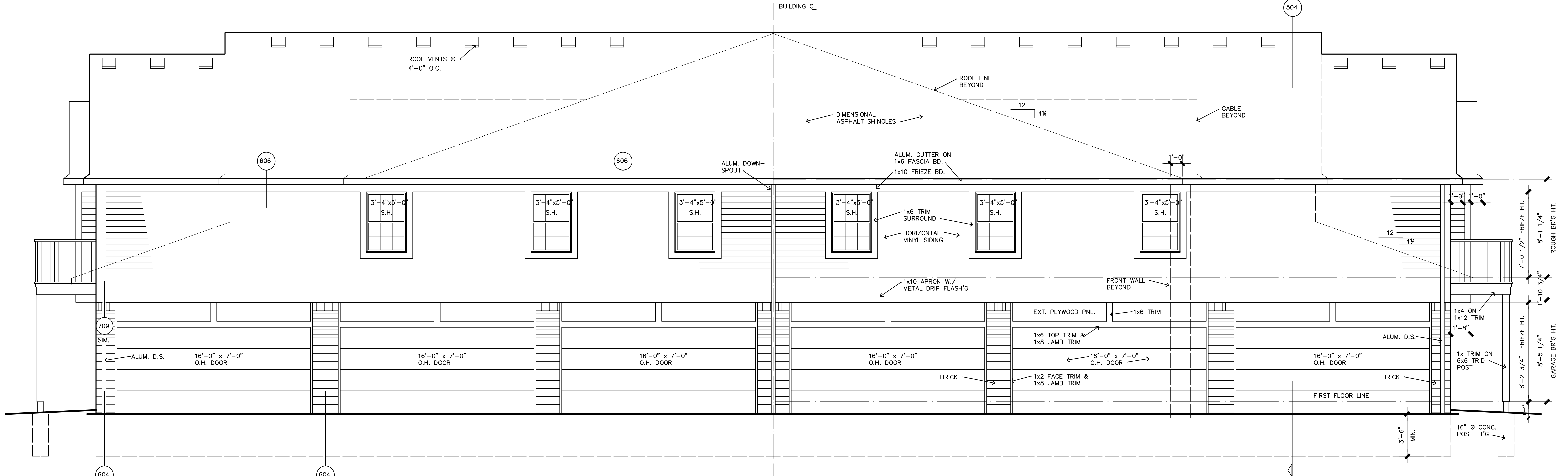
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 Job: 18173
 Drawn by: MAK
 Date: 17JUL18
 Sheet Number:



Front/Rear Elevation "B"
 Scale: 1/4" = 1'-0"



401 Partial Elevation "B"
 Scale: 1/4" = 1'-0"



Side Elevation "B"
 Scale: 1/4" = 1'-0"

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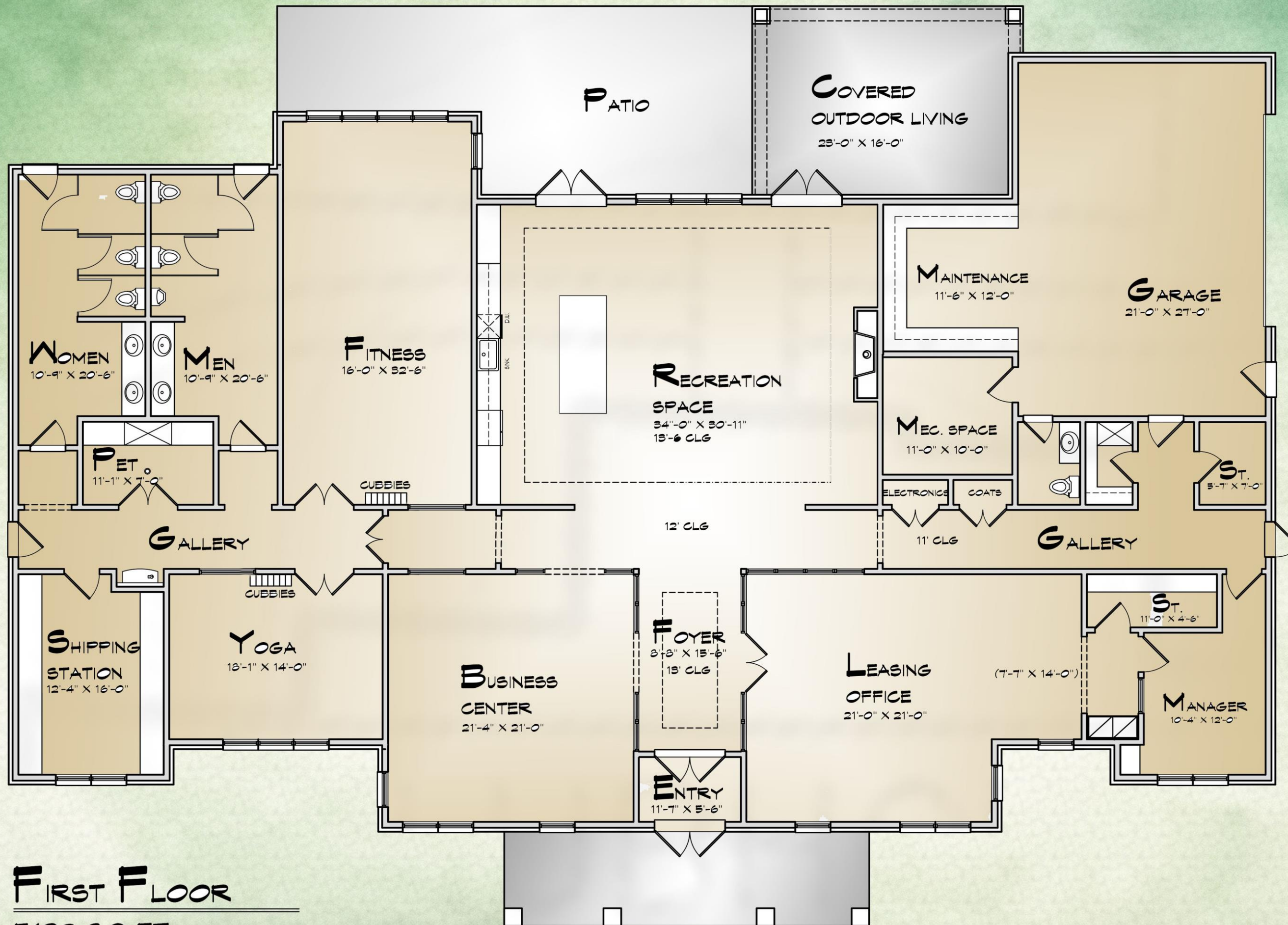
WHITE LAKE HILLS
PROPOSED CLUBHOUSE

+ OPT. 5132 SQ.FT. BONUS

11-13-2021

VERSION 3





FIRST FLOOR

5132 SQ FT

(EXCLUDES GARAGE AND MAINTANCE AREA)

10' CLG



PROPOSED CRAFTSMAN CLUB HOUSE
ENTRY SIDE



PROPOSED CRAFTSMAN CLUB HOUSE
POOL SIDE



ABERDEEN

First Level	1,182 sf
Second Level	1,091 sf
Total	2,273 sf

THE CRAFTSMAN

Craftsman architecture has been one of America's most iconic styles for decades. The historic design includes an array of distinctive porches, gables, siding materials and stately rooflines.

THE NEXT GENERATION OF STYLE

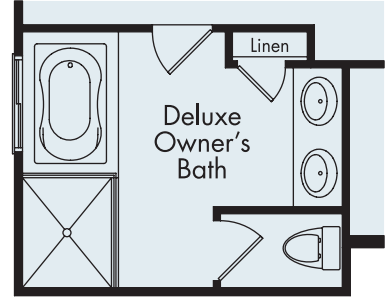
MJC homes are a lot like custom homes without the expense and added stress of starting with a blank canvas. Begin by browsing our newest collection of modern living designs and personalize the spaces that matter most to your family. Want a special style of cabinets and countertops? Unique flooring options? It's up to you. Personalize one of our award-winning home designs to your heart's content. Then sit back and watch your worry-free building experience unfold. Come explore your options to live better with MJC.

ABERDEEN

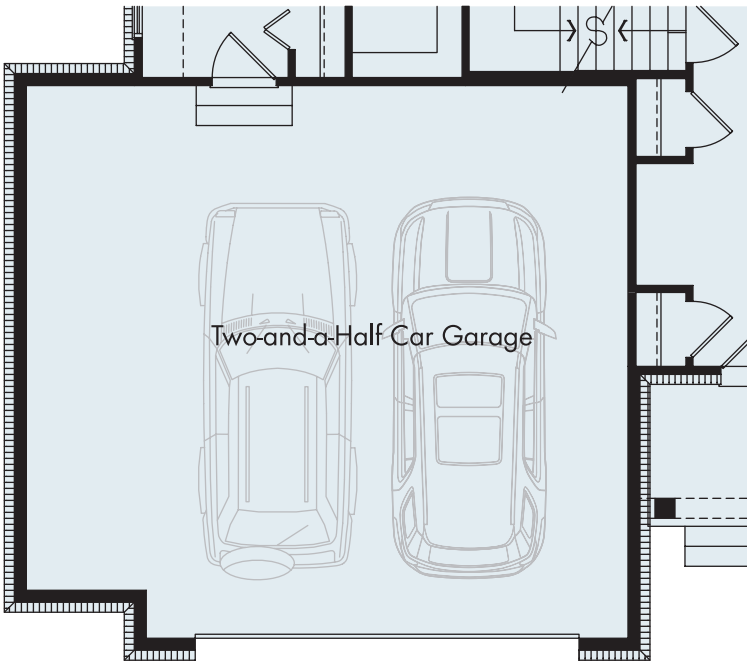
First Level 1,182 sf
 Second Level 1,091 sf
 Total 2,273 sf



The Aberdeen is designed for entertaining and flexible family living. There's smart space for everything — main-floor study, a mud room with an optional bench, island kitchen with walk-in pantry, large family room with fireplace, and options for a covered porch or harvest room off the dining area. Upstairs, there's a convenient laundry room, private wing with an elegant owner's suite, complete with its own luxurious bath and walk-in closet. There are also options for an oversized 2.5-car or 3-car garage.



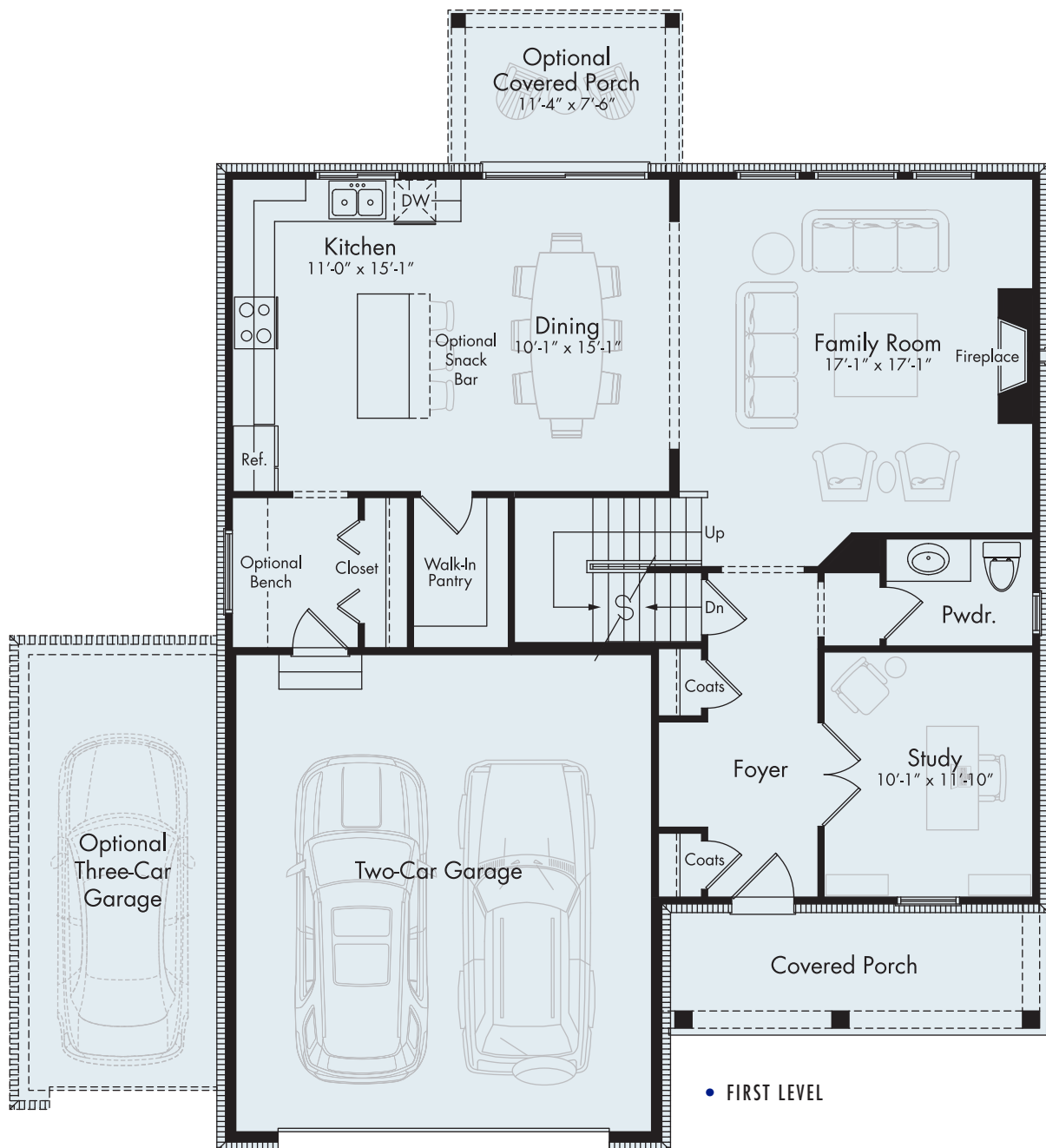
• OPTIONAL DELUXE OWNER'S BATH



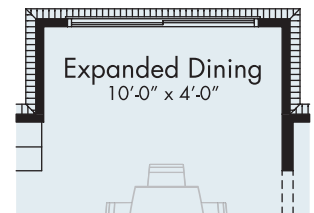
• OPTIONAL TWO-AND-A-HALF CAR GARAGE



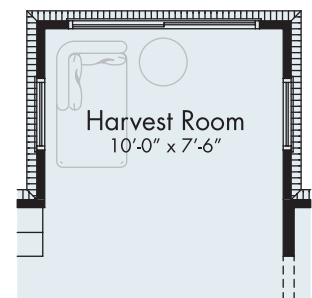
• SECOND LEVEL



• FIRST LEVEL



• OPTIONAL EXPANDED DINING ROOM



• OPTIONAL HARVEST ROOM

The Wide Choice of Elevations Create a Varied and Appealing Streetscape in Your Neighborhood



THE FRENCH ECLECTIC

American soldiers returned home in the mid-1920's with romantic thoughts of French architecture. This timeless, eclectic style showcases rich exterior materials with tall, steeply pitched roofs, dormers and shutters.



THE FARMHOUSE

Modern farmhouse architecture evokes feelings of warmth and comfort. This historic style combines clean lines with rustic touches to provide a relaxed level of sophistication.



THE TRADITIONAL

MJC's traditional elevation styles are modern interpretations of classic forms that provide an attractive, cohesive look to the community. Our traditional elevations offer eye-pleasing symmetry, brick details and timeless color palettes.



BERKSHIRE

First Level 1,653 sf

THE CRAFTSMAN

Craftsman architecture has been one of America's most iconic styles for decades. The historic design includes an array of distinctive porches, gables, siding materials and stately rooflines.

THE NEXT GENERATION OF STYLE

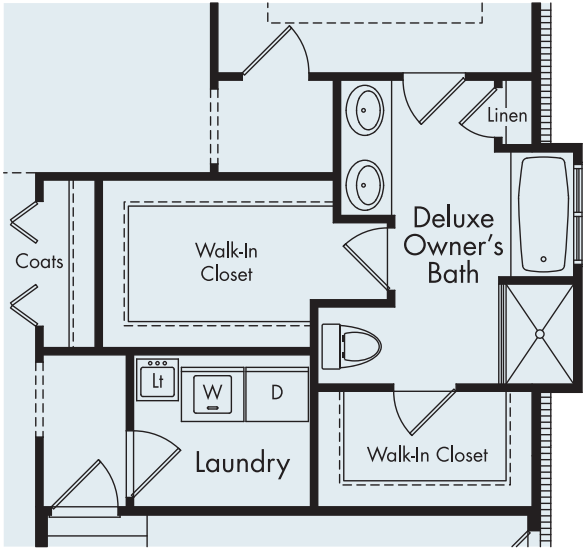
MJC homes are a lot like custom homes without the expense and added stress of starting with a blank canvas. Begin by browsing our newest collection of modern living designs and personalize the spaces that matter most to your family. Want a special style of cabinets and countertops? Unique flooring options? It's up to you. Personalize one of our award-winning home designs to your heart's content. Then sit back and watch your worry-free building experience unfold. Come explore your options to live better with MJC.

BERKSHIRE

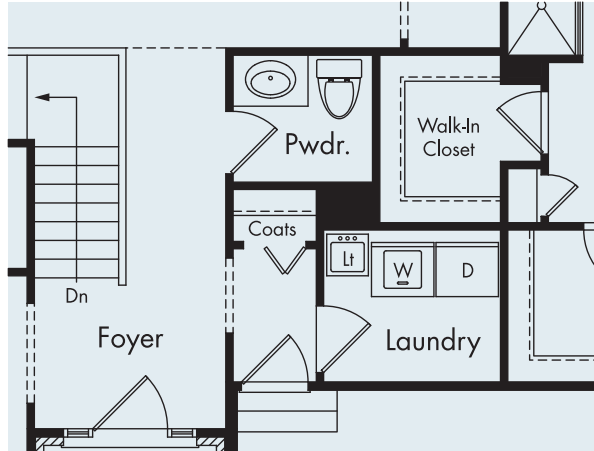
First Level 1,653 sf



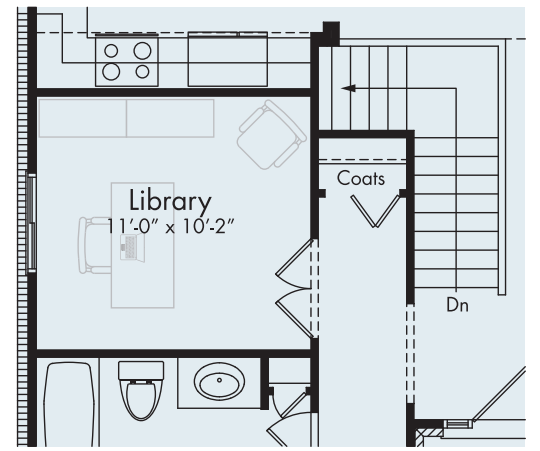
We designed the Berkshire to offer modern, single-level living with a casual touch. The kitchen, family room and dining area have all been brought together to create an open flow for relaxed family times and lively entertaining. Whether you were unwinding in the family room or gathering in the spacious island kitchen, you'll love the natural sunlight that comes in from all the windows in the main living area. The owner's suite showcases the stepped ceiling, spacious private bath and twin walk-in closets. Another wing at the front of the home contains two spacious bedrooms with walk-in closets and access to a second full bath.



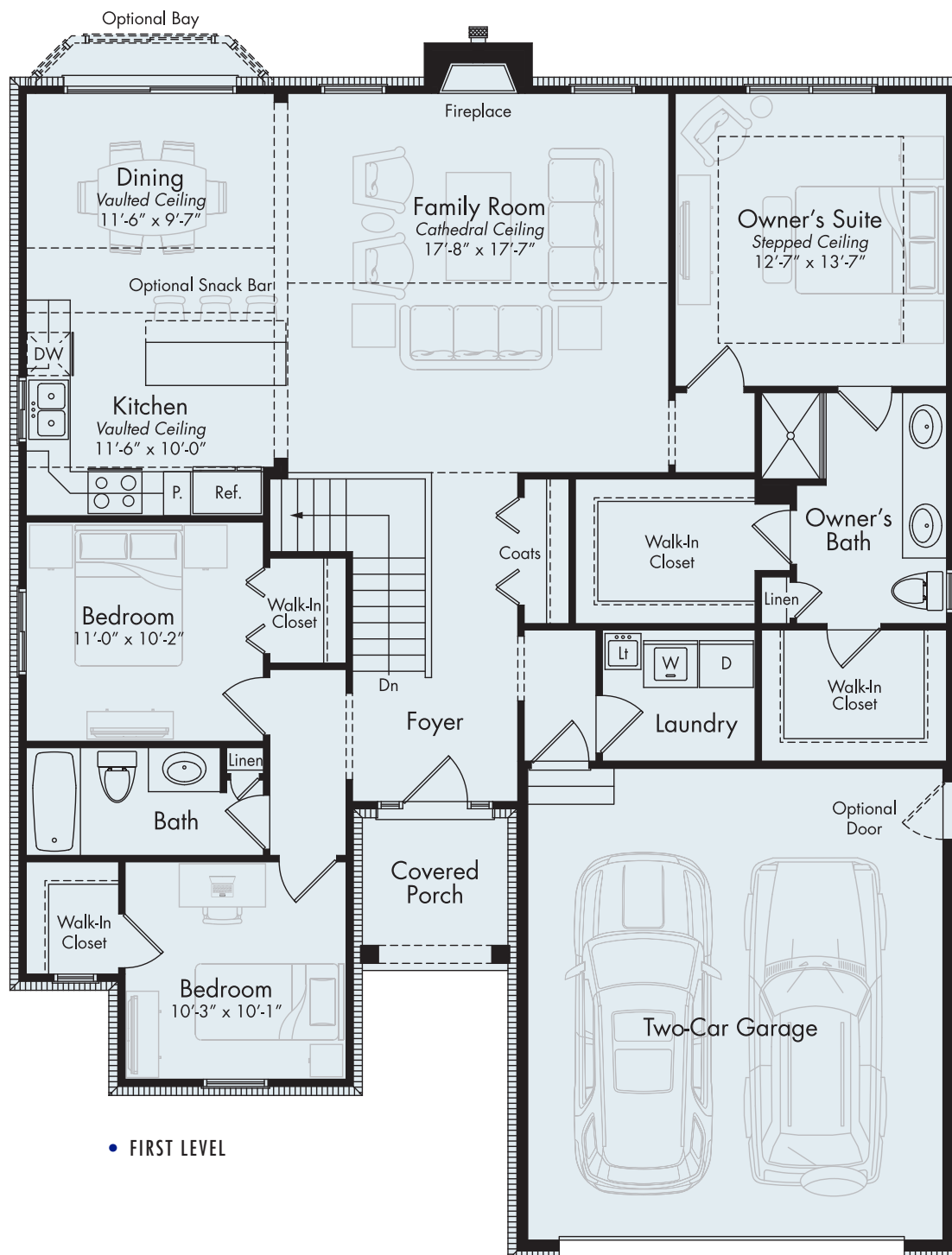
• OPTIONAL DELUXE OWNER'S BATH



• OPTIONAL POWDER ROOM



• OPTIONAL LIBRARY



• FIRST LEVEL

The Wide Choice of Elevations Create a Varied and Appealing Streetscape in Your Neighborhood



THE FRENCH ECLECTIC

American soldiers returned home in the mid-1920's with romantic thoughts of French architecture. This timeless, eclectic style showcases rich exterior materials with tall, steeply pitched roofs, dormers and shutters.



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Modern farmhouse architecture evokes feelings of warmth and comfort. This historic style combines clean lines with rustic touches to provide a relaxed level of sophistication.



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BURBANK

First Level	1,332 sf
Second Level	1,160 sf
Total	2,492 sf

THE CRAFTSMAN

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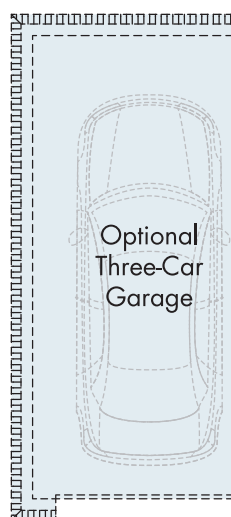
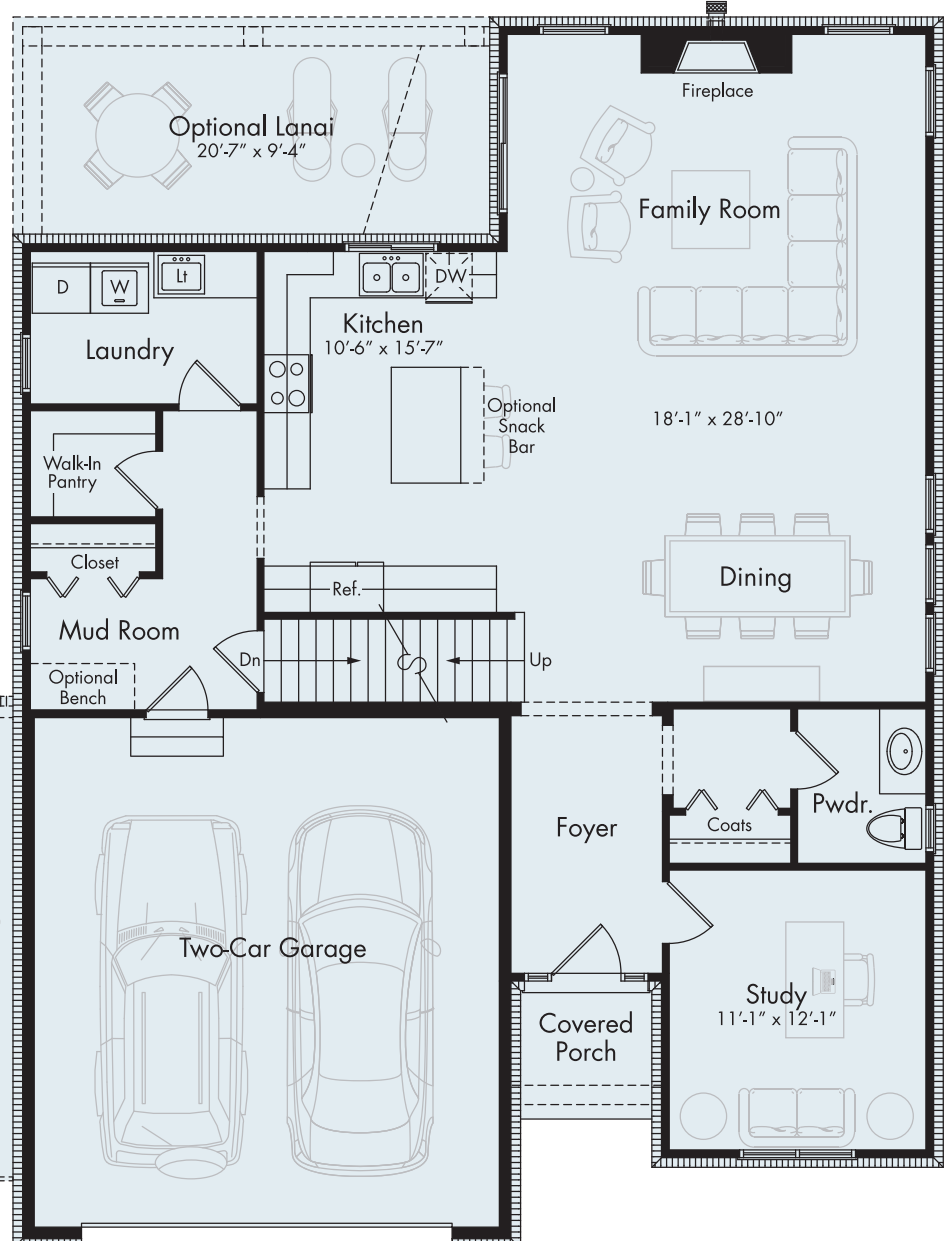
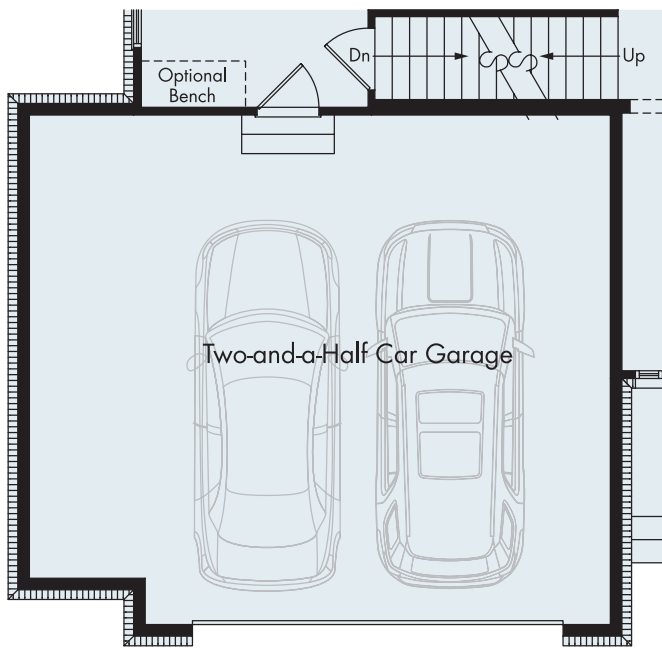
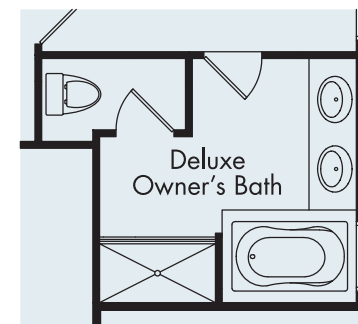
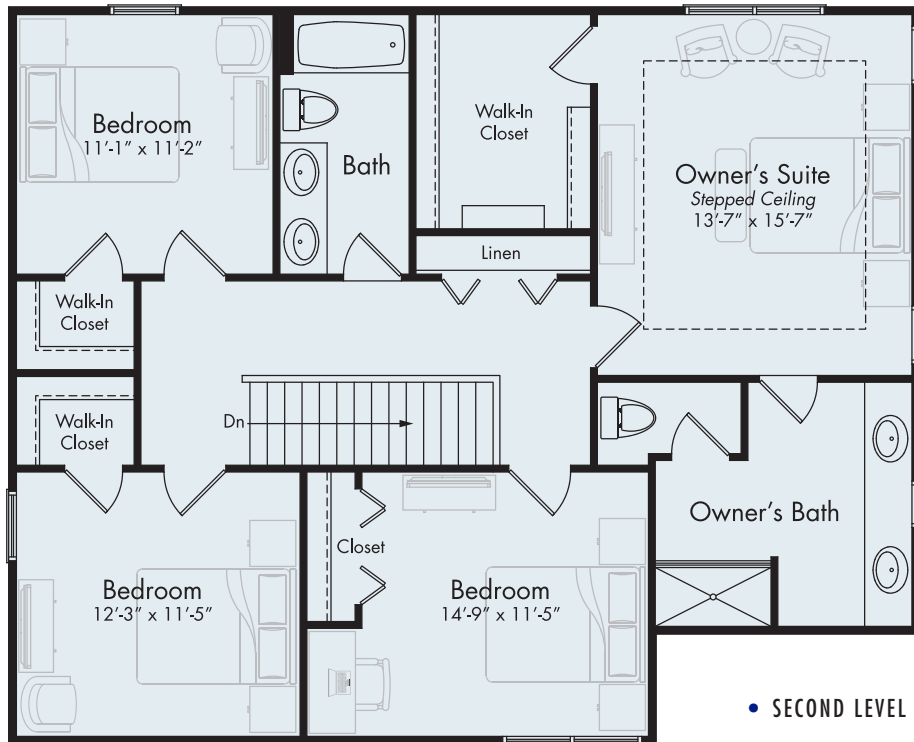
BURBANK

First Level 1,332 sf
 Second Level 1,160 sf
 Total 2,492 sf



The two-story Burbank is a stunning open concept plan with an L-shaped living area that includes the family room, oversized dining room and enormous island kitchen. The optional lanai vastly increases the living space and brings the outdoors into this spacious home. The main floor also includes a secluded study, guest closet, powder room, mud room, walk-in pantry and laundry room. No convenience was overlooked, including the option of a 2.5- or 3-car garage.

Upstairs, the owner's suite features a stepped ceiling, spacious bath with an optional whirlpool tub and oversized walk-in closet. Three more large bedrooms share a central bath with double sinks. No convenience was overlooked, including the option of a 2.5- or 3-car garage.



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CAMPBELL

First Level	1,217 sf
Second Level	1,402 sf
Total	2,619 sf

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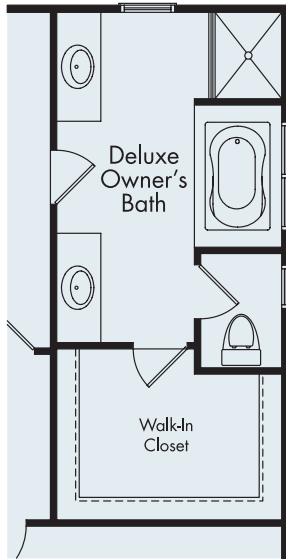
CAMPBELL

First Level 1,217 sf
 Second Level 1,402 sf
 Total 2,619 sf

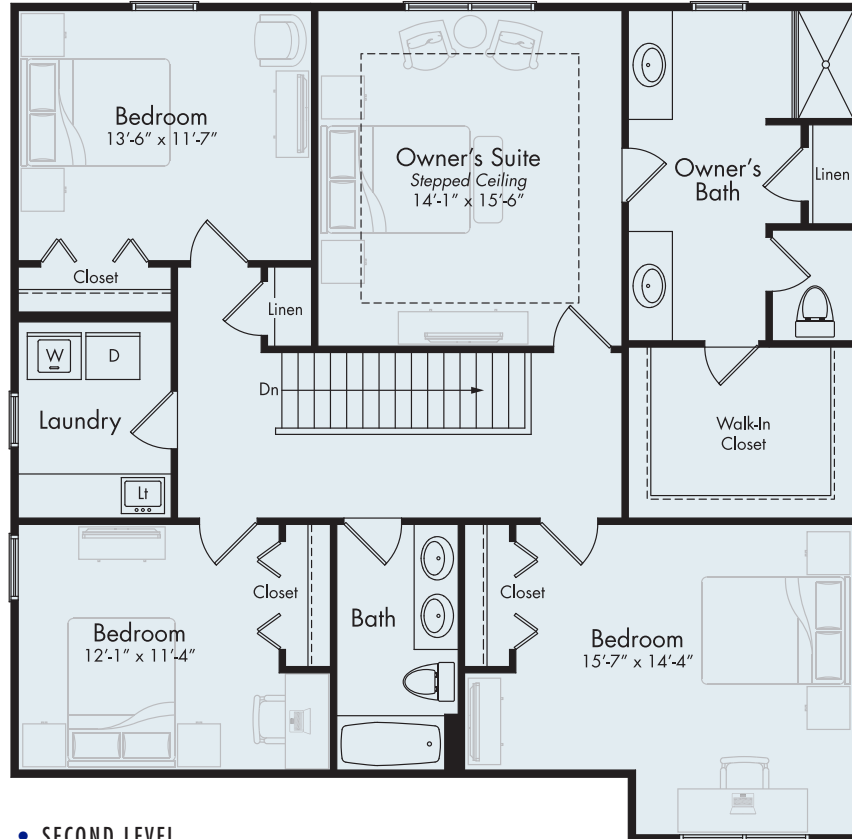


The four-bedroom Campbell is an ideal family home with two spacious levels. The foyer opens to reveal the family room with its centered fireplace and triple windows. This sunny dining room with its sliding glass doorwall can extend outdoors for an optional covered porch. The U-shaped kitchen is centered on a convenient island with snack bar seating. The main floor also includes a secluded study, powder room, mud room and walk-in pantry.

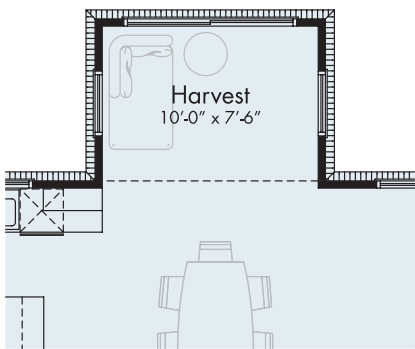
The upper level showcases the owner's suite with stepped ceiling, spacious bath with twin vanities, and large walk-in closet. There is also an option to include a whirlpool tub. There are three more bedrooms on the second floor along with a full bath and oversized laundry room.



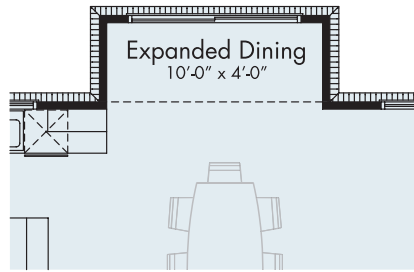
• OPTIONAL DELUXE OWNER'S BATH



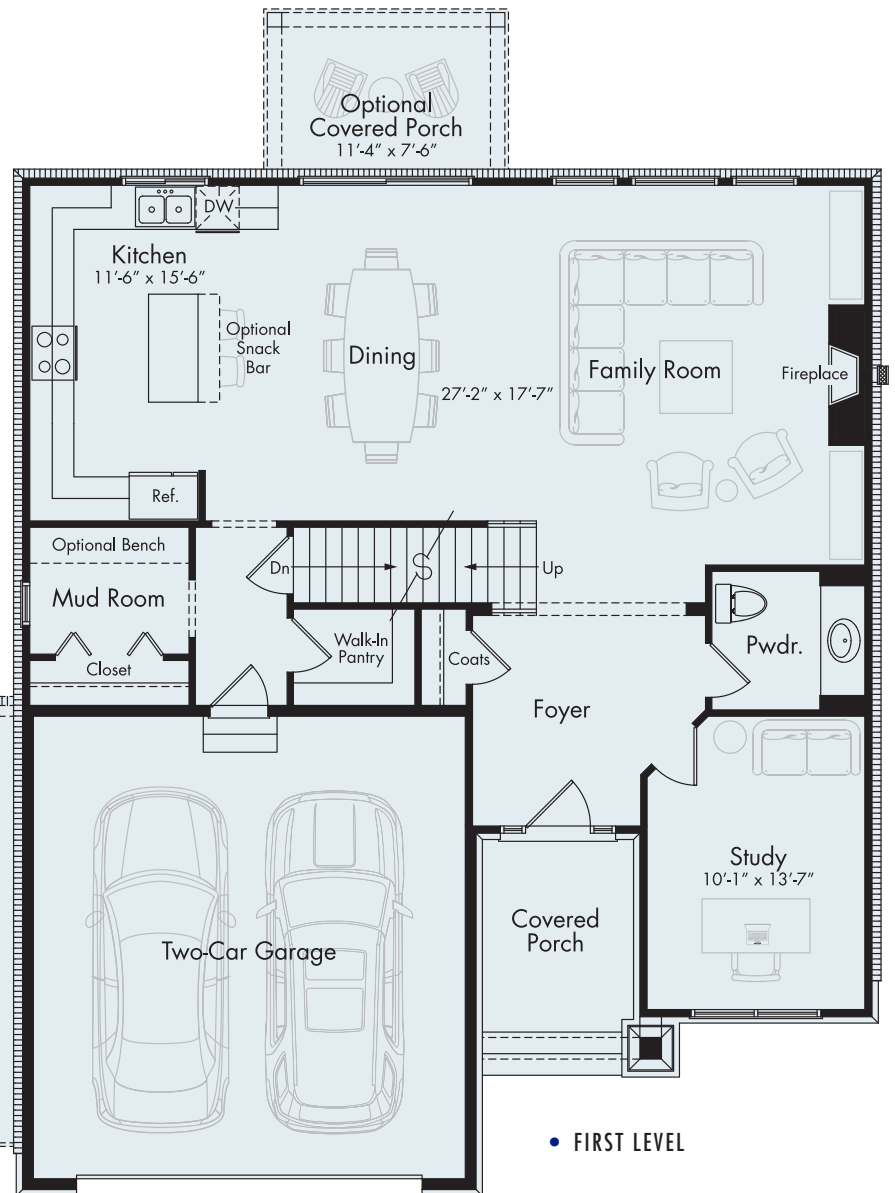
• SECOND LEVEL



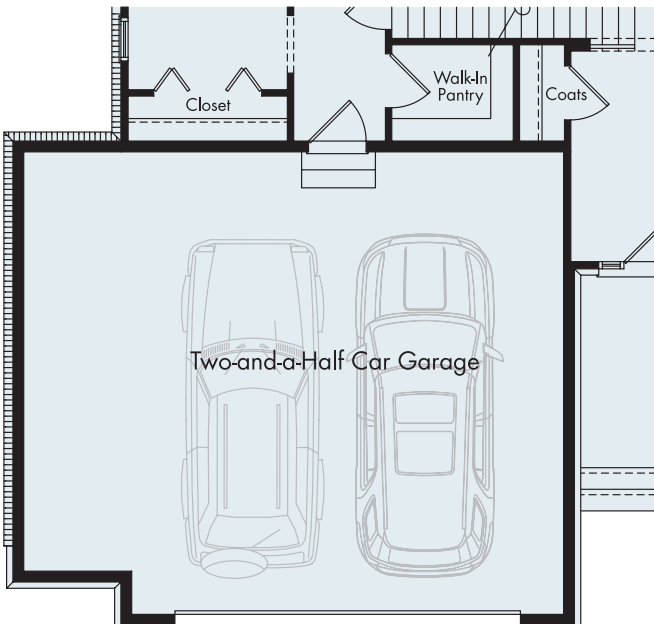
• OPTIONAL HARVEST ROOM



• OPTIONAL EXPANDED DINING ROOM



• FIRST LEVEL



• OPTIONAL TWO-AND-A-HALF CAR GARAGE



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CYPRESS

First Level 1,539 sf

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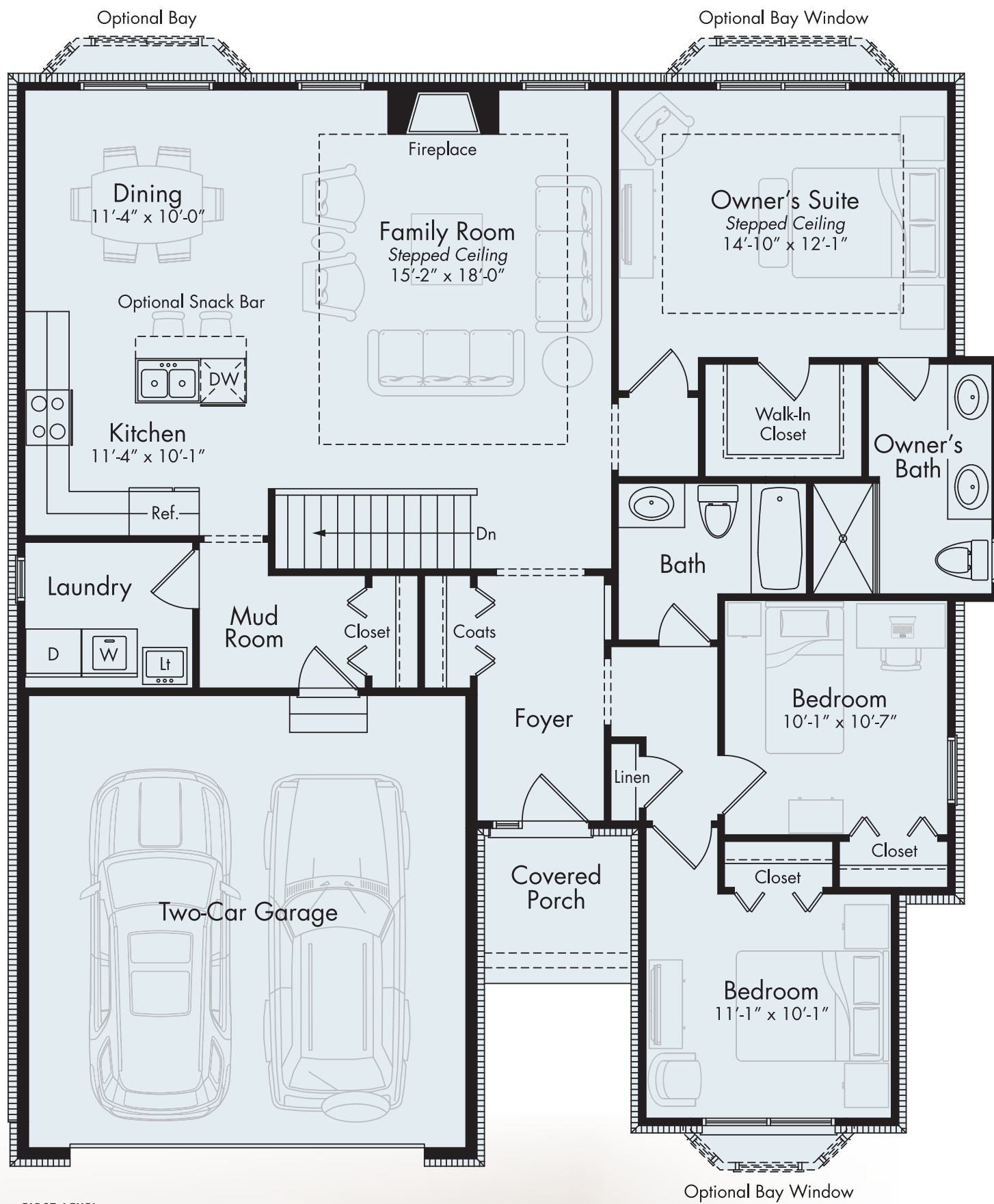
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CYPRESS

First Level 1,539 sf



If you're looking for the perfect ranch floor plan with no wasted space, then the Cypress is ideal for you! The open island kitchen, dining area with its optional bay window, and family room with a cozy fireplace, will keep your family together and enhance the connections during special times hosted at your home. The Cypress also keeps privacy in mind with the elegant owner's suite and two additional bedrooms and a full bath nicely separated from the living space. The 2-car garage opens to a large mud room with a closet and adjacent laundry room.



• FIRST LEVEL



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DAVENPORT

First Level	1,411 sf
Second Level	1,293 sf
Total	2,704 sf

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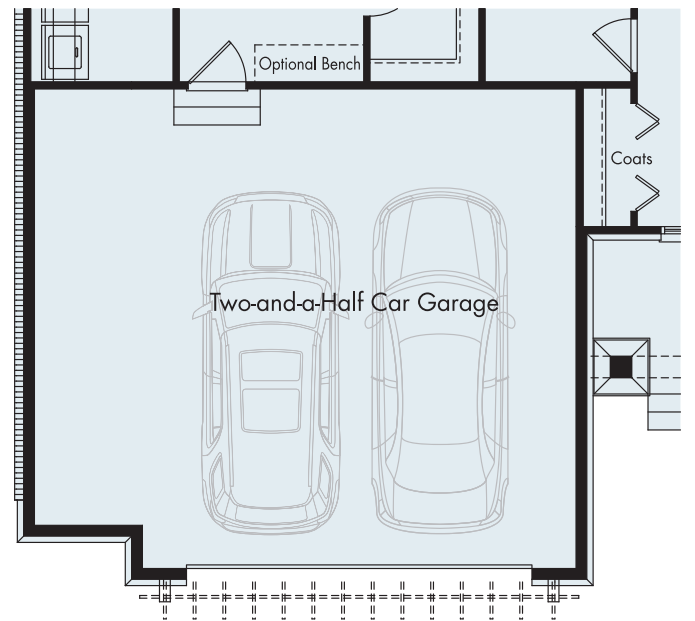
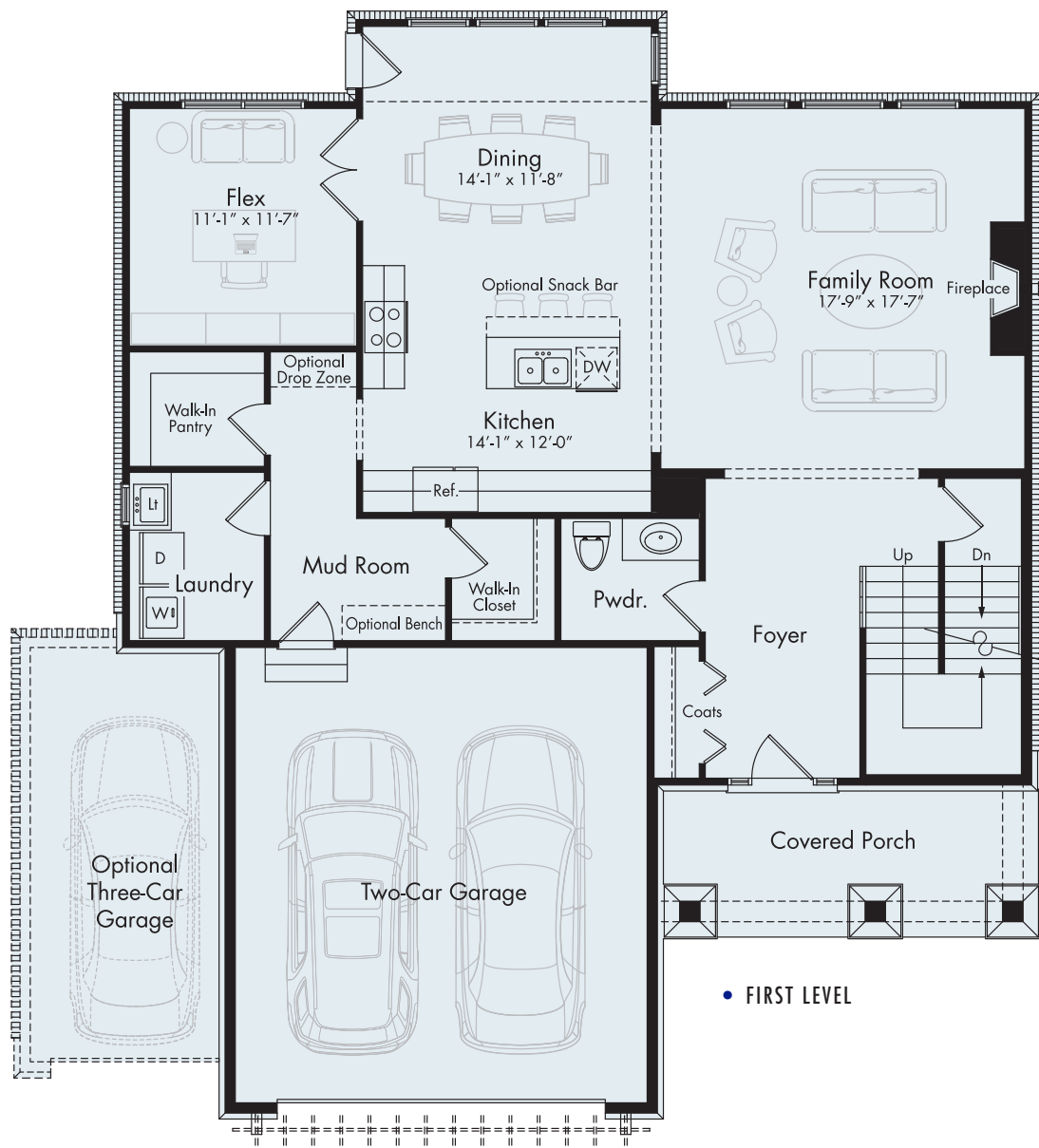
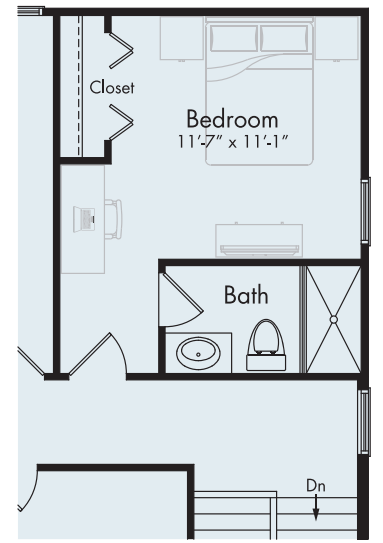
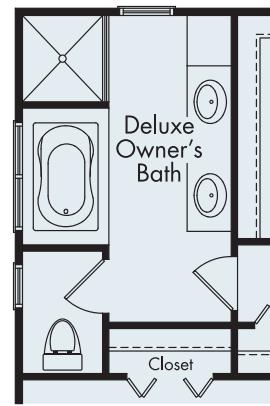
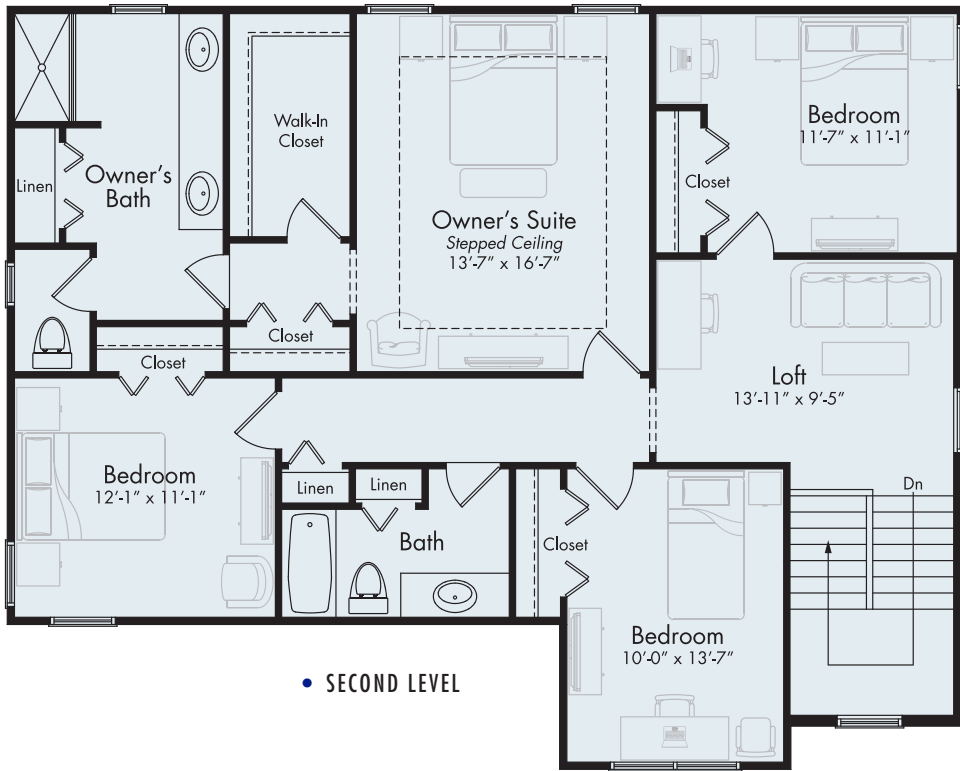
DAVENPORT

First Level 1,411 sf
 Second Level 1,293 sf
 Total 2,704 sf



Fall in love with the spacious open flow of the Davenport's main floor living area. The Davenport offers an imaginatively designed two-story home with an inviting central family room with a cozy fireplace and triple windows. The adjoining kitchen is a dream with lots of counter space and a functional island with optional snack bar seating. The dining room is extended beyond the balance of the room with triple windows and a French door. A flex-room is a pleasant surprise off this area with its double doors and double window. The first floor also offers a powder room, mud room, laundry and walk-in pantry.

The second floor showcases four bedrooms including the owner's suite with its stepped ceiling, plenty of closet space and an elegant bath with the option of a spa tub and stall shower. There is an option for a second bedroom suite with a full bath on this level or a large loft as the standard. A covered front porch adds a distinctive touch to the home as well as an optional 2.5-car or 3-car garage.



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EASTWIND

First Level 1,848 sf

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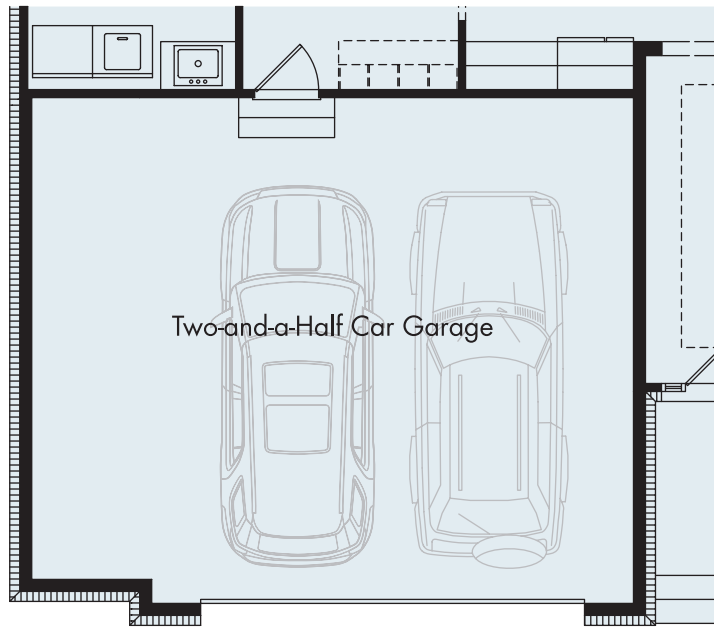
EASTWIND

First Level 1,848 sf

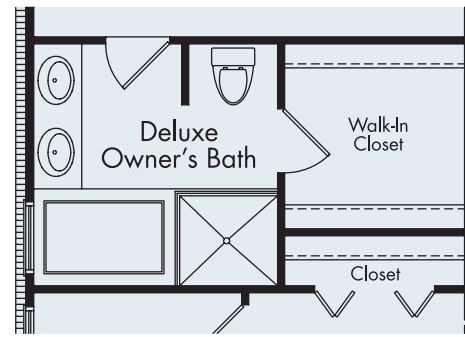


Love the open layouts offered by modern ranch designs, but want more space? The Eastwind is the floor plan for you — with no wasted space. The kitchen, with its oversized island, is the heart of the home with the adjoining dining and family room and a cozy fireplace, abundant windows and stepped ceiling. This creative space will keep your guests well entertained during special occasions.

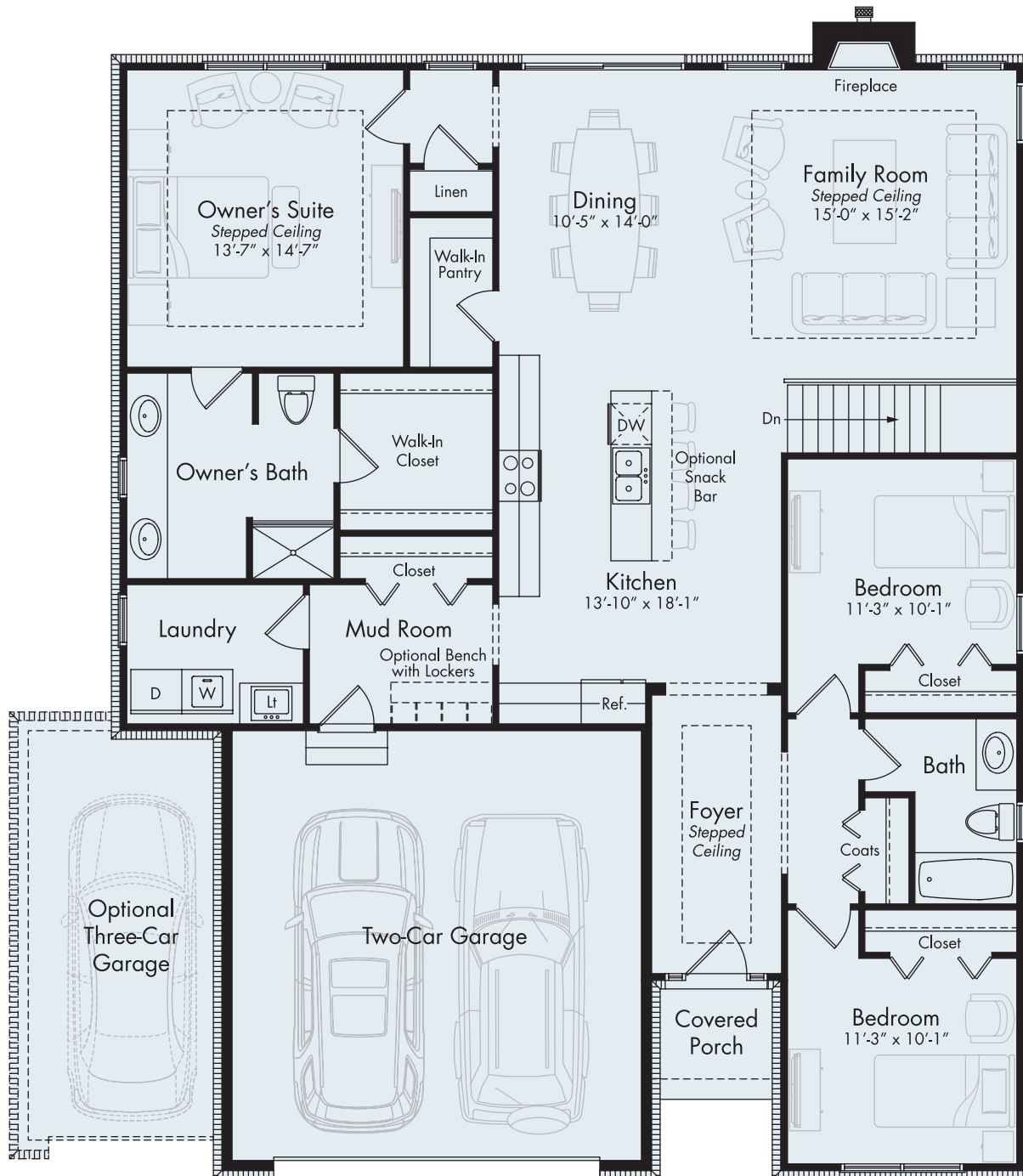
Two bedrooms are tucked away off the foyer with a central bath to share. An owner's suite offers an extra measure of privacy and elegance with its stepped ceiling, spacious bath and an optional soaking tub and large walk-in closet. The garage offers options for 2.5-cars and 3-cars, opens to a mud room with optional bench and lockers and a central laundry room.



• OPTIONAL TWO-AND-A-HALF CAR GARAGE



• OPTIONAL DELUXE OWNER'S BATH



• FIRST LEVEL

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EVANSTON IV

First Level	797 sf
Second Level	1,139 sf
Total	1,936 sf

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EVANSTON IV

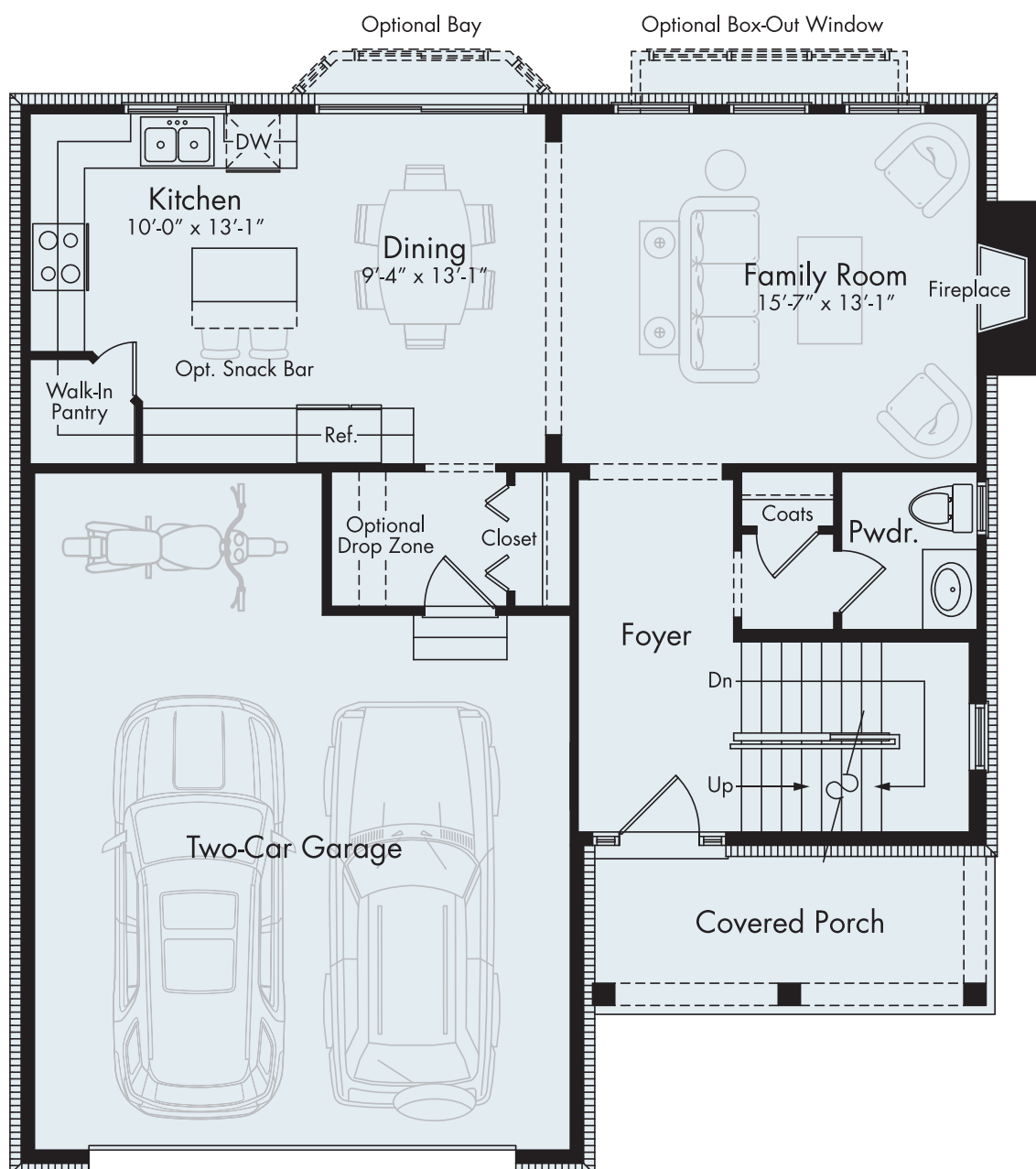
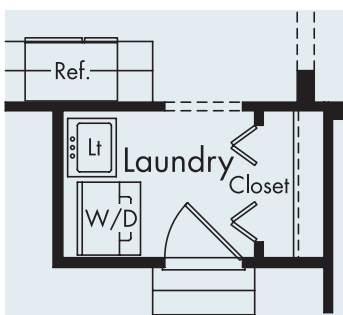
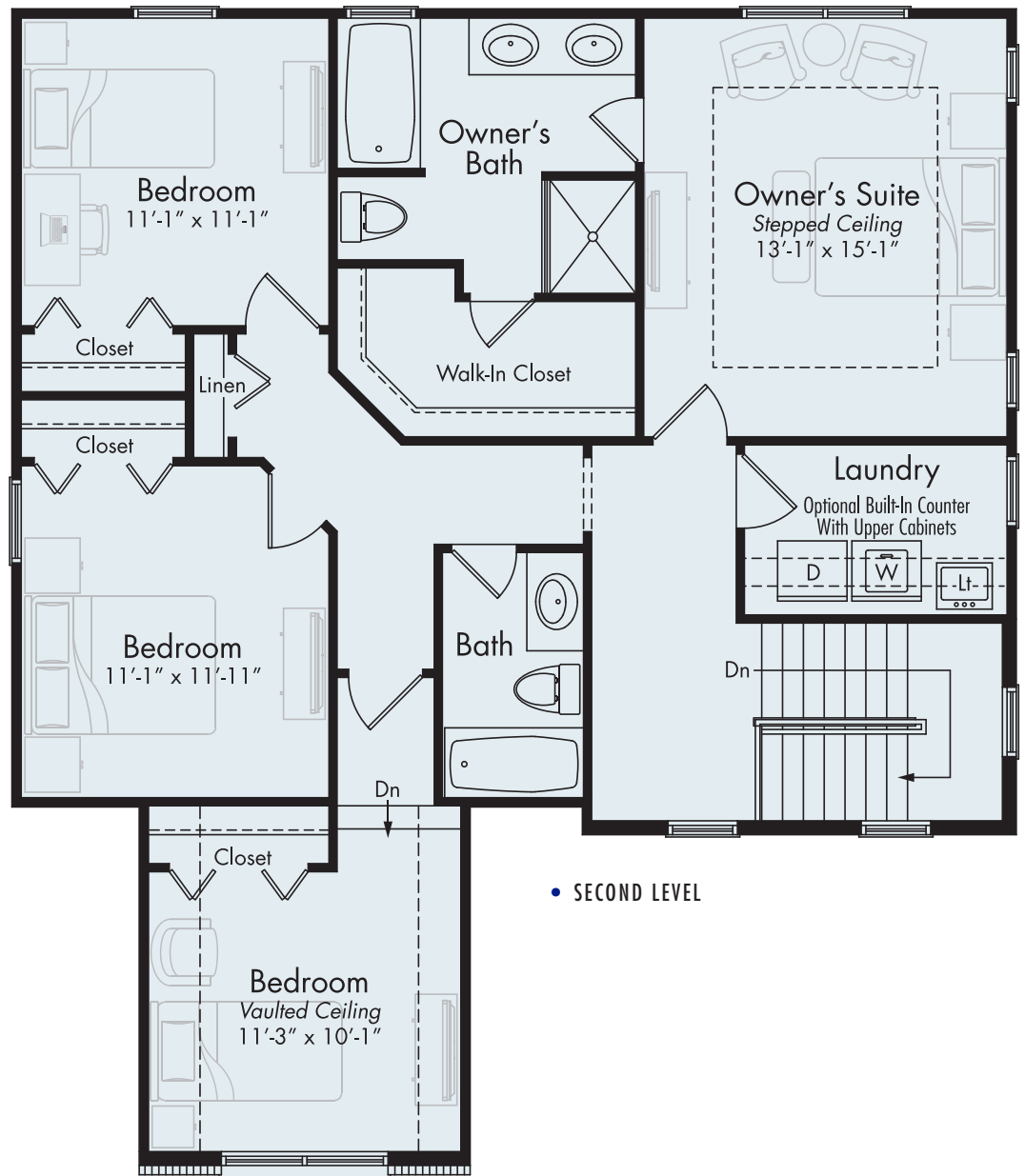
First Level 797 sf
 Second Level 1,139 sf
 Total 1,936 sf



This home is a two-story masterpiece. Featuring a charming front porch with columns, the Evanston IV opens to a large foyer with a guest closet and powder room. The huge U-shaped kitchen, a dining area and family room are bathed in sunlight from lots of windows and sliding glass doorwall with options for a bay and box-out windows to further enhance the open feeling.

Upstairs, the owner's suite boasts a stepped ceiling, elegant bath with separate tub, shower and walk-in closet. There are three more bedrooms on the second floor, along with a central bath and convenient laundry room.

The garage opens to an optional drop zone or second laundry area.



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WASHINGTON

First Level	1,147 sf
Second Level	1,092 sf
Total	2,239 sf

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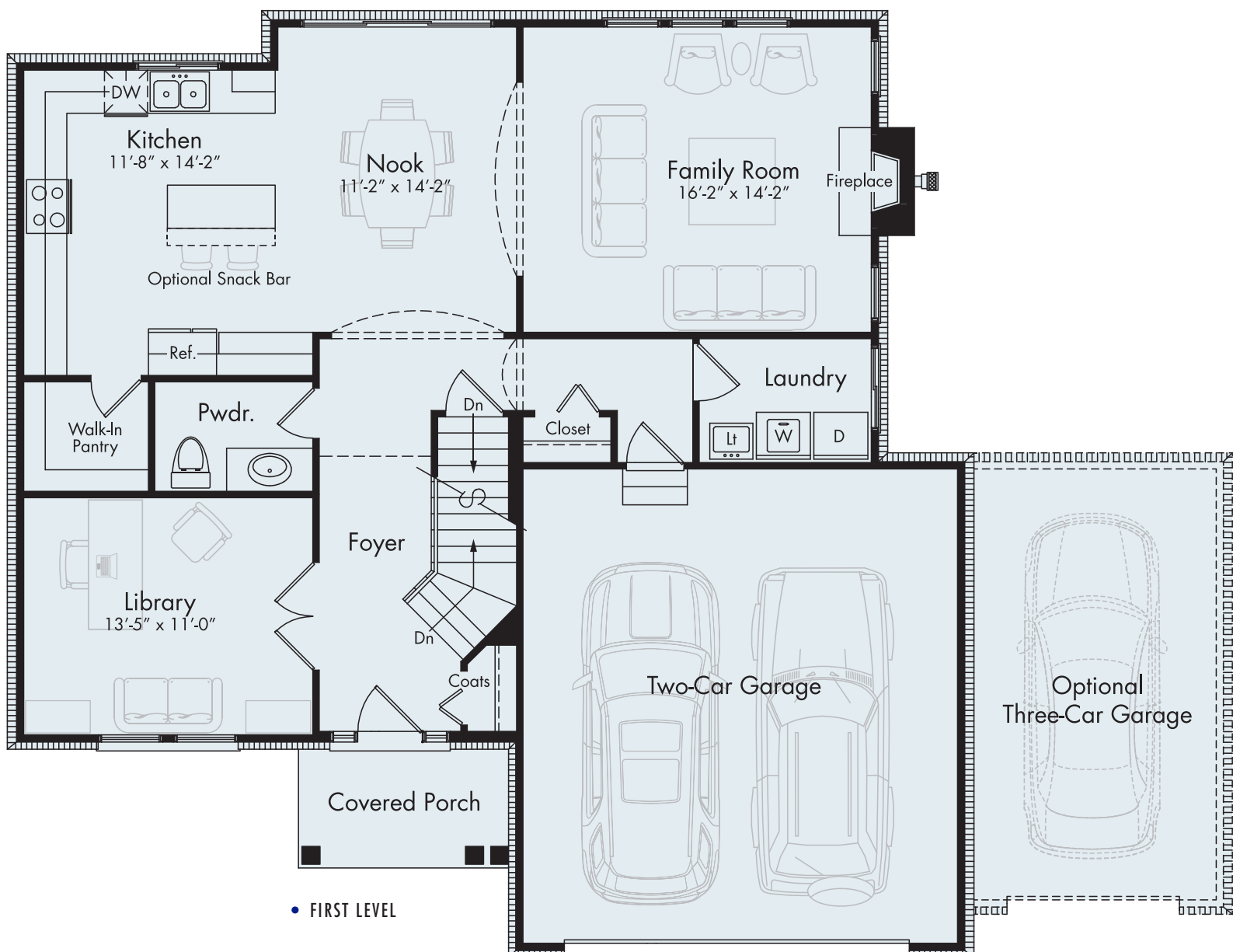
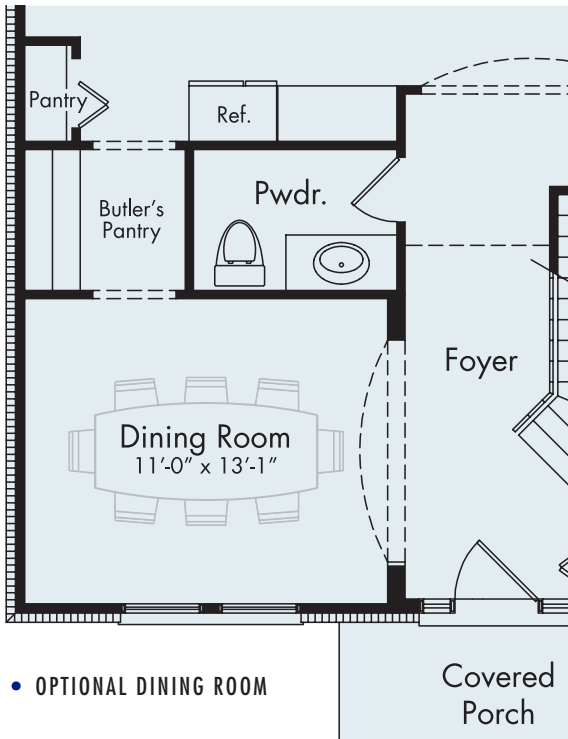
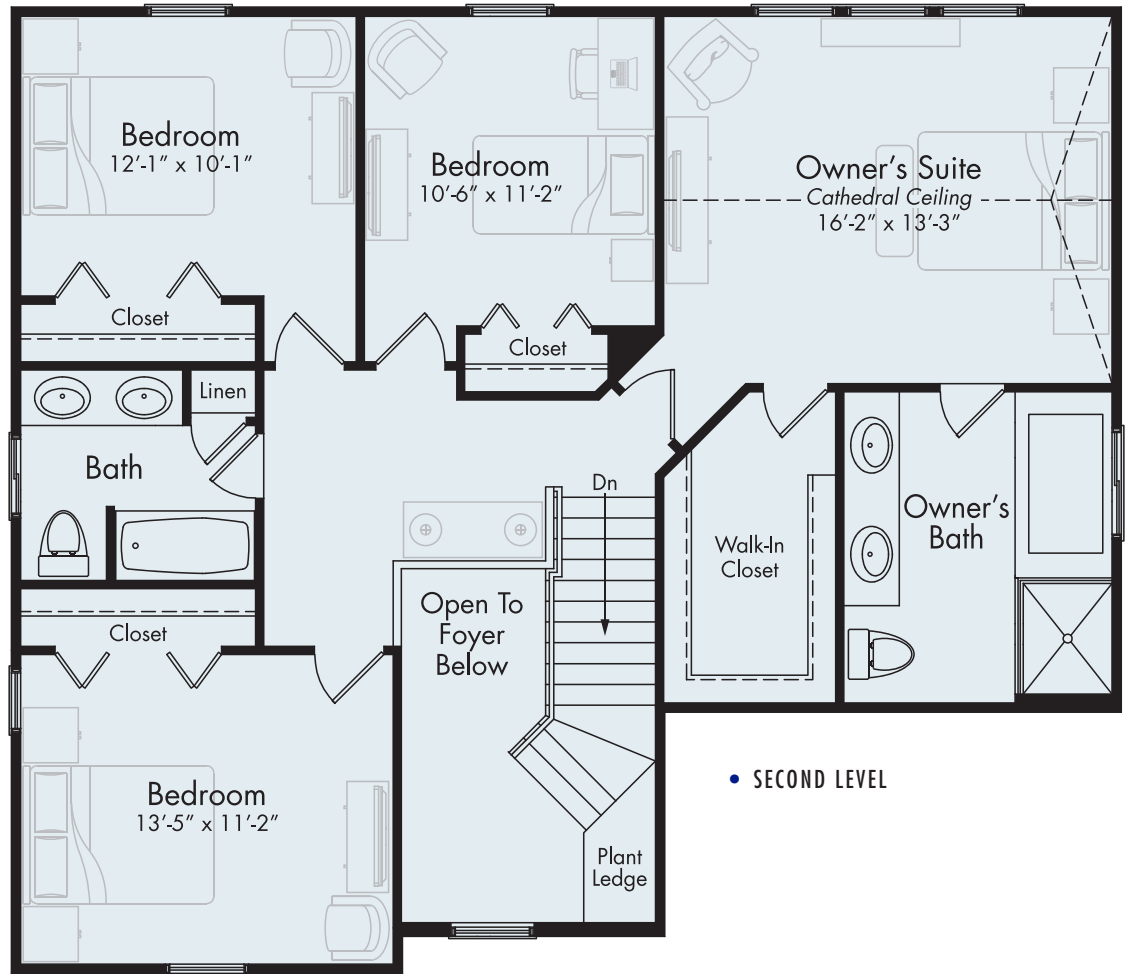
First Level 1,147 sf
 Second Level 1,092 sf
 Total 2,239 sf



The Washington is a very unique floor plan that lives large thanks to its two-story foyer and very open, flowing first floor living area. The foyer opens to a cozy library or optional formal dining room with butler's pantry. The spacious island kitchen, dining nook and family room keep the family connected and engaged.

The second level owner's suite offers a cathedral ceiling, triple windows and an elegant spa bath with separate tub and shower. Three additional bedrooms share a central bath and space for a study station.

A 2-car or optional 3-car garage leads to a mud room and convenient laundry. You'll love this home from the moment you enter from the covered porch.



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Director's Report

Project Name: Hypershine Car Wash

Description: Preliminary site plan & special land use approvals

Date on Agenda this packet pertains to: April 21st, 2022

- Public Hearing

 Special Land Use
 Initial Submittal

 Rezoning
 Revised Plans

 Other: PDA
 Preliminary Approval
 Final Approval

Contact	Consultants & Departments	Approval	Denial	Approved w/Conditions	Other	Comments
Sean O'Neil	Planning Director	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Subject to all staff and consultant review comments being addressed.
DLZ	Engineering Consultant	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See letter dated 04/04/2022
Justin Quagliata	Staff Planner	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See letter dated 04/01/2022
Jason Hanifen	WLT Fire Marshal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See letter dated 03/21/2022
Jeanine Smith	WLT Assessor	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See memo dated 03/21/2022



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

April 4, 2022

Sean O' Neil
Community Development Department
Charter Township of White Lake
7525 Highland Road
White Lake, Michigan 48383

RE: Hypershine Car Wash- Preliminary Site Plan Review – 2nd Review

Ref: DLZ No. 2245-7382-03 Design Professional: Stonefield Engineering &
Design

Dear Mr. O' Neil,

Our office has performed a Preliminary Site Plan review for the above-mentioned revised plan dated March 16, 2022. The plans were reviewed for feasibility based on general conformance with the Township Engineering Design Standards.

General Site Information

This site is located on the south side of M-59, west of Fisk Road, and north of Tull Lake. Total site acreage is approximately 4.854 acres.

Site Improvement Information:

- Construction of car wash building totaling 3756 square feet.
- Associated paved and curbed parking for both car wash employees and for patrons utilizing central vacuum system for their vehicles as well as maneuvering aisles. One (1) ADA accessible parking space is also proposed.
- Site to be serviced by watermain and sanitary sewer.
- Storm water runoff is proposed to be detained in proposed detention basin, located on southwestern side of the site, with discharge to the existing storm sewer in M-59.



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

WLT-Hypershine Car Wash- Preliminary Site Plan Review.02

April 4, 2022

Page 2 of 5

We offer the following comments:

Note that comments from our February 22, 2022 review letter are in *italics*. Responses to those comments are in **bold**. New comments are in standard typeface.

The following items should be noted with respect to Planning Commission review:

- a) *Although the plan indicates that the existing asphalt walkway along the M-59 frontage is to remain, the paved walkway will need to be removed and replaced with an 8' wide path (1' inside ROW line) such that a greenbelt area between it and M-59 would be established. We defer to the Township and the Township Planning review letter dated February 18, 2022 for further comment and discussion.*
Comment addressed. The existing asphalt walkway shall be removed; an 8' wide path located 1' inside the ROW is now shown.
- b) *A plan indicating fire truck access and turning radii shall be provided so as to demonstrate fire truck accessibility to the site.* **Comment addressed. A Fire Truck Turning Exhibit plan sheet has now been provided.**
- c) *The proposed ADA parking space does not currently meet the required dimensions (8" stall with adjacent 8' access aisle) per Zoning Ordinance 5.11.O.iii.* **Comment addressed. The proposed ADA space now meets Zoning Ordinance requirements.**
- d) *The proposed one-way drive on the east side of the proposed building and vacuum area does not appear to meet the minimum required width of 20' for a one way drive per Zoning Ordinance 5.11 Q.v.* **The applicant has indicated the 20' drive requirement is for site ingress/egress, not for internal drive isles. This appears consistent with the Ordinance considering that one way drive isles are shown within the Ordinance for angled or parallel parking adjacent at dimensions less than 20 feet. DLZ defers Ordinance interpretation to the Township's Community Development Department.**
- e) *The location of the proposed dumpster pad appears to present a conflict regarding the flow and exit of traffic on site; it appears that a garbage truck could hinder traffic flows on site causing backup of vehicles coming from the West and heading eastbound on M-59, that intend to right hand turn into the carwash. There is also the concern that westbound traffic intending to left turn into the car wash would end up with a long queue in the left hand turn lane with the potential to cause conflicts with outbound traffic from the opposing boulevard entrance on the north side of M-59.* **Comment addressed. Per the design engineer's response letter dated March 16, 2022, the dumpster and enclosure have been moved back out of the front yard setback; trash pickup shall occur during car**

wash off hours. The design engineer refers to MDOT for input with respect to potential queuing of vehicles in the M-59 westbound turn lane.

- f) *Preliminary detention basin contours and sizing calculations are required to demonstrate adequate required storage volume; clarification shall also be made relative to the ‘infiltration basin’ label shown on Sheet C-4 of the plan. Should the applicant desire to discharge to the existing M-59 storm sewer as shown on the plan, permission from MDOT would be required as this storm sewer is under MDOT jurisdiction. Design engineer shall also indicate method by which storm sewer shall be installed under M-59 for connection to the existing storm sewer on the north side of the road.*

Comment addressed. The design engineer states: “Proposed site discharge is to be reduced compared to existing discharge rates. Plans to be submitted to MDOT for stormwater and access approval prior to Final Site Plan. Stormwater design will be coordinated with MDOT as required. Final calculations are pending the results of geotechnical testing to confirm infiltration rates on site and will be provided at Final Site Plan. Storm pipe is to be jack and bored beneath Highland Road as required by MDOT. Drilling pit locations to be shown on demolition plan at Final Site Plan.”

- g) *Method of stormwater pretreatment shall be provided. Comment addressed. A mechanical water quality unit is proposed for storm water pretreatment. Details regarding manufacturer and TSS removal rated (80% required) shall be provided at time of FSP/FEP submittal.*
- h) *Storm sewer easements shall be shown on plan; it appears that a portion of the concrete pad with induction loops along the western side of property would encroach into the sewer easement, which is not allowed. Comment addressed. 10’ wide storm sewer easements are now shown on the plan. Per the design engineer, the proposed induction loops and concrete pad are not located in the storm easement.*
- i) *Clarification on the water reclaim system will be required along with coordination with White Lake Township DPS and Oakland County WRC regarding the potential need for an external 1000-gallon oil/grit separator; a 4’ diameter sampling MH located downstream of the oil/grit separator shall also be provided. A sampling manhole has been added upstream of the proposed duplex grinder station. In the design engineer’s response letter, the engineer states that oil and grit separation occurs internally. Further clarification with respect to the process used shall be required to be coordinated with White Lake Township DPS and Oakland County WRC at the time of Final Site Plan. The concern is adequately protecting the sanitary sewer grinder station from grit and oils.*
- j) *The proposed gas valve for the proposed gas lead encroaches into the existing watermain easement and shall be relocated. Comment addressed. Gas valve has now been located outside existing watermain easement.*
- k) *Storm/Sanitary Crossing CR1 elevation data appear to be in error; reference Sheet C-5. Elevations in this data table appear to have an elevation difference of approximately 30’ as compared to*



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

WLT-Hypershine Car Wash- Preliminary Site Plan Review.02

April 4, 2022

Page 4 of 5

surrounding topography. **Comment addressed. The elevation data error has now been corrected. As-Built plans for the Sanitary Sewer have been sent over separately.**

- l) *The proposed Evergreen trees shown along the western property line on the landscape plan Sheet C-7 will need to be planted a minimum horizontal distance of 10' from the storm sewer.* **Comment addressed. Location of proposed trees has been revised to meet the 10' horizontal separation requirement.**

The following items can be addressed at the time of Final Site Plan/ Final Engineering Plan Submittal:

FSP/FEP Comments-

General

1. *Plan shall contain notes per White Lake Township Engineering Design Standards Section A. 8. a.-d.* **Comment addressed.**

Paving/Grading

1. *All proposed barrier free ramps will need to meet ADA standards in terms of slopes and dimensions.* **Comment addressed. ADA notes/standards have been added to the grading plan sheet.**
2. *Bollard steel pipe shall be 6" minimum diameter per Zoning Ordinance 5.19N.i.d.* **Comment addressed. The pipe is now shown as 6" diameter.**
3. *Parking stall markings shall be per Zoning Ordinance 5. 11Q. xi. (dual striping).* **Comment addressed. Detail on Construction Details sheet has now been updated.**

Watermain

1. *We defer to the Fire Department with regard to items related to fire suppression including proposed hydrant locations.* **Comment remains as a notation.**

Sanitary Sewer

1. *Provide peak flows for the grinder station as the station will need to be sized to accommodate anticipated discharge.* **Comment remains. Design engineer notes that this information will be provided on the FSP/FEP.**



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

WLT-Hypershine Car Wash- Preliminary Site Plan Review.02

April 4, 2022

Page 5 of 5

Permits

1. *Permission from White Lake Township will be required for work within the existing 15' wide watermain easement. Comment remains as a notation.*

Recommendation

We recommend approval of the Preliminary Site Plan subject to confirmation that a 15' one way drive lane is acceptable per Comment d) above. Any remaining comments can be addressed at the time of Final Site Plan/ Final Engineering Plan submittal.

Please feel free to contact our office should you have any questions.

Sincerely,

DLZ Michigan

Michael Leuffgen, P.E.
Department Manager

Victoria Loemker, P.E.
Senior Engineer

Encl. None

Cc: Justin Quagliata, Community Development, *via email*
Hannah Micallef, Community Development, *via email*
Aaron Potter, DPS Director, White Lake Township, *via email*
John Holland, Fire Chief, White Lake Township, *via email*
Jason Hanifen, Fire Marshall, White Lake Township, *via email*

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WHITE LAKE TOWNSHIP PLANNING COMMISSION

REPORT OF THE COMMUNITY DEVELOPMENT DEPARTMENT

TO: Planning Commission

FROM: Sean O'Neil, AICP, Community Development Director
Justin Quagliata, Staff Planner

DATE: April 1, 2022

RE: Hypershine Auto Wash
Preliminary Site Plan and Special Land Use – Review #2

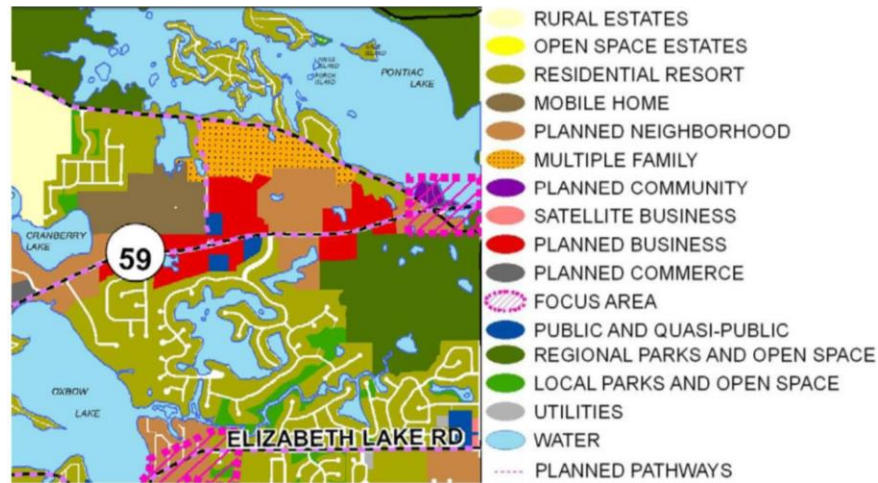
Staff reviewed the revised site plan prepared by Stonefield Engineering & Design (revision date March 16, 2022). The following comments from the first review dated February 18, 2022 are listed below. Responses to those comments are provided in **(red)**.

EROP, LLC has requested preliminary site plan and special land use approval to construct a 3,756 square foot automobile wash establishment at 9345 Highland Road (Parcel Number 12-23-202-006). The 4.85-acre subject site is zoned GB (General Business).

Master Plan

The Future Land Use Map from the Master Plan designates the subject site in the Planned Business category. All development in Planned Business is required to adhere to strict access management principles in order to minimize traffic conflict and maximize safety throughout the M-59 corridor. Connections to and segments of the Township's community-wide pathway system are required as an integral part of all Planned Business development.

FUTURE LAND USE MAP



Zoning

Automobile wash establishments are permitted with special land use approval in the GB zoning district. At its meeting on July 21, 2020 the Township Board approved rezoning the parcel from Local Business (LB) and R1-C (Single Family Residential) to GB (General Business), which requires a minimum lot area of one (1) acre and 200 feet of lot width. The subject site contains 338.2 feet of frontage along Highland Road and 4.85 acres of lot area.

Physical Features

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wetland Map and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map indicate neither wetlands nor floodplain are present on or near the site. Currently a vacant house and three accessory buildings are located on the property. **A demolition plan shall be provided at final site plan.** (Comment remains as a notation. This requirement was acknowledged by the applicant's engineer in the response letter provided to the first review).

Access

The site fronts on Highland Road, which along the property is a five-lane road (counting the center turn lane). The site plan notes the existing paved shoulder along Highland Road would remain. **The existing paved shoulder shall be removed and converted to greenbelt.** (Comment addressed. The existing paved shoulder is to be removed. An eight-foot-wide asphalt sidewalk one-foot off the property line has been proposed). The zoning ordinance requires a minimum eight-foot-wide sidewalk placed one-foot from the inside edge of the right-of-way along the Highland Road property frontage. Direct pedestrian access from the sidewalk to the building is also required. **The applicant is not proposing to install the required sidewalk as part of the project; therefore, a variance from the public sidewalk standards is required from the Zoning Board of Appeals.** (Comment addressed. A sidewalk is now proposed). Along the front (north side) of the building, a 10-foot-wide sidewalk is provided.

Driveways must have a minimum of 455 feet of spacing provided from other driveways along the same side of the street, measured centerline to centerline. The centerline of the proposed driveway would be located approximately 242 feet from the existing driveway (Art of Dance) to the east and approximately 220 feet from the existing driveway (vacant Brendel’s Septic property) to the west; **therefore, variances are required from the Zoning Board of Appeals. (Comment outstanding; however, the applicant intends to seek a variance from the Zoning Board of Appeals).** The proposed Highland Road driveway must be aligned with the existing driveway on the opposite side of the street or offset 350 feet, measured centerline to centerline. **The centerline of the proposed driveway shall exactly offset the west side of the existing boulevard driveway (Fisk Corners) on the north side of Highland Road, or a variance shall be required from the Zoning Board of Appeals. (Comment outstanding; however, the applicant intends to seek a variance from the Zoning Board of Appeals).** The minimum distance between a proposed driveway and the nearest intersection shall not be less than the minimum required driveway-to-driveway spacing. Also, a proposed driveway on the approach to an intersection shall not be opposite a dedicated left-turn lane for the intersection, or within 100 feet upstream of that lane. This provision may be waived by the Planning Commission if supported by a traffic impact study. The nearest street intersection (Fisk Road and Highland Road – to the east) is approximately 422 feet from the subject site. **As the driveway is not 455 feet from the intersection, a variance from the Zoning Board of Appeals is required, or a waiver is required by the Planning Commission if supported by a traffic impact study. (Comment addressed. The applicant’s engineer stated the proposed driveway is approximately 524 feet from the Fisk Road intersection (measured centerline to centerline). A variance/waiver is not required).**

To minimize turning conflicts, boulevard-style access drives (or local streets) shall generally not be approved opposite undivided access drives, or vice versa. If cause has been shown for a Planning Commission waiver of this requirement, interlocking entering left turns must be minimized by aligning the entering side of the divided drive with the undivided drive. **The proposed undivided two-way driveway is opposite a boulevard-style access drive (Fisk Corners). A waiver from the coordination of divided and undivided driveways is required. (Comment outstanding. The applicant is requesting a Planning Commission waiver from this requirement. If cause has been shown for a waiver of this requirement, interlocking entering left turns must be minimized by aligning the entering side of the divided drive with the undivided drive).**

Utilities

Municipal water and sanitary sewer are available to serve the site. The Township Engineering Consultant will perform an analysis of utilities, stormwater, and grading to ensure compliance with all applicable ordinances as well as the Township Engineering Design Standards.

Staff Analysis

Special land uses for automobile wash establishments are evaluated using the general standards for all special land uses listed in Article 6, Section 10 of the zoning ordinance and the following specific standards for automobile wash establishments found in Article 4, Section 11:

- A. *Buildings shall be set back sixty (60) feet from the existing or proposed right-of-way line. The proposed front yard setback is 135.2 feet.*
- B. *Entrance and exit drives shall be no less than one hundred (100) feet from any street intersection and at least two hundred (200) feet from any residential district. The nearest street intersection (Fisk Road and Highland Road – to the east) is approximately 422 feet from the subject site. The proposed driveway exceeds the minimum 200-foot setback from a residential zoning district.*
- C. *Waiting spaces shall be provided in an amount equal to seven (7) times the maximum automobile capacity within the building. No vehicle shall be permitted to wait or stand within a dedicated right-of-way. The site plan states there would be four car capacity within the building; therefore, 28 stacking spaces are required. 32 stacking spaces are shown on the plan.*
- D. *The site shall be drained so as to dispose of all surface water in such a way as to preclude drainage of water onto adjacent property or heavy tracking onto a public street. A combination of alternatives may be used, including, but not limited to, blowers, hand-drying, length of exit drive and general site design. The Community Development Department defers to the Director of Public Services and Township Engineering Consultant on the stormwater management plan for the site.*
- E. *The site plan shall detail the location of all proposed vacuum stations. These areas shall be located so as not to conflict with any required parking, drive, or automobile standing areas. Self-contained, covered waste receptacles shall be provided at each proposed vacuum station to provide convenient disposal of customer refuse. Vacuum stations (quantity: 26) are located north of the building (25 spaces – 13’ by 18’ in size); **however, waste receptacles for each vacuum station are not shown. Trash receptacles are required to be of commercial quality and complement the building design and style. (Comment partially addressed. The applicant’s engineer stated waste receptacles are mounted at each vacuum; this shall be noted on the site plan. Additionally, if this project proceeds to final site plan, a detail of the trash receptacles shall be provided at that time).** The zoning ordinance states no noise, as measured from a property line, exceeding 70 dB(A) from 6:00 a.m. to 9:00 p.m. or 65 dB(A) from 9:00 p.m. to 6:00 a.m. shall be emitted. **The applicant shall confirm if it was intentional to provide 26 vacuum stations served by 25 parking spaces.** (Comment addressed. The applicant’s engineer stated there are 26 vacuums for 25 spaces because vacuums are provided on each side of each vehicle space).*

Staff recommends reducing the number of vacuum stations by 50 percent. (Comment remains as a notation. The applicant’s engineer stated 25 vacuums are anticipated to be required for the customer volume. The Planning Commission should determine if the number of vacuums are acceptable or if the number of vacuums should be reduced).
Also, the applicant shall submit a predictive noise analysis to demonstrate noise levels for the site will not exceed the performance standards. (Comment remains as a notation. The applicant’s engineer stated the hours of operation are 8:00 a.m. to 8:00 p.m. and the site would comply with the performance standards. The Planning Commission should determine if a predictive noise analysis is required. In making its determination, the Planning Commission should consider the proposed use in relation to adjoining properties and uses).

F. *An outdoor lighting plan shall specify the type of fixtures to be used, light intensity, and method of shielding the fixtures so that light does not project onto adjoining properties or on any public or private street or right-of-way. Dropped fixtures shall not be allowed. The site plan shall include a photometric plan and catalog details for all proposed fixtures. Outdoor lights must meet the performance standards of Section 5.18.* Information on site lighting was provided and will be reviewed in detail during final site plan review. Following are initial comments on the lighting (photometric) plan:

- **Footcandles shall be measured at approximately six feet above grade. Revise accordingly, and the plan must contain a note confirming footcandles are measured at six feet above grade. (Comment addressed. Lighting calculations have been updated to reflect data at six-feet above grade).**
- **Complete catalog details (lighting fixture specification sheets) for all proposed fixtures shall be provided. Light fixture selections and colors are subject to review and approval by the Township. (Comment partially addressed. Partial lighting fixture specifications have been provided on Sheet C-10. Complete catalog details shall be submitted separately at final site plan).**
- **No wall-mounted decorative or architectural lighting shall be installed on the south (rear) facade of the building. (Comment addressed. The applicant’s engineer stated the south wall-packs would only turn on in emergency situations only). Up-lighting or outward shining lighting are also not permitted on the building. (Comment remains as a notation).**
- **The light pole detail indicating height (Sheet C-9) is inconsistent with the height labeled on the lighting plan. Revise accordingly to provide the total height, including the base, pole, and light fixture. (Comment outstanding. Total height shall be measured to the top of the fixture. Additionally, the light pole detail (Sheet C-10 of the revised plans) does not accurately represent the fixture to be utilized on the pole-mounted luminaries. For reference, the fixture is the assembly holding a lamp (bulb). Revise accordingly).**

- The Planning Commission may require special conditions for properties adjacent to residential uses and districts.

G. *A screen wall or obscuring fence shall be provided on those sides abutting a residential district, in accordance with the provisions of this Ordinance.* While the proposed building is located 427.7 feet from the residential zoning district to the south, **the required screening is not shown on the plan. If not provided, a variance shall be required from the Zoning Board of Appeals.** (Comment addressed. A six-foot-tall vinyl opaque fence has been proposed. If the project proceeds to final site plan, a fence detail shall be provided).

Development Standards

The site plan shows compliance with building and parking setback requirements. Proposed building height is 19'-4", which complies with the maximum building height allowed in the GB zoning district (35 feet or 2 stories, whichever is less). **The height of the parapet tower shall be dimensioned on the exterior elevations.** Based on a note on the site plan, it appears the maximum height of the parapet is 24 feet. (Comment outstanding. Sheet A-2 (exterior elevations) notes the parapet cap is 124'-3³/₄" tall. This appears to be an error, as the applicant's engineer stated the parapet tower height is 24'-3³/₄". Revise accordingly).

Building Architecture and Design

In accordance with the M-59 architectural character requirements, exterior building materials shall be composed primarily of high quality, durable, low maintenance material, such as masonry, stone, brick, glass, or equivalent materials. Buildings should be completed on all sides with acceptable materials. The proposed building materials for the project are a mix of brick veneer, and cultured stone veneer with a stone cap four feet up around the base of the building. Faux columns add architectural interest to the building, with an EFIS (exterior insulation finishing system) parapet tower at the west side of the building. Pre-fabricated decorative metal panels are located below the EFIS parapet on the south and west elevations. An aluminum parapet cap complimentary in color to the proposed building materials would be located on top of the walls around the building (with the exception of the parapet tower). Tinted mirrored windows are proposed on three elevations of the building (no windows on east side), with aluminum lattice canopies using aluminum kicker legs at each end to attach to the building. Aluminum clad fascia (stripe) is proposed on three elevations of the building (not proposed on the rear). **The fascia shall be removed from the building, or be the same color as the cap on top of the walls around the building. If the fascia (stripe) attracts attention to the building, a variance shall be required from the Zoning Board of Appeals.** (Comment partially addressed. The fascia is specified as 'sierra tan', the same color as the wall caps as to not attract attention to building. A note shall be added to the exterior elevations stating all cladding/fascia and wall caps shall be 'sierra tan' color).

A sample board of building materials to be displayed at the Planning Commission meeting and elevations in color are required by the zoning ordinance and must be submitted at final site plan. (Comment remains as a notation. This requirement was acknowledged by the applicant's engineer in the response letter provided to the first review).

Address identification characters are proposed on the east elevation of the building. A note on the plan states each character shall be a minimum of four inches high. **Six-inch-tall numbers visible from the street shall be required. The address location is subject to approval of the Township Fire Marshal.** (Comment remains as a notation. This requirement was acknowledged by the applicant's engineer in the response letter provided to the first review. Revised elevations are to be provided at final site plan).

The applicant shall provide an explanation in writing for the purpose of the second overhead door (north door) on the east elevation of the building. (Comment partially addressed. The applicant's engineer stated the second overhead door at the exit is to be utilized for chemical deliveries and maintenance access to mechanical equipment. Sheet A-1 (floor plan) shows equipment locations. Sheet A-1 shall be revised; it incorrectly identifies the east elevation of the building as the car wash entrance and the west elevation of the building as the car wash exit. Those labels (and directorial arrows) are reversed and shall be revised at the time of final site plan).

Parking

In addition to the required stacking spaces previously described, one parking space per each employee (working on the largest shift) must be provided. Four 'Employee Only' parking spaces are proposed at the northeast corner of the site. **The applicant shall verify the employee information provided with the parking data represents the number of employees working on the largest shift.** (Comment addressed. The response letter provided to the first review indicates four (4) employees would be the maximum number of employees on any shift).

The accessible parking stall detail on Sheet C-8 is inconsistent with the dimensions on the site plan, which shows a three-foot-wide access aisle west of the barrier-free space. In accordance with the zoning ordinance and Americans with Disabilities Act (ADA), the adjacent access aisle shall be eight-feet-wide. The plan shall be revised accordingly. (Comment addressed. ADA accessible space and standard detail has been revised to comply with ADA requirements. **The zoning ordinance also requires each individual parking space be delineated by dual stripes, two feet apart centered on the dividing lines and painted white. The plan (including the parking stall markings detail) shall be revised accordingly to indicate the required striping.** (Comment addressed. Parking stall striping and detail has been revised to provide dual striping).

The zoning ordinance requires one-way drives be a minimum of 20-feet-wide. The plan shall be revised accordingly, or a variance is required from the Zoning Board of Appeals. (Comment outstanding. A variance from this standard is required from the Zoning Board of Appeals. This variance request shall be added to the zoning relief table on Sheet C-1).

Off-Street Loading Requirements

The zoning ordinance requires one loading space for a development of this size. Such loading and unloading space must be an area 10 feet by 50 feet, with a 15-foot height clearance. **No loading space is proposed; therefore, a variance is required from the Zoning Board of Appeals.** (Comment partially addressed. A loading space is now proposed. The response letter provided to the first review indicates any loading/unloading would occur off-hours as to not conflict with customer traffic flow; a plan note stating such shall be provided on the final site plan).

Trash Receptacle Screening

The zoning ordinance requires dumpsters to be surrounded by a six-foot-tall to eight-foot-tall wall on three sides and an obscuring wood gate on a steel frame on the fourth side, located on a six-inch concrete pad extending 10 feet in front of the gate, with six-inch concrete-filled steel bollards to protect the rear wall and gates. **The bollards for the dumpster enclosure shown on Sheet C-8 shall be six-inch diameter instead of four-inch diameter, and bollards shall be provided six inches in front of (north) of each gate post.** (Comment addressed. Bollard detail has been revised from four-inch to six-inch bollards. Trash enclosure detail has been revised to show bollards six-inches from front gate posts). The proposed enclosure is located north of the building. The zoning ordinance prohibits trash enclosures within a required front yard setback, and does not allow enclosures closer to the front lot line than the principal building. The proposed dumpster enclosure is located closer to Highland Road than the automobile wash building, and does not meet the front yard setback. As proposed, **the following variances are required from the Zoning Board of Appeals: an 89-foot variance to project into the front yard, and a 10-foot variance to encroach into the front yard setback.** (Comment partially addressed. The trash enclosure detail was shifted south out of the front yard setback. However, the trash enclosure is projecting approximately 81.3 feet into the front yard (Sheet C-2 shall be revised to measure the projection to the northern extent of the trash enclosure). The applicant intends to seek a variance from the Zoning Board of Appeals).

At the time of trash pick-up, the location of the dumpster enclosure could cause conflict with traffic entering and exiting the site. Circulation must be considered when relocating the dumpster enclosure, or during consideration of a variance request to allow the dumpster location at the currently proposed location. (Comment remains as a notation. The response letter provided to the first review indicates all trash pickup would occur prior to 8:00 a.m. before the car wash opens).

An eight-foot-tall split-face block (8" CMU) screen wall is proposed around three sides of the dumpster enclosure, with steel doors on the north side of the structure. The zoning ordinance states dumpsters and trash storage enclosures shall be constructed of the same decorative masonry materials as the buildings to which they are accessory. Brickform concrete (simulated brick pattern) or stained, decorative CMU block are not permitted where the principal building contains masonry. Plain CMU block is also prohibited. **The dumpster enclosure shall match the same brick veneer as the facade of the building with a steel backed wood gate painted a complementary color to the brick veneer. The trash/recycle enclosure detail on Sheet C-8 shall be revised to show brick veneer on the outside walls of the concrete enclosure and indicate the color of the gate.** (Comment partially addressed. The gate as shown on the front elevation detail does not match the gate detail. Additionally, the gate detail states the cedar boards are to be stained "color as selected by owner." The color/stain of the gate is subject to review and approval by the Township. The gate shall be stained a color similar to 'sierra tan'. Revise accordingly).

Landscaping and Screening

Landscaping must comply with the provisions of the zoning ordinance and should be designed to preserve existing significant natural features and to buffer service areas, parking lots, and dumpsters. A mix of evergreen and deciduous plants and trees are preferred, along with seasonal accent plantings. A landscape plan is not required as part of the preliminary site plan, but was provided for consideration and will be reviewed in detail during final site plan review if the preliminary site plan is approved. Following are initial comments on the landscape plan:

- Interior Landscaping Requirements: for every new development requiring site plan review, except site condominiums as regulated in Article 6, Section 1, interior landscaping areas shall be provided, equal to at least 15 percent of the total lot area. These landscaped areas shall be grouped near all building entrances, building foundations, pedestrian walkways, and service areas, and may also be placed adjacent to fences, walls, or rights-of-way. These planting areas shall be so located as to breakup an otherwise continuous abutment of building facade with sidewalks and/or parking areas. All interior landscaping shall provide one large deciduous, small ornamental deciduous, or evergreen tree and five shrubs for every 300 square feet of required interior landscaping area.
- Parking Lot Landscaping: within every parking area containing 10 or more spaces, there shall be parking lot landscaping in accordance with this Subsection. These landscaping areas shall be located so as to better define parking spaces and drives. Landscaping on the perimeter of the parking lot does not satisfy the parking lot landscaping requirement. Island locations shall also be considered in a manner that will assist in controlling traffic movements. The requirements, for trees and islands, may be modified when it is found through careful coordination of parking lot landscaping with peripheral and building plantings an unnecessary duplication of plantings would be created. In addition, consideration shall be given to situations when an excess number of small islands would be created that would only serve to disrupt reasonable traffic patterns and maintenance activities. **Trees as previously described are not provided; therefore, a variance is required from the Zoning Board of Appeals.** (Comment addressed. Additional trees have been proposed).

- Transformer and Mechanical Equipment Screening: all ground mounted transformers, climate control, and similar equipment shall be screened from view from any street or adjacent property by a wall constructed of the same decorative exterior materials as the building and not less than the height of the equipment to be screened. As an alternative, the equipment may be screened by landscaping approved by the Planning Commission. All rooftop climate control equipment, transformer units, and similar equipment shall be screened. The materials used to screen the equipment shall be compatible in color and type with exterior finish materials of the building. All rooftop equipment shall conform to the maximum height regulations of this Ordinance. **The plans do not show proposed locations for mechanical units or provide the method of screening. The plans shall be revised accordingly to provide the location(s) and method of screening.** (Comment partially addressed. Electric transformer has been shown on the plans screened by evergreen shrubs. The proposed shrubs shall be replaced with arborvitae. Revise accordingly).
- Greenbelts are required between nonresidential parking areas adjacent to road rights-of-way and shall be at least 20-feet-wide and improved with one large deciduous or evergreen tree and eight shrubs for every 30 lineal feet, except they may be substituted in part with a masonry screen wall, 30 inches in height, at the discretion of the Planning Commission, in which case, a five-foot greenbelt adjacent to the screen wall must be provided. **Trees as previously described are not provided; therefore, a variance is required from the Zoning Board of Appeals.** (Comment outstanding. The applicant intends to seek a variance from the Zoning Board of Appeals. Their reason for requesting the variance is the front greenbelt is within a watermain easement. This variance request shall be added to the zoning relief table on Sheet C-1).
- **Arborvitae are not considered evergreen trees; they are considered shrubs. The Plant Schedule shall be revised accordingly.** (Comment addressed. The proposed arborvitae have been replaced with White Spruce trees, which staff supports as preferable in the proposed locations. As previously stated, arborvitae shall screen the transformer).
- **Trees identified for protection during construction and the means of protection shall be identified prior to final site plan. No construction shall occur until tree protection has been installed and approved by the Community Development Director.** (Comment remains as a notation. This requirement was acknowledged by the applicant's engineer in the response letter provided to the first review).
- Trees shall not be planted closer than four feet to a property line. **Add note to landscape plan at final site plan.** (Comment addressed. A note has been added to the landscape plan (Sheet C-7)).
- All required landscape areas in excess of 200 square feet shall be irrigated to assist in maintaining a healthy condition for all plantings and lawn areas. **An irrigation plan shall be provided at final site plan.** (Comment remains as a notation. This requirement was acknowledged by the applicant's engineer in the response letter provided to the first review).

- All required site irrigation systems shall include a rain sensor or similar measure to ensure irrigation does not occur during or shortly after precipitation events. All site plans shall note installation of required irrigation. **Add note to all plans. (Comment remains as a notation. This requirement was acknowledged by the applicant’s engineer in the response letter provided to the first review).**
- **Six-inch straight-faced (vertical) curb of concrete construction shall be used around landscape and parking areas. The standard Michigan Department of Transportation (MDOT) detail for six-inch straight-faced curb shall be provided on Sheet C-9 of the site plan. (Comment addressed. MDOT standard curb details have been added to Sheet C-9 of the plans).**
- **The zoning ordinance requires a land form buffer, buffer strip and obscuring fence, or screen wall between the subject site and the property to the west. No screening as previously described is proposed; therefore, a variance for the west screening is required from the Zoning Board of Appeals. (Comment addressed. A six-foot-tall vinyl fence has been proposed. If the project proceeds to final site plan, a fence detail shall be provided).**
- **Note 2 on the landscape plan mentions seed, and sod is required. (Comment addressed. Note 2 has been revised to indicate sod).**
- **Note 3 on the landscape plan mentions mulch. The zoning ordinance states the mulch product itself shall be at least doubled-shredded quality. (Comment addressed. Note 3 has been revised to specify double-shredded quality).**
- All required landscape areas in excess of 200 square feet must be irrigated to assist in maintaining a healthy condition for all landscape plantings and lawn areas. **An irrigation plan shall be required at final site plan. (Comment remains as a notation. This requirement was acknowledged by the applicant’s engineer in the response letter provided to the first review).**

Signs

The site plan does not show the location of a monument sign along Highland Road. Exterior elevations show two wall signs on the building (both on the parapet tower (north side and west side)). A maximum of one wall sign is permitted for each principal building; the one permitted wall sign must be located flat against the building's front facade or parallel to the front facade on a canopy. Total area of a wall sign cannot exceed 10 percent of the front facade of the building. **The wall sign on the west elevation shall be removed, or a variance is required from the Zoning Board of Appeals. (Comment remains as a notation. The response letter provided to the first review indicated the west wall sign is to be removed. Revised elevations are to be provided at final site plan).** Additionally, wall signs cannot extend above the roofline of a building. **A variance from the Zoning Board of Appeals is required to install a wall sign extending above the roofline of the building. (Comment outstanding; however, the applicant intends to seek a variance from the Zoning Board of Appeals).**

Planning Commission Options / Recommendation

The Planning Commission may recommend approval, approval with conditions, or denial of the preliminary site plan to the Township Board; action on the special land use is determined by the Planning Commission. **Staff recommends the plans be revised and resubmitted to address the items identified in this memorandum. A list of any requested variances shall also be provided. (Staff recommends the project is eligible for consideration by the Planning Commission. Any recommendation of approval of the preliminary site plan or approval of the special land use shall be conditioned on the applicant addressing all staff and consultant review comments and recommendations, and requesting and receiving the necessary variances from the Zoning Board of Appeals).**

Notes:

1. A notarized signature of the property owner shall be provided on the site plan application. Evidence, satisfactory to the Township Attorney, that the signatories on the application are authorized to execute on behalf of the property owner and applicant shall be a condition of any approvals.
 - a. Paragraph 5.h of the Operating Agreement of the LLC provides the Assistant Managers with authority to execute development documents related to a property only “Upon the Manager’s approval of a letter of intent or other document evidencing the approval of the acquisition of a parcel or parcels of real property (and such document being hereinafter referred to as an “LOI”) ...”
 - b. The LOI provided for the subject property is not signed by a Manager, but an Assistant Manager. Without the “Manager’s approval of the LOI,” the Assistant Managers are without authority to take any action related to the development of the subject property.
2. A date (including revision dates) shall be provided on the exterior elevations and floor plan. Said plans shall also be sealed by the Registered Architect who prepared the plans.



Fire Department
Charter Township
of White Lake

Site / Construction Plan Review

To: Sean O'Neil, Planning Department Director

Date: 3/21/2022

Project: Hypershine Auto Wash

Project ID #: DET-210462

Date on Plans: 3/16/2022

The Fire Department has the following comments with regards to the 2nd Review of Hypershine Auto Wash.

1. The access layout has the potential (depending on customer demand) to completely block fire department access, forcing the apparatus to remain and operate off of Highland Rd.
2. Customer approach and departure is likely to create traffic since there is only one means of site access.
3. The North drive exceeds the 150 feet threshold for dead-end fire apparatus access roads, and will require an approved turnaround. Dead-end fire apparatus access roads in excess of 150 feet shall be provided with width and turnaround provisions in accordance with table D103.4. (120-foot hammerhead, 60 foot "Y" or 96-foot diameter cul-de-sac).

Jason Hanifen
Fire Marshal
Charter Township of White Lake
(248)698-3993
jhanifen@whitelaketwp.com

Plans are reviewed using the International Fire Code (IFC), 2015 Edition and Referenced NFPA Standards.

Assessing Department

Memo

To: Sean O'Neil, Planning

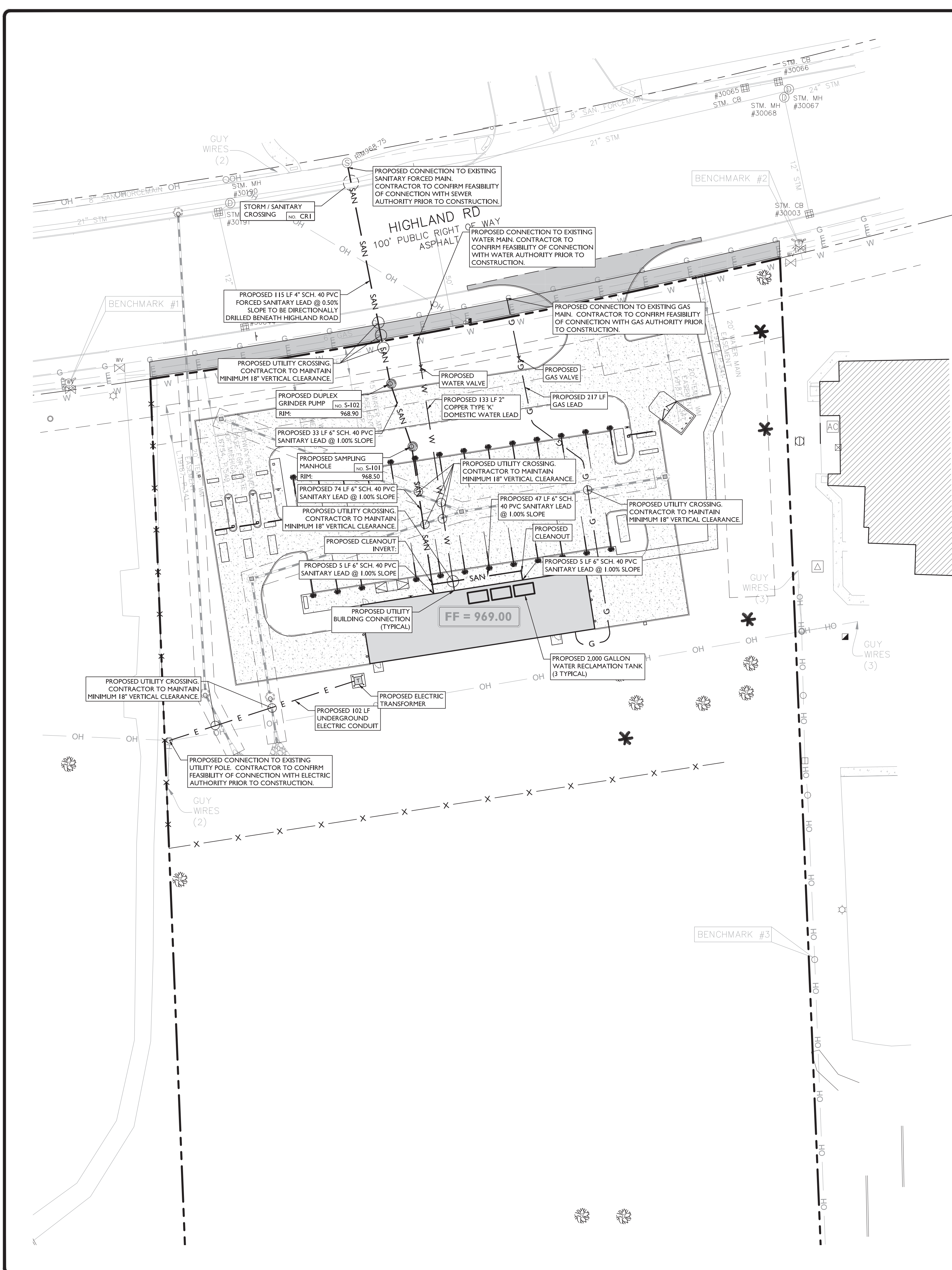
From: Jeanine A Smith

Date: March 21, 2022

Re: Project Name: Hypershine Car Wash File No: Parcel Number:12-23-201-006

Comments:

No comment.



SYMBOL	DESCRIPTION
---	PROPERTY LINE
SAN	PROPOSED SANITARY LATERAL
W	PROPOSED DOMESTIC WATER SERVICE
E	PROPOSED ELECTRIC CONDUITS
G	PROPOSED GAS LINE
⊗	PROPOSED VALVE
⊕	PROPOSED WATER TEE / BEND
⊙	PROPOSED SANITARY MANHOLE / CLEANOUT
⊠	PROPOSED TRANSFORMER ON CONCRETE PAD WITH BOLLARDS

REVISION	DATE	BY	DESCRIPTION
2	03/16/2022	ECH	REVISED PER SITE PLAN REVIEW #1
1	01/05/2022	BAC/ECH	FOR PRELIMINARY SITE PLAN APPROVAL

NOT APPROVED FOR CONSTRUCTION

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Princeton, NJ • Tampa, FL • Boston, MA
www.stonefielddesign.com

607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

HYPERSHINE

PROPOSED AUTO WASH

PARCEL ID: 12-23-202-2006
9345 HIGHLAND ROAD (M-59)
WHITE LAKE TOWNSHIP
OAKLAND COUNTY, MICHIGAN

STATE OF MICHIGAN
MICHAEL J. COFFEY
REGISTERED PROFESSIONAL ENGINEER
No. 043123
LIFE MEMBER

STONEFIELD
engineering & design

SCALE: 1" = 30' PROJECT ID: DET-210462

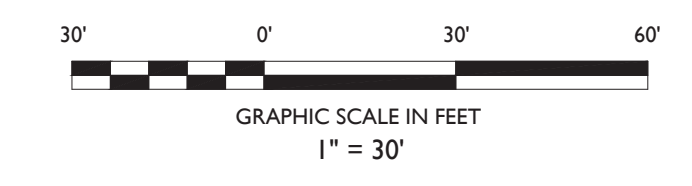
TITLE: **UTILITY PLAN**

DRAWING: **C-5**

MANHOLE SCHEDULE

#	TYPE	RIM (FT)	SIZE (IN)	DIRECTION	INVERT (FT)
30003	CATCH BASIN	969.98	12	N	963.48
30044	CATCH BASIN	970.93	12	N	962.93
30065	CATCH BASIN	967.54	12	E	962.74
30066	CATCH BASIN	967.63	12	W	962.63
30067	STORM MANHOLE	967.78	12	SE	962.63
			12	SW	962.03
			12	NW	962.28
			24	E	959.38
			21	W	959.43
30068	STORM MANHOLE	967.89	12	S	962.39
			12	NE	962.29
30190	STORM MANHOLE	969.35	12	SW	961.53
			21	E	960.97
			21	W	960.90
30191	CATCH BASIN	968.78	12	NE	962.08
			12	S	962.28

- DRAINAGE AND UTILITY NOTES**
- THE CONTRACTOR IS REQUIRED TO CALL THE APPROPRIATE AUTHORITY FOR NOTICE OF CONSTRUCTION/EXCAVATION AND UTILITY MARK OUT PRIOR TO THE START OF CONSTRUCTION IN ACCORDANCE WITH STATE LAW. CONTRACTOR IS REQUIRED TO CONFIRM THE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES IN THE FIELD. SHOULD A DISCREPANCY EXIST BETWEEN THE FIELD LOCATION OF A UTILITY AND THE LOCATION SHOWN ON THE PLAN SET OR SURVEY, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC IMMEDIATELY IN WRITING.
 - THE CONTRACTOR IS RESPONSIBLE TO PROTECT AND MAINTAIN IN OPERATION ALL UTILITIES NOT DESIGNATED TO BE REMOVED.
 - THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO ANY EXISTING UTILITY IDENTIFIED TO REMAIN WITHIN THE LIMITS OF THE PROPOSED WORK DURING CONSTRUCTION.
 - A MINIMUM HORIZONTAL SEPARATION OF 10 FEET IS REQUIRED BETWEEN ANY SANITARY SEWER SERVICE AND ANY WATER LINES. IF THIS SEPARATION CANNOT BE PROVIDED, A CONCRETE ENCASMENT SHALL BE UTILIZED FOR THE SANITARY SEWER SERVICE AS APPROVED BY STONEFIELD ENGINEERING & DESIGN, LLC.
 - ALL WATER LINES SHALL BE VERTICALLY SEPARATED ABOVE SANITARY SEWER LINES BY A MINIMUM DISTANCE OF 18 INCHES. IF THIS SEPARATION CANNOT BE PROVIDED, A CONCRETE ENCASMENT SHALL BE UTILIZED FOR THE SANITARY SEWER SERVICE AS APPROVED BY STONEFIELD ENGINEERING & DESIGN, LLC.
 - THE CONTRACTOR TO PERFORM A TEST PIT PRIOR TO CONSTRUCTION (RECOMMEND 30 DAYS PRIOR) AT LOCATIONS OF EXISTING UTILITY CROSSINGS FOR WATER AND SANITARY SEWER CONNECTION IMPROVEMENTS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC IN WRITING.
 - THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING GAS, ELECTRIC AND TELECOMMUNICATION CONNECTIONS WITH THE APPROPRIATE GOVERNING AUTHORITY.
 - CONTRACTOR SHALL START CONSTRUCTION OF ANY GRAVITY SEWER AT THE LOWEST INVERT AND WORK UP GRADIENT.
 - THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD SET OF PLANS REFLECTING THE LOCATION OF EXISTING UTILITIES THAT HAVE BEEN CAPPED, ABANDONED, OR RELOCATED BASED ON THE DEMOLITION/REMOVAL ACTIVITIES REQUIRED IN THIS PLAN SET. THIS DOCUMENT SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.
 - THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD OF THE AS-BUILT LOCATIONS OF ALL PROPOSED UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR SHALL NOTE ANY DISCREPANCIES BETWEEN THE AS-BUILT LOCATIONS AND THE LOCATIONS DEPICTED WITHIN THE PLAN SET. THIS RECORD SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.



NOTES: 1. IDENTIFY ALL UTILITIES ALONG HIGHLAND ROAD, WHITE LAKE TOWNSHIP, MICHIGAN. PHOTOGRAPH UTILITIES.

Mirada Medium Outdoor LED Area Light

ORDERING GUIDE

Back to Quick Links

TYPE: _____

TYPICAL ORDER EXAMPLE: **MRM LED 36L SIL FTA UNV DIM 50 70CR1 ALSCS04 BRZ IL**

Luminaire Profile	Light Source	Lumen Package	Light Output	Distribution	Orientation*	Voltage	Driver
MRM - Mirada	LED	7L - 7,000 lms 14L - 14,000 lms 17L - 17,000 lms 19L - 19,000 lms 24L - 24,000 lms 36L - 36,000 lms 42L - 42,000 lms 48L - 48,000 lms	SIL - Square	2 - Spot 2 3 - Type 3 SW - Type 5 Wide FT - Forward Throw FTM - Forward Throw Automotive AM - Automotive Manhandle	L - Optics rotated left 90° R - Optics rotated right 90°	UNV - Universal Voltage (120-277V) HV - High Voltage (347-480V)	DM - 0-10V Dimming (0-10%)

Color Temp	Color Rendering	Finish	Options
50 - 5,000 CCT 65 - 6,500 CCT 30 - 3,000 CCT AMB - Photocell Converted Amber**	70CRI - 70 CRI	BRZ - Bronze BLK - Black GPT - Graphite MSV - Metallic Silver WHT - White P/P - Platinum Plus SVG - Satin Verde Green	(Blank) - None IH - Integral Housecode Shield† IL - Integral Lens† (Legacy "SIL" Light Output)

Accessory Ordering Information*

Controls Accessories	Order Number*	Mounting Accessories*	Order Number*
PC120 Photocell for use with CRFP option (120V)	122514	Universal Mounting Bracket	684616LR
PC120-277 Photocell for use with CRFP option (208V/240V/277V)	122515	Adjustable Slip Fitter (F - 2.38" Taper)	688130LR
Test Lock Photocell (240V) for use with CRFP†	122516	Enclosed Slip Fitter (F - 2.38" Taper)	682510LR
Test Lock Photocell (240V) for use with CRFP†	122518	Quick Mount Pole Bracket (Square Pole)	687010LR
ArtLink 5 Pin Test Lock Controller†	681409	Quick Mount Pole Bracket (4.5" Round Pole)	688910LR
ArtLink 7 Pin Test Lock Controller†	681410	T5 T8 Quick Mount Pole Bracket (Square Pole)	689010LR
PM0524 24V Pin-Mounted Occupancy Sensor (24V)	682842LR	T5 T8 Quick Mount Pole Bracket (4.5" Round Pole)	688910LR
Shorting Cap for use with CRFP	148329	Wall Mount Bracket	382130LR
		Wood Pole Bracket (6" Minimum Pole Diameter)	711219LR

FOOTNOTES:

- Custom lumen and wattage packages available, consult factory. Values are within industry standard tolerances but not DLC listed.
- Not available with 5W distribution.
- Consult Factory for availability.
- Not available in HV.
- IMSBT is field configurable via the LSI app that can be downloaded from your smartphone's native app store.
- Control device or shorting cap must be ordered separately. See Accessory Ordering Information.
- Accessories are shipped separately and field install.
- Factory installed CRFP option required. See Options.
- "CCT" denotes Finish. See Finish options.
- Only available with ALS/ALSC/ALSC/ALSC control options.
- Fusing must be located in hand hole of pole.
- Only available in 9L and 12L Lumen Packages. Consult factory for lead time and availability.
- Only available in 9L and 12L Lumen Packages. Consult factory for lead time and availability.

Mirada Wall Sconce (XWM)

ORDERING GUIDE

Back to Quick Links

TYPE: _____

TYPICAL ORDER EXAMPLE: **XWM 2 LED 03L 30 UE BRZ ALSC**

Luminaire Profile	Distribution	LED Technology	Lumen Package	Color Temperature	Voltage
XWM - Mirada Wall Sconce	2 - Type 2 3 - Type 3 FT - Type 4 Forward Throw	LED	0L - 0,000 lms 1L - 1,000 lms 4L - 4,000 lms 6L - 6,000 lms 8L - 8,000 lms 12L - 12,000 lms	AL - 4,000K 40 - 4,000K 50 - 5,000K	UE - Universal Voltage (120-277V) HV - High Voltage (347-480V)

Finish	Controls (Choose One)	Options
BRZ - Bronze BLK - Black GPT - Graphite MSV - Metallic Silver WHT - White P/P - Platinum Plus SVG - Satin Verde Green	Wireless Controls ALSC - ArtLink Synapse Control System† ALSC01 - ArtLink Synapse Control System with 8-12' Motion Sensor† ALSC02 - ArtLink Synapse Control System with 12-20' Motion Sensor† ALSC03 - ArtLink Blue Wireless Motion & Photo Sensor Controller (8-24' mounting height)† ALSC04 - ArtLink Blue Wireless Motion & Photo Sensor Controller (25-40' mounting height)† Standalone Controls DM - 0-10V Dimming leads extended to housing exterior IMSBT1 - Integral Bluetooth™ Motion and Photo Sensor max 8-24' mounting height† IMSBT2 - Integral Bluetooth™ Motion and Photo Sensor max 25-40' mounting height† Button Type Photocells PC120 - 120V PC120-277 - 208 - 277V PC124 - 347V	BB - Battery Back-up† CWB - Cold Weather Battery Backup† XPM - Pole Mounting Bracket SP1 - 10kV Surge Protection TB - Terminal Block

Accessory Ordering Information*

Description	Order Number	Description	Order Number
XWM SW BLK - Surface Wiring Box (Available in black only)	356915BLK	DK - Double Fusing	DFK20P
FK10P - Single Fusing	FK10P	DK - Double Fusing (240V)	DFK24P
FK27P - Single Fusing	FK27P	DK - Double Fusing (480V)	DFK48P
FK34P - Single Fusing	FK34P	10' Linear Bird Spike Kit (2' Recommended per Luminaire)	736795

FOOTNOTES:

- Consult Factory for availability.
- Not available in HV.
- Consult Factory for Site Layout.
- IMSBT is field configurable via the LSI app that can be downloaded from your smartphone's native app store.
- Fusing must be located in a hand hole for pole or in the junction box.
- Custom lumen and wattage packages available consult factory. Values are within industry standard tolerances but not DLC listed.

Luminaire Shown with IMSBT

Mirada Wall Sconce (XWM)

ORDERING GUIDE

Back to Quick Links

TYPE: _____

TYPICAL ORDER EXAMPLE: **XWM 2 LED 03L 30 UE BRZ ALSC**

Luminaire Profile	Distribution	LED Technology	Lumen Package	Color Temperature	Voltage
XWM - Mirada Wall Sconce	2 - Type 2 3 - Type 3 FT - Type 4 Forward Throw	LED	0L - 0,000 lms 1L - 1,000 lms 4L - 4,000 lms 6L - 6,000 lms 8L - 8,000 lms 12L - 12,000 lms	AL - 4,000K 40 - 4,000K 50 - 5,000K	UE - Universal Voltage (120-277V) HV - High Voltage (347-480V)

Finish	Controls (Choose One)	Options
BRZ - Bronze BLK - Black GPT - Graphite MSV - Metallic Silver WHT - White P/P - Platinum Plus SVG - Satin Verde Green	Wireless Controls ALSC - ArtLink Synapse Control System† ALSC01 - ArtLink Synapse Control System with 8-12' Motion Sensor† ALSC02 - ArtLink Synapse Control System with 12-20' Motion Sensor† ALSC03 - ArtLink Blue Wireless Motion & Photo Sensor Controller (8-24' mounting height)† ALSC04 - ArtLink Blue Wireless Motion & Photo Sensor Controller (25-40' mounting height)† Standalone Controls DM - 0-10V Dimming leads extended to housing exterior IMSBT1 - Integral Bluetooth™ Motion and Photo Sensor max 8-24' mounting height† IMSBT2 - Integral Bluetooth™ Motion and Photo Sensor max 25-40' mounting height† Button Type Photocells PC120 - 120V PC120-277 - 208 - 277V PC124 - 347V	BB - Battery Back-up† CWB - Cold Weather Battery Backup† XPM - Pole Mounting Bracket SP1 - 10kV Surge Protection TB - Terminal Block

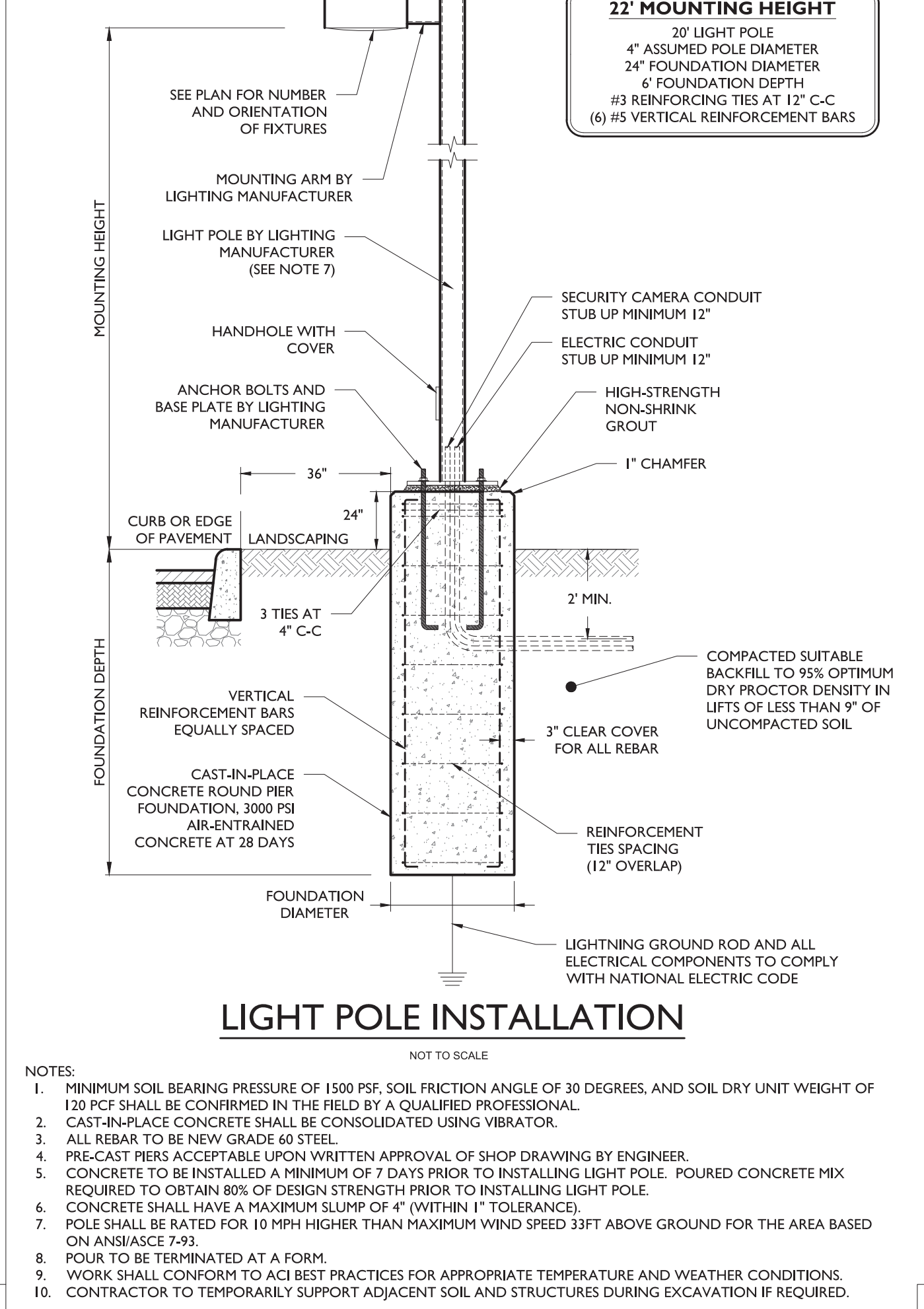
Accessory Ordering Information*

Description	Order Number	Description	Order Number
XWM SW BLK - Surface Wiring Box (Available in black only)	356915BLK	DK - Double Fusing	DFK20P
FK10P - Single Fusing	FK10P	DK - Double Fusing (240V)	DFK24P
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FK34P - Single Fusing	FK34P	10' Linear Bird Spike Kit (2' Recommended per Luminaire)	736795

FOOTNOTES:

- Consult Factory for availability.
- Not available in HV.
- Consult Factory for Site Layout.
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- Fusing must be located in a hand hole for pole or in the junction box.
- Custom lumen and wattage packages available consult factory. Values are within industry standard tolerances but not DLC listed.

Luminaire Shown with IMSBT



SPECIFICATIONS FOR FIXTURES 'A' - 'E'

NOT TO SCALE

SPECIFICATIONS FOR FIXTURE 'F'

NOT TO SCALE

SPECIFICATIONS FOR FIXTURE 'G'

NOT TO SCALE

REVISED PER SITE PLAN REVIEW #1	ECH	DATE	BY	DESCRIPTION
2	03/16/2022			
1	01/03/2022			

NOT APPROVED FOR CONSTRUCTION

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607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

HYBERSHINE

PROPOSED AUTO WASH

PARCEL ID: 12-23-202-006
9145 HIGHLAND ROAD (M-59)
WHITE LAKE TOWNSHIP
OAKLAND COUNTY, MICHIGAN

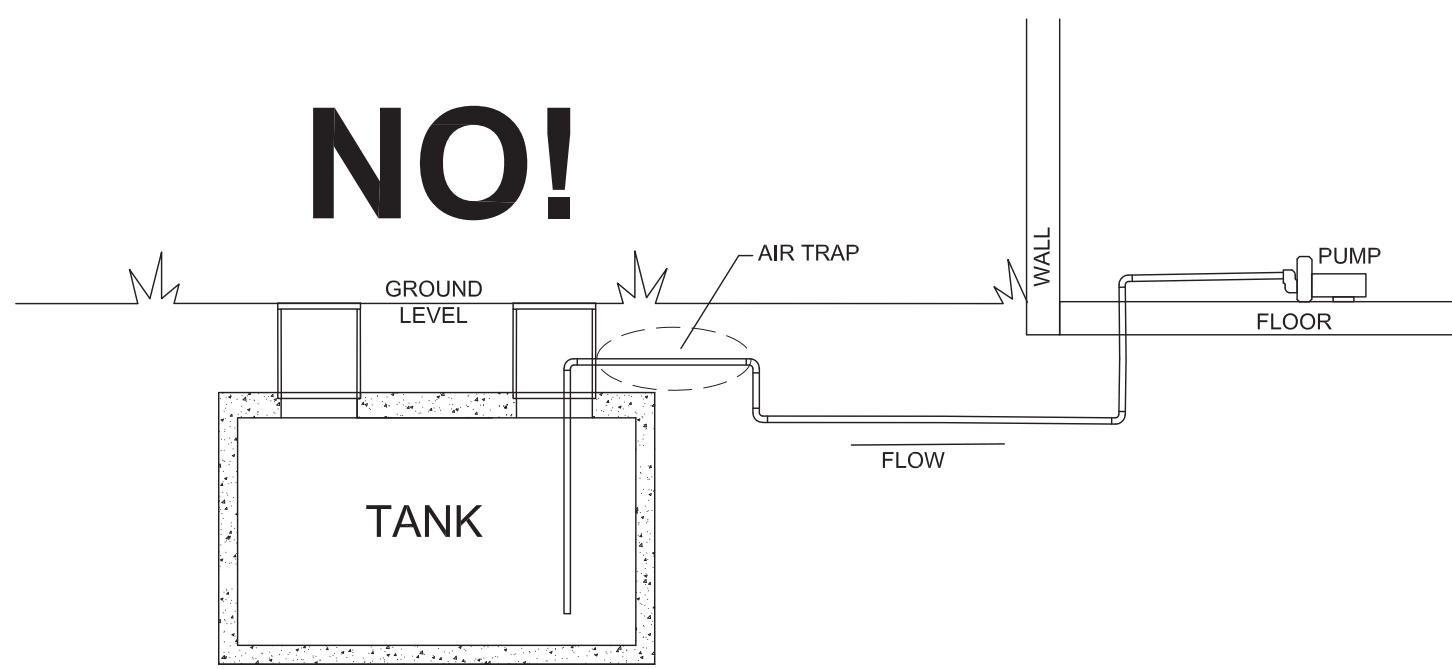


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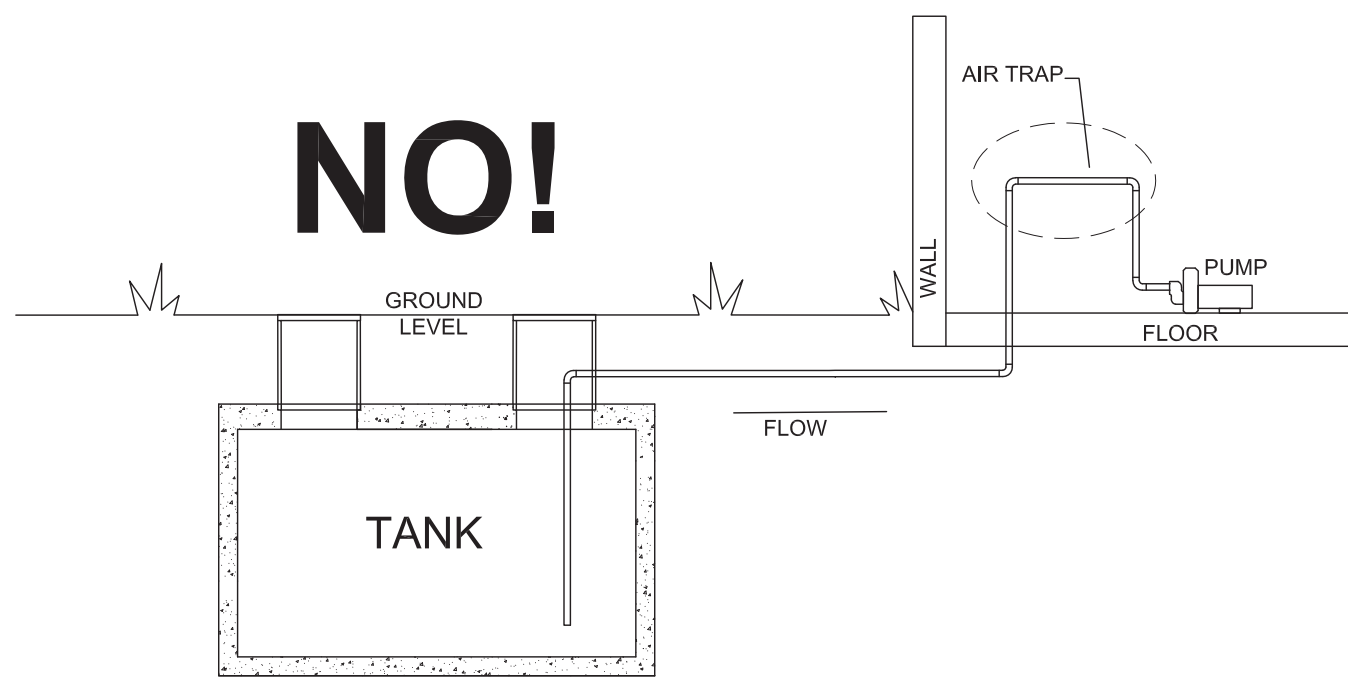
SCALE: AS SHOWN PROJECT ID: DET-210462

TITLE:
CONSTRUCTION DETAILS

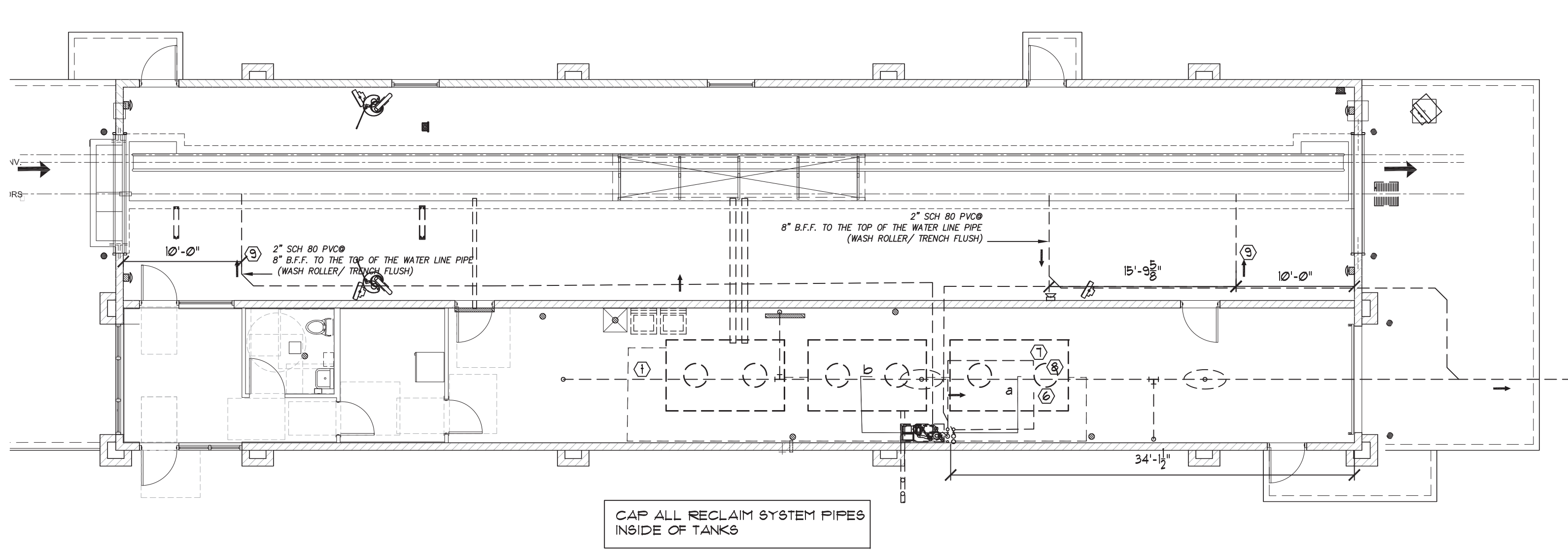
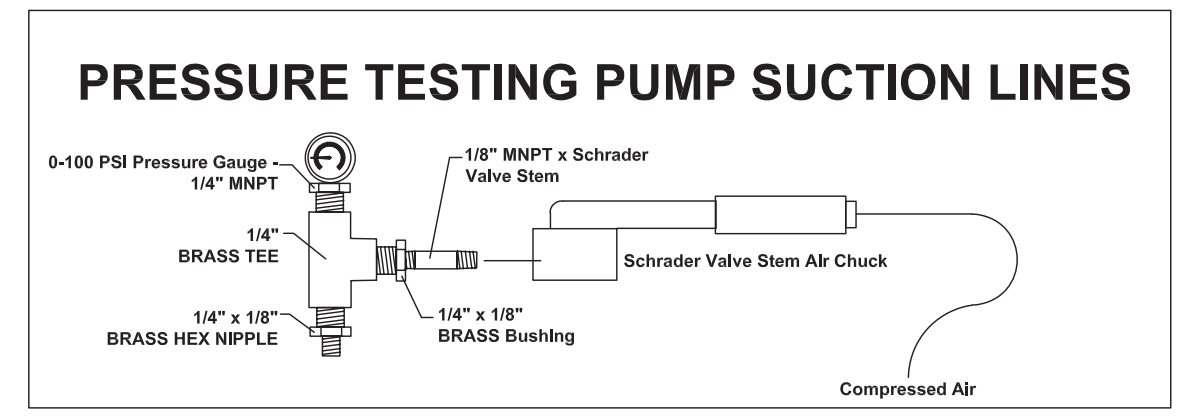
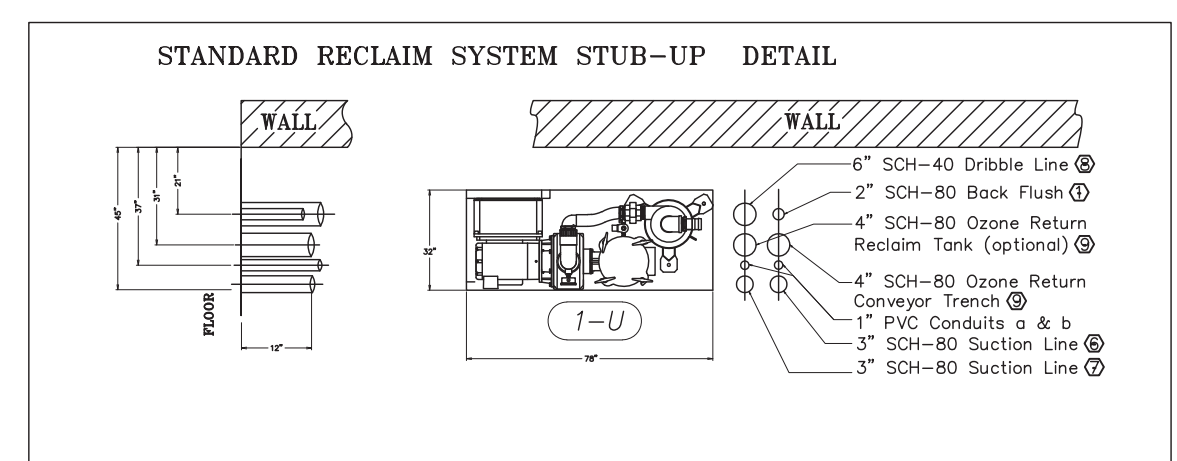
DRAWING:
C-10



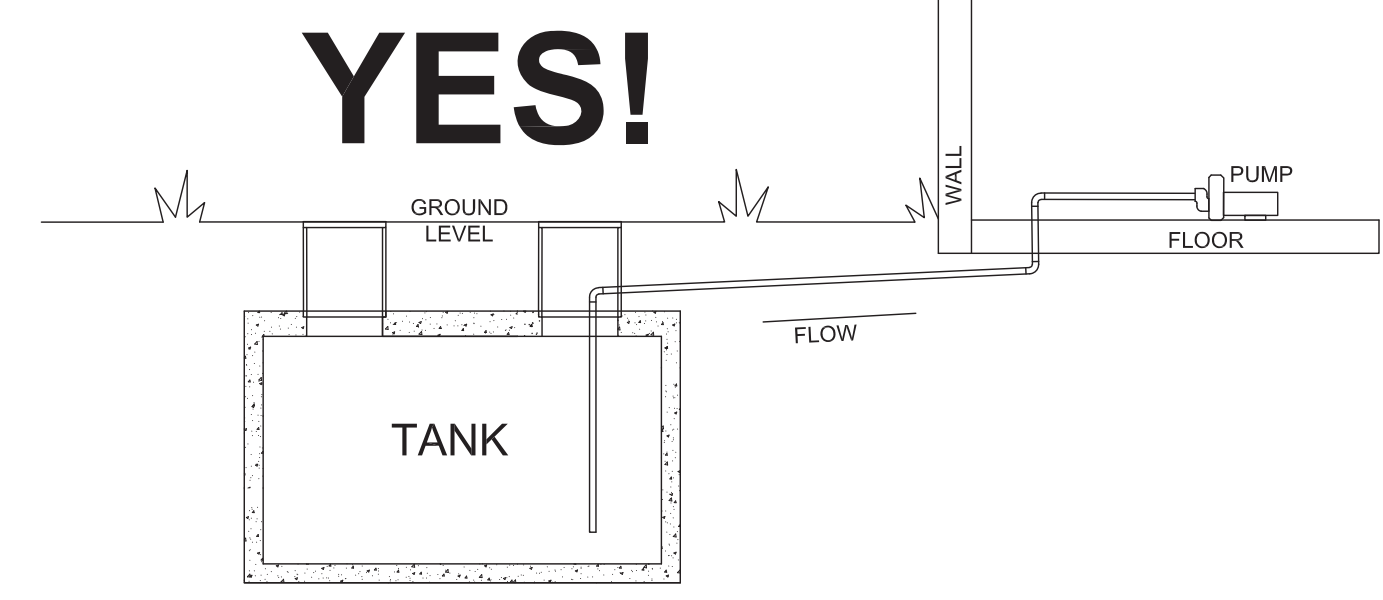
BELOW GROUND TANKS
ALL suction lines must NEVER slope down and then back up again (Air Trap).



BELOW GROUND TANKS
ALL suction lines must NEVER slope up and then back down again (Air Trap).

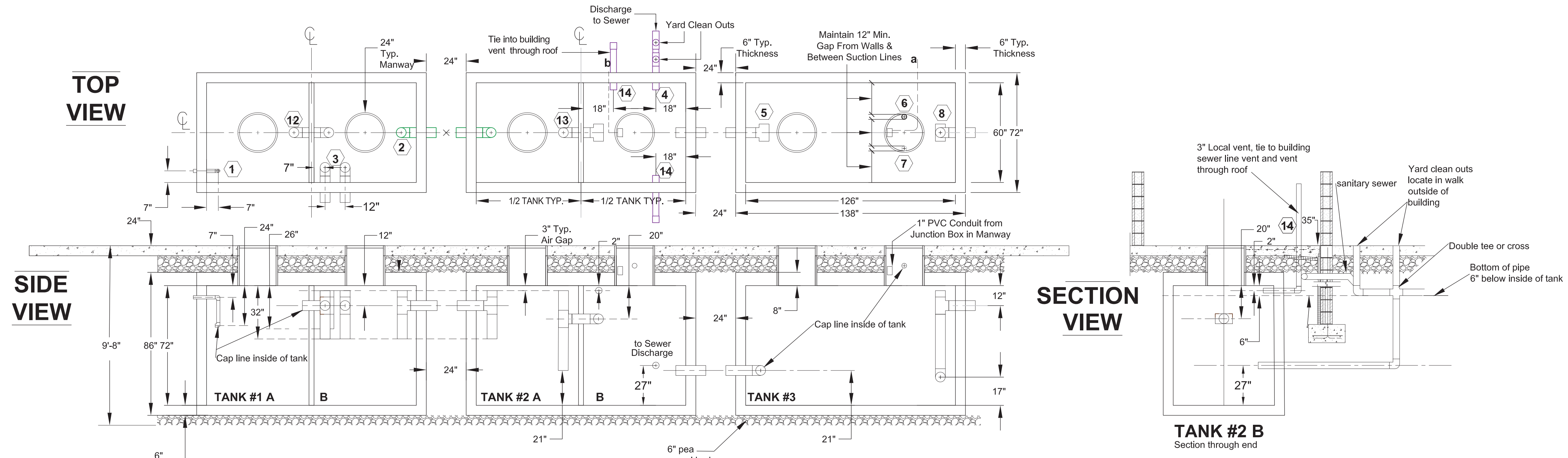


RECLAIM SYSTEM PLAN
SCALE: 1/8" = 1'-0"



BELOW GROUND TANKS
ALL suction lines require a continuous upward slope to the Equipment Room.

Three 2,000 Gallon Precast Concrete Tanks



THREE 2,000-GALLON PRECAST CONCRETE TANKS
138" Length x 72" Width x 86" Height

- TANK #1 - 1A Underflow - 1B Primary Settlement
TANK #2 - Secondary Settlement w/ Baffle
TANK #3 - Future use
- PLUMBING LEGEND**
- 1 - 2" sch 80 PVC Pipe - Underflow Discharge - To TANK 1A
 - 2 - 6" sch 40 PVC Pipe - External Crossover - From TANK 1B to TANK 2A
 - 3 - Two 6" sch 40 PVC Pipes - Center Trench - To TANK 1B
 - 4 - 6" sch 40 PVC Pipe - Discharge to Sewer - From TANK 2B
 - 5 - 6" sch 40 PVC Pipe - External Crossover - From TANK 2B to TANK 3
 - 6 - 3" sch 80 PVC Pipe - Filter Pump Suction Line - From TANK 3
 - 7 - 3" sch 80 PVC Pipe - Optional Extra Suction Line - From TANK 3
 - 8 - 6" sch 40 PVC Pipe - AquaPrep Discharge - To TANK 3
 - 12 - 6" sch 40 PVC Pipe - Internal Crossover - From TANK 1A to TANK 1B
 - 13 - 6" sch 40 PVC Pipe - Internal Crossover - From TANK 2A to TANK 2B
 - 14 - 3" sch 40 PVC Pipe - Local Vent - from TANK 2B, Tie into building vent and exit through roof
- ELECTRICAL LEGEND**
- a - 1" PVC Conduit - Low Water Protection Float Switch (FS-2) - TANK 3
 - b - 1" PVC Conduit - FOR FUTURE USE - TANK 2B

- NOTES:**
- All underground plumbing & tanks by other.
 - Actual tank dimensions may vary.
 - Plumbing should be placed as shown regardless of what tanks are used.
 - All pipes must be set below frost line.
 - Suction lines MUST be sch 80 PVC.
 - Do NOT install screens on foot valve.
 - All tank bottoms should be same elevation.
 - Consult engineer for elevations.

DRAWING NOT TO SCALE

(If Foot Valve is Raised, The Float Switch Also Needs to be Raised) Keep a 10" Distance Between Them!

BOTTOM OF TANK TOPS @ 32" B.F.F., TYP.

Item B.

REB ARCHITECTS

103 WIND HAVEN DR, STE 101
NICHOLASVILLE KY 40356
859.523.1500

REVISION	DATE

xx/xx/xx
Permit Set

PROJECT NUMBER

DRAWN BY: REB

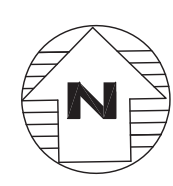
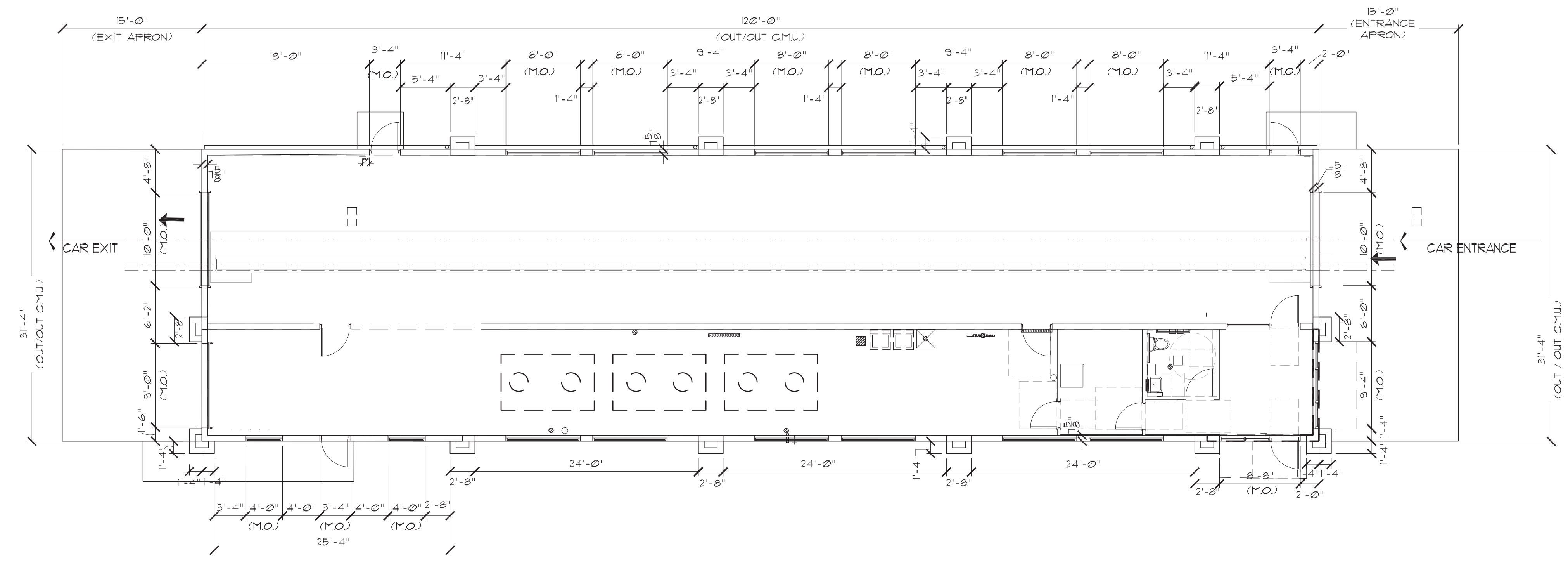
Hypershine Carwash
2703 E. Grand River
East Lansing MI 48823

Tank details & Stub up locations future sys.

Not for Construction



103 WIND HAVEN DR, STE 101
NICHOLASVILLE KY 40356
859.523.1500



OVERALL FLOOR PLAN

(REFER TO SHEETS A-1.1 AND A-1.2 FOR PARTIAL ENLARGED FLOOR PLANS, SEE SHEET A-1.3 FOR INTERIOR ELEVATIONS)

SCALE: 1/8" = 1'-0"

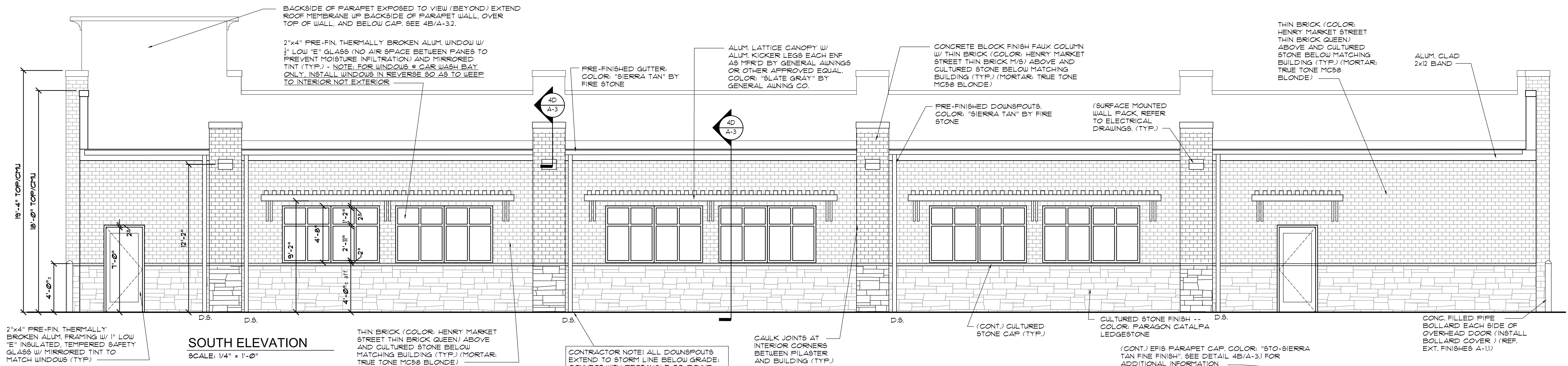
GENERAL FLOOR PLAN NOTES:

- 1. ALL DIMENSIONS ARE TAKEN TO FACE OF CMU OR STUD UNLESS NOTED OTHERWISE.
2. CONTRACTOR SHALL PROVIDE AND INSTALL FIRE TREATED WOOD SUPPORT BLOCKING OR 16 GA. STEEL PLATE BLOCKING IN ALL WALLS RECEIVING ANCHORS OF CASEWORK, SHELVING, GRAB BARS AND THE LIKE. REFER TO PLANS AND COORDINATE W/ OWNER PRIOR TO CONCEALING WALLS. ADDITIONALLY, COORDINATE WITH ALL OTHER TRADES TO DETERMINE LOCATIONS OF ADDITIONAL STEEL STUDS.
3. NEW TOILET ROOM SHALL BE CONSTRUCTED IN ACCORDANCE WITH 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN (ADAAG) INCLUDING BUT NOT LIMITED TO GRAB BARS, FIXTURE HEIGHTS, CLEAR FLOOR ACCESS, AND 60" DIAMETER TURN AROUND.
4. CONTRACTOR SHALL INSTALL NEW GYPSUM BOARD INSTALLATIONS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS FOR LOCATING GYPSUM BOARD CONTROL AND EXPANSION JOINTS. EXPANSION JOINTS SHALL NOT EXCEED 30'-0" O.C.
5. ALL INTERIOR WALLS (EXCEPT PLUMBING WALLS) SHALL BE ASSUMED TO BE 3 5/8" STEEL STUDS (NON COMBUSTIBLE) @ 16" O.C. WITH 5/8" WATER RESISTANT GYP. BD. EACH SIDE UNLESS OTHERWISE NOTED. PLUMBING WALLS SHALL BE 6" STEEL STUDS.
6. ALL DOORS SHALL BE EQUIPPED WITH LEVER STYLE LATCH (UNLESS NOTED OTHERWISE) IN ACCORDANCE WITH ADAAG (ACCESSIBILITY) GUIDELINES. ALL LOCK SETS SHALL BE PUSHBUTTON TYPE LOCKING MECHANISMS OR EQUIVALENT. INTERIOR KEYED LOCKS ARE NOT ALLOWED.
7. CONTRACTORS SHALL COORDINATE THEIR RESPECTIVE WORK WITH OTHER TRADES AND SHALL PROVIDE REQUIRED SUB SLAB PIPING, CONDUIT, PLUMBING, FIRE SLEEVES, FLOOR DRAINS AND THE LIKE AS REQUIRED PRIOR TO POURING NEW INTERIOR CONCRETE SLAB.
8. ALL WOOD BLOCKING AND/OR PLYWOOD/OSB INSTALLED IN CONCEALED PLACES SHALL BE OF THE FRTU TYPE (FIRE TREATED).
9. ALL NEW INSULATION SHALL HAVE A MAXIMUM FLAME SPREAD OF 25. SMOKE DEVELOPMENT RATINGS FOR ALL NEW INSULATION SHALL NOT EXCEED 450 (TYP.).
10. TENANT SHALL FURNISH BOTTLED WATER IN LIEU OF A WATER COOLER.
11. FIRE EXTINGUISHERS:
A. PORTABLE FIRE EXTINGUISHERS SHALL BE PROVIDED ON SITE FOR THE DURATION OF CONSTRUCTION. EXTINGUISHERS SHALL BEAR THE LABEL OF AN APPROVED AGENCY.
B. PERMANENT FIRE EXTINGUISHER (FE). PORTABLE FIRE EXTINGUISHER(S) SHALL BE PROVIDED ON SITE ON A PERMANENT BASIS, BEARING THE LABEL OF AN APPROVED AGENCY. EXTINGUISHER(S) SHALL BE WALL HUNG W/ MFR'S STANDARD WALL BRACKET. LOCATIONS INDICATED ON PLANS ARE SCHEMATIC AND SUBJECT TO CHANGE PER LOCAL AUTHORITY'S REQUIREMENTS/DIRECTION.
C. THE MAXIMUM TRAVEL DISTANCE TO A PERMANENT FIRE EXTINGUISHER SHALL NOT EXCEED 75 FEET. ADDITIONALLY, FIRE EXTINGUISHERS SHALL BE LOCATED WHERE THEY WILL BE READILY ACCESSIBLE AND IMMEDIATELY AVAILABLE FOR USE AND SHALL NOT BE OBSTRUCTED OR OBSCURED FROM VIEW. THESE LOCATIONS SHALL BE AMONG NORMAL PATHS OF TRAVEL.
12. TEMPERED SAFETY GLAZING SHALL BE PROVIDED IN ACCORDANCE WITH CODE INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
A. WITHIN 24 INCH ARC ALONG THE VERTICAL EDGE OF A DOOR.
B. IN ANY GLASS PANEL THAT IS 18 INCHES OR LESS ABOVE AN ADJACENT WALKING SURFACE AND IS (9) SQUARE FEET OR LARGER IN AREA.
13. ANY TRANSACTION AND/OR SERVICE COUNTERS USED FOR TRANSACTION OF SELLING MERCHANDISE, MAKING PAYMENTS OR OTHER SIMILAR TYPES OF TRANSACTIONS SHALL HAVE A 3'-0" (MINIMUM) SECTION OF SAID COUNTER NOT EXCEEDING 2'-10" AFF. FOR USE BY THE PHYSICALLY DISABLED.
14. ALL INTERIOR FINISHES SHALL COMPLY WITH THE MICHIGAN BUILDING CODE (MBC) FOR FLAME SPREAD AND SMOKE DEVELOPMENT RATINGS FOR (B) BUSINESS USE GROUP 46 FOLLOWS:
A. CORRIDORS = "B" FLAME SPREAD OF 26-75; SMOKE DEVELOPMENT = 0-450
B. ENCLOSED ROOMS/SPACES = "C" FLAME SPREAD OF 16-200; SMOKE DEVELOPMENT = 0-450
15. ALL CAR WASH EQUIPMENT SHOWN IN ARCHITECTURAL PLANS AND/OR NOTED IN WASH BAY AND MECHANICAL ROOM SHOULD BE CONSIDERED SCHEMATIC AND ONLY FOR REFERENCE. CONTRACTOR SHALL REFER TO AND COORDINATE WITH CAR WASH EQUIPMENT DRAWINGS FURNISHED BY OTHERS FOR FINAL EQUIPMENT LAYOUT.

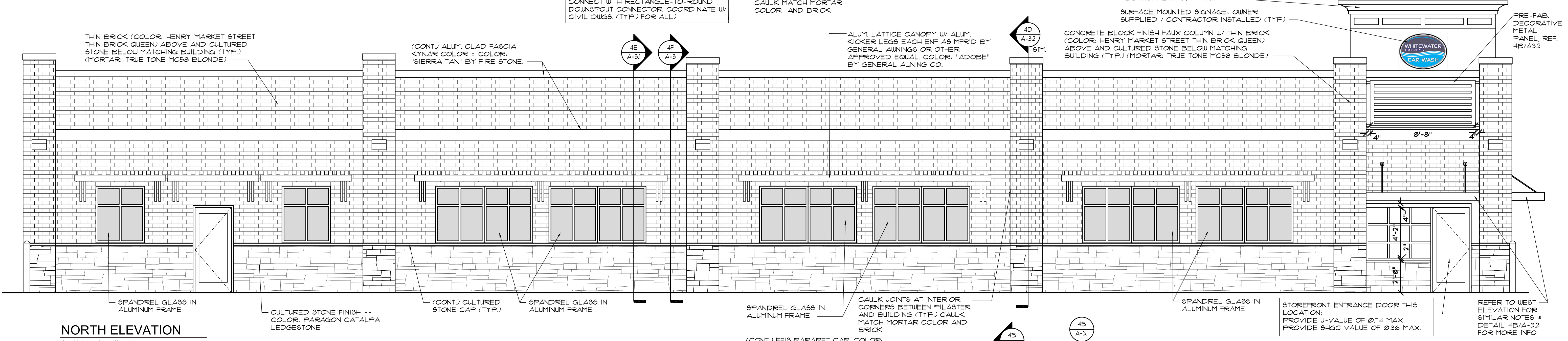
BUILDING INTERIOR SIGNAGE SCHEDULE:

- PROVIDE THE FOLLOWING INTERIOR SIGNAGE:
A. TOILET ROOM: PROVIDE ADA TACTILE RAISED BRAILLE UNISEX RESTROOM SIGN, ADJACENT TO DOOR. REFER TO DETAIL ON SHEET G-2.
B. BUILDING EGRESS (EXIT) DOORS: PROVIDE ADA TACTILE RAISED BRAILLE SIGN STATING "EXIT" AND COMPLYING WITH ICC A117.1 ADJACENT TO EACH BUILDING EXIT DOOR. REFER DETAIL ON SHEET G-2.

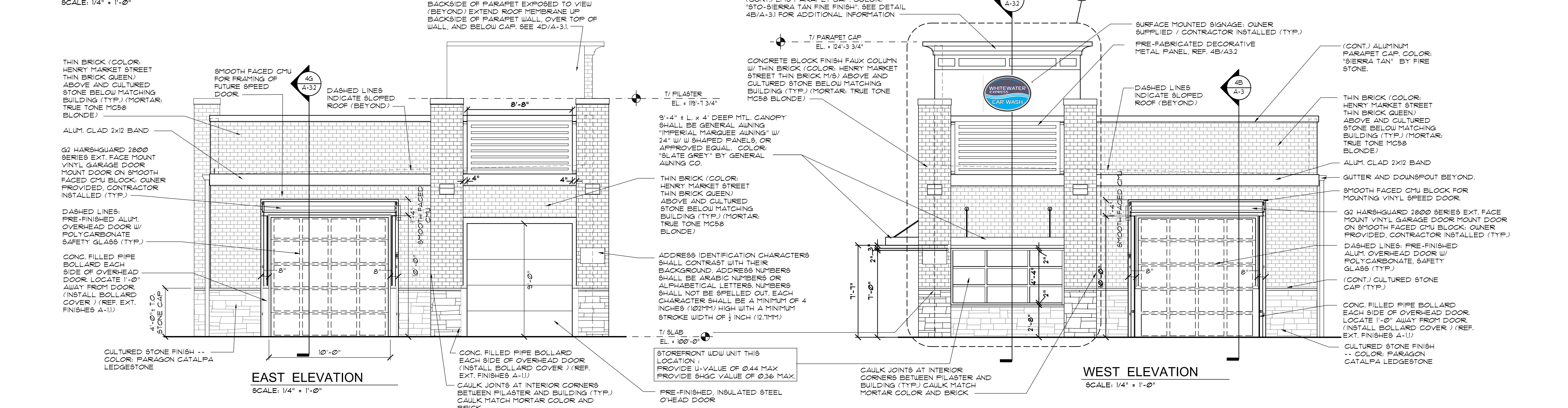
Hypershine Carwash
9345 Highland Rd.
White Lake, MI 48386
Floor Plan



SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



NORTH ELEVATION
SCALE: 1/4" = 1'-0"



EAST ELEVATION
SCALE: 1/4" = 1'-0"

WEST ELEVATION
SCALE: 1/4" = 1'-0"

Item B

Not for Construction

103 WIND HAVEN DR, STE 101
NICHOLASVILLE KY 40356
859.523.1500

REVISION	DATE

xx/xx/xx
Permit Set

PROJECT NUMBER

DRAWN BY: REB

Hypershine Carwash
9345 Highland Road
White Lake MI 48386

Exterior Elevations

SHEET NUMBER

A-2

307